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GENDER DISPARITIES IN THE MALAGASY LABOUR MARKET[1]

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Abstract

In this study, we address the issue of gender differences in labour market performances for Madagascar using data from two national household surveys carried out in 2001 and 2005. The data collected in these surveys allow us to measure the gender pay gap at two points in time, and to analyze the determinants of occupational choices across sectors of employment as well as of wages and earnings. Our results show that the average gender wage gap is relatively small and stable over time. Across wage employment sectors, the gender gap appears to be the lowest in the public sector and the highest in the informal sector. In non-farm self-employment, however, the gender earnings gap is much higher and declined between 2001 and 2005. Using full decomposition techniques, we provide evidence that gender specific sectoral location explains a significant share of the gender wage gap in both years. Augmented earnings equations estimates carried out for the non-farm self-employment sector suggest that the gap in this sector is driven by the very unequal distribution of micro-firm attributes between men and women. This results points to a potential source of earnings differential often ignored in the gender gap literature which is access to physical capital by women.

Key words: labour force participation, sectoral allocation, earnings equations, gender wage gap, Madagascar

Résumé

Dans cet article, nous analysons les différences de genre en matière de performances sur le marché du travail de Madagascar à l'aide d'enquêtes ménages menées au niveau national en 2001 et en 2005. Grâce à ces deux points dans le temps, nous examinons la dynamique des déterminants de l'allocation sectorielle et de l'écart de gains entre sexes. Nos résultats montrent que l'écart salarial moyen entre sexes est relativement faible et stable entre ces deux périodes. L'écart salarial est le plus faible dans le secteur public et le plus élevé dans le secteur informel. Pour les travailleurs indépendants hors-agriculture, l'écart de gains est beaucoup plus élevé et a décliné entre 2001 et 2005, une période de crise économique. A l'aide de décompositions de ces écarts, nous montrons que les différences de localisation sectorielle selon les sexes expliquent une grande part de l'écart de gains pour les deux années. L'estimation de fonctions de gains augmentées de caractéristiques des micro-entreprises des travailleurs indépendants suggère par ailleurs que l'écart de genre dans ce secteur s'explique en grande partie par une répartition inégale entre sexes des attributs des micro-entreprises, en particulier du capital physique. Ce résultat met en évidence une source potentielle de discrimination souvent ignorée dans la littérature, à savoir l'accès au capital physique par les femmes.

Mots clés: écart de genre, participation au marché du travail, allocation sectorielle, équations de gains, écart salarial de genre, Madagascar

JEL Classification: J24, J31, O12

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1. Introduction

Gender differences in terms of the labour market performances are common around the world. In the case of least developed countries, understanding the roots of inequalities between the sexes and reducing the gender gap is important since gender disparities have a potential negative impact for both broad-based growth and poverty reduction. Policies designed to reduce gender discrimination are indeed among the most often recommended solutions to reduce poverty: Goal 3 of the Millennium Development Goals (MDG) is specifically aimed at reducing gender inequalities and promotion of women empowerment is often among the aims of Poverty Reduction Strategies of many poor countries.

In developed countries, the gender wage gap has been the subject of an important area of labour economics research. More specifically, starting with the seminal methodological contributions of Oaxaca (1973) and Blinder (1973), many attempts have been made to estimate the extent to which the average gender wage gap is due to differences in human capital attributes, such as schooling and work experience, versus differences between genders in wages paid for given attributes (Blau and Kahn, 2000; Weichselbaumer and Winter-Ebmer, 2005). The part of the gender wage gap that is not explained by differences in observed endowments across genders (the unexplained portion of the gap) is often interpreted as the result of discrimination (see Appendix A for a definition).

For Africa, research on gender disparities in labour market outcomes is relatively recent and has followed similar methodological approaches. There is so far a wide consensus on the presence of important earnings inequalities between men and women, both for salaried and self-employed workers.[2] For instance, in Guinea, Glick and Sahn (1997) find that differences in characteristics account for 45 percent of the male-female gap in earnings from self-employment and 25 percent of the differences in earnings from public-sector employment while, in the private sector, women actually earn more than men. Armitage and Sabot (1991) also found that such gender inequality exists in the public sector of Tanzania but observed no gender “discrimination” in Kenya's labour market. The latter result is true both for the public and private sectors of the Kenyan economy. Similarly, Glewwe (1990) found no residual gender wage gap once individual characteristics are

[2] See, notably, Glewwe (1990) for Ghana; Cohen and House (1993) for Sudan; Milne and Neitzert (1994) and Agesa (1999) for Kenya; Glick and Sahn (1997) for Guinea; Lachaud (1997) for Burkina and Cameroun; Armitage and Sabot (1991) for Kenya and Tanzania; Appleton, Hoddinott and Krishnan (1999) for Uganda, Côte d'Ivoire and Ethiopia; Isemonger and Roberts (1999) for South Africa; Siphambe and Thokweng-Bakwena (2001) for Botswana; Kabubo-Mariara (2003) for Kenya; Nordman (2004) for Tunisia; Temesgen (2006) for Ethiopia; Kolev and Suarez Robles (2009) for Ethiopia; Nordman and Wolff (2009a) for Morocco; Nordman and Wolff (2009b) for Madagascar and Mauritius and Nordman and Roubaud (2009) for Madagascar.

accounted for in Ghana. On the contrary, females seem better off than males in the public sector. More recently, Siphambe and Thokweng-Bakwena (2001) show that in the public sector of Botswana most of the wage gap is due to differences in characteristics between men and women. On the other hand, in the private sector, most of the wage gap remains unexplained by workers' endowments. Likewise, in Uganda and Côte d'Ivoire, Appleton et al. (1999) find evidence that the public sector practises less wage discrimination than the private sector. However, from their data on Côte d'Ivoire, Ethiopia and Uganda, they conclude that there is no common cross-country pattern in the relative magnitudes of the gender wage gaps in the public and private sectors.[3]

There is however an important specificity of African countries labour markets that makes the interpretation of the unexplained part of the gender pay gap solely by discriminatory practices against women hazardous. This specificity is the large share of the labour force that is employed in nonwage activities in these countries. Besides, religion, ethnic issues and social norms are likely to also play a non-negligible role in gender disparities in labour market outcomes.

In the Malagasy case, the deterioration of the labour market as well as the partial freeze on public sector recruitment from the mid-1980s may have accentuated the circumstances (i.e. labour market entry and exit) that could give rise to gender inequalities in the labour market. Indeed, the decrease in jobs for women in the public sector was particularly significant while this sector offered the most rewarding labour market segment (Razafindrakoto and Roubaud, 1999; Roubaud, 2002). In this context, the predominance of the informal activity for women as well as the decreasing role of the public sector in providing stable jobs may have given rise to increased poverty and consequently to significant selection effects at the formal labour market entry.

In this paper, we cast new light on these issues by using household surveys carried out in 2001 and 2005 in Madagascar. In this country, the previous studies we are aware of are those of Nicita and Razzaz (2003), Nordman and Roubaud (2009) and Nordman and Wolff (2009b, 2009c). The first authors investigate the gender wage gap in relation to an analysis of the growing potential of a particular economic sector, the textile industry. From their earnings differential decomposition, they first show that both the endowments and the unexplained part of the wage difference favour male workers, although the latter dominates the former.[4] Second, education and potential experience are

[3] In Uganda, the authors find that the wage gaps in the public and private sector are comparable. In Ethiopia, there is a much wider gap in the private sector than in the public sector. In Côte d'Ivoire, the reverse is true.

[4] In 1999, the gross unadjusted wage differential is about 51 percent in favour of males. The results of the decomposition attribute about 14 percent to differences in endowments. The unexplained part accounts for about 59 percent of the wage differential, while the remaining 27 percent is due to selectivity.

similarly important in determining the wage differential. Third, level of education and being resident in urban Antananarivo slightly reduce the unexplained part of the wage differential. However, an important limitation of their study is that, as a result of lack of information, they proxy total experience by age and include very few regressors in their wage equations by sexes. As pointed out by some authors (e.g., Weichselbaumer and Winter-Ebmer, 2005; Nordman and Roubaud, 2009), this has the consequence of greatly amplifying the unexplained share of the gender pay gap.

By contrast, using linked worker-firm data from the manufacturing sectors, thereby enabling perfect controls of the employer effects on earnings, Nordman and Wolff (2009b, 2009c) show that the magnitude of the adjusted gender wage gap is almost insignificant. Yet no general conclusion on Madagascar can be drawn from this analysis as it only concerns the formal sector of the economy whereas informal activity largely dominates the Malagasy labour market.

Nordman and Roubaud (2009) adopt a different approach by matching two original urban surveys conducted in Madagascar in 1998 – a labour force survey and a biographical survey. They build a dataset that enables them to combine the original information gathered from each survey, particularly the earnings from current employment and the workers' entire professional trajectories. They results lead to a reassessment of the returns to human capital for both males and females. They show that using more precise labour force attachment variables greatly increases the portion of the gender gap explained by observable characteristics.

In this study, we extend the analysis of the previous authors to the entire country (rural and urban), though with more data constraints concerning the workers' and employers' observed characteristics, notably the lack of precise labour force attachment variables. However, the originality of our study lies in the longer time perspective of gender differences in labour market performances that is made possible by the availability of two cross-sectional household surveys (2001 and 2005). During this period, the Madagascar economy experienced several large scale shocks: in addition to recurrent weather problems, the 2002 political crisis resulted in a major disruption of economic activity due to general strikes and roadblocks on major national roads. More recently, the Madagascar economy had to face the strong depreciation of the currency and rise in international oil and rice prices in 2004 and 2005 as well as the final phase-out of the Multi-Fibre Arrangement in 2005 (Cling, Razafindrakoto and Roubaud, 2007). These shocks may have affected men and women differently and, as result, changed their relative positions on the labour market. In order to address that

question, we examine two aspects of gender differences in labour market outcomes: (i) employment status, and (ii) wages and earnings.

Our results for labour allocation show that the structure of employment has changed between 2001 and 2005. We find a strong positive impact of education on the probability of getting a paid job, for both males and females. This effect is also increasing with the education levels. For men and women alike, education has the strongest positive impact on the probability of accessing the public sector, followed by private formal wage employment and finally informal self-employment. Interestingly, education seems to be more favourable to having a self-employed job in the informal sector rather than a salaried job in this sector.

Regarding gender inequality in earnings[5], the results show that the average gender wage gap (i.e. for wage workers, including farm salaried workers) is relatively small and stable over time. In non-farm self-employment, however, the gap is much higher and declined between 2001 and 2005. Earnings equations estimates indicate that human capital is an important determinant of earnings for both men and women and across sectors of employment. Decompositions of the gender wage gap show that differences in individual characteristics of men and women account for almost 70 percent of the gap in 2001. However, this share is down to less than 40 percent in 2005. When also taking into account job characteristics of men and women, differences in characteristics explain over 60 percent of the gap and the share remains stable over time. Across wage employment sectors, the gender gap appears to be the lowest in the public sector and the highest in the informal sector. Using full sectoral decomposition techniques, we also highlight that gender specific sectoral location explains a significant share of the gender wage gap in both years. This result is mainly driven by the fact that the proportion of women is higher in the self-employed sector where earnings are lower. Augmented earnings equations estimates carried out for the non-farm self-employment sector suggest that the gap in this sector is driven by the very unequal distribution of micro-firm attributes between men and women. This result points to a potential source of earnings differential often ignored in the gender earnings gap literature which is access to physical capital.

The remainder of the paper is divided as follows. Section 2 briefly presents the background of the Malagasy labour market and its main characteristics. Section 3 discusses the data, concepts and methods used in this study. In section 4 we comment on the results. Finally, in section 5, we draw together the main findings and conclude.

[5] We consider earnings resulting from primary activities only.

2. Characteristics of Malagasy labour market[6]

Workforce participation in Madagascar is high. Table 1 provides some basic labour market indicators for 2001 and 2005. These numbers show that 86.9 percent of the population report some form of productive activity in 2005, an increase of 4.4 percentage points from 2001. This growth in activity was driven by greater participation among women, with female activity rate growing from 77.7 percent to 84.6 percent, relative to male activity rate rising from 87.5 to 89.4. Open unemployment is structurally low, though it may be problematic in urban areas and is found to be higher for women than for men.

Table 1: Selected labour market indicators in Madagascar

	All (%)		Male (%)		Female (%)	
	2001	2005	2001	2005	2001	2005
Activity rate	82.5	86.9	87.5	89.4	77.7	84.6
Employment ratio	81.5	84.7	86.8	87.8	76.5	81.7
Wage employment ratio	18.2	14.6	22.6	17.5	13.5	11.6
Unemployment rate	1.2	2.6	0.9	1.8	1.6	3.5

Source: Madagascar EPM 2001 & EPM 2005; authors' calculations. *Note:* Individuals aged 15 and above.

Over 85 percent of workers in Madagascar were employed in nonwage activities in 2005 and this share of nonwage to total employment rose by 3.4 percentage points between 2001 and 2005. Unsurprisingly, the informal sector dominates the labour market in Madagascar. A conservative estimate places 64.5 percent of the 1.2 million wage workers in the informal sector. Considering the total workforce, including nonwage workers, approximately 95 percent of the 8.3 million working age adults are informally employed.

Despite relatively equal access to the general workforce, men have greater access to "good" jobs than women, i.e. non-agricultural wage employment. Men and women have similar nonwage agricultural earnings, but men fare better than women in terms of earnings in every other employment category. Women tend to be employed more in agriculture and the informal sector where earnings are relatively low, while men tend to have higher rates of employment in the formal sector where earnings are relatively high. Further, for those women who are employed in the formal sector and/or better wage jobs, their earnings fall below those of men in the same sectors on average.

[6] See Stifel, Rakotomanana and Celada (2007) for more details on labour market conditions in Madagascar based on an analysis of EPM 2001 and 2005.

The Malagasy labour market is characterized by the coexistence of different types of employment sectors with different entry, exit, and wage setting rules. However, according to Stifel, Rakotomanana and Celada (2007), there is no evidence of labour market segmentation between the private formal and informal wage sectors. Differences in earnings between those employed in the private formal and informal sectors appear to be driven by differences in endowments, not by differences in returns to education and labour market experience. The exception is that the gap between men's earnings (higher) and women's earnings (lower) is larger in the informal sector than in the formal sector. However, there does appear to be some segmentation between the private and public sectors as there are higher returns to education in the latter.

3. Data, definitions and methods

In this section, we first describe the data and concepts used in this study before discussing the methodology of earnings equations and gender earnings decompositions, an essential aspect of our investigation of the gender disparities in the labour market.

3.1. Data and definitions

This study is based primarily on an analysis of the 2001 and 2005 *Enquête Périodique auprès des Ménages* (EPM). The EPM are nationally representative integrated household surveys of 5,080 households (23,167 individuals) and 11,781 households (55,995 individuals) in 2001 and 2005, respectively. Our study is carried out on the sub-sample of individuals aged 15 years and older. In 2005, women represent 51.3 percent of this sample of individuals.

The multipurpose questionnaires include sections on education, health, housing, agriculture, household expenditure, assets, non-farm enterprises and employment. Employment and earnings information are available in the employment, non-farm enterprise and agriculture sections.

The choice of these databases to analyse gender disparities on the Malagasy labour market can be justified on the following grounds:

- The EPM is the only survey that provides information on labour market conditions and is representative at the national and regional level without any restriction on the type of jobs (paid or unpaid, wage or non wage), on the sectors (agricultural or not), and on the institutional sector (public or private, formal or informal).

- Another advantage of these data bases lies in their multipurpose characteristic. The fact of having access to a large set of data in different domains stemming from the same survey allows analyzing a wide range of issues within a comprehensive and coherent framework. It improves the quality of analysis carried out on determinants of labour participation such as individual characteristics (age, gender, education) and household living condition (household size and structure, consumption and wealth).
- The questionnaires in 2001 and 2005 are very similar thus allowing for a consistent analysis of the evolution of labour market indicators.

Among the 15 sections of the questionnaire, the employment section covers more specifically the supply side of the labour market with information on the main variables used in our study: employment status, sector of employment, wage labour earnings, hours worked, as well as other data on employment conditions. The section on non-farm enterprises (NFE) provides information on earnings for self-employed workers as well as some characteristics of NFEs. The other variables used in this study are derived from the section on the demographic composition of the household as well as from the section on education.

Gender differences on labour market performances will be grasped through the analysis of two types of labour market outcomes: employment status and earnings. As pointed out in Section 2, more than 85 percent of workers in Madagascar are employed in nonwage activities. Although the EPM are designed to measure both wage and non wage earnings, this latter type of earnings are typically often generated at the household level, making it difficult to analyse in relation with individual characteristics such as gender. Another issue is that non wage earnings are usually derived not only from human capital but also from physical capital. However, the data at hand does not allow separating labour from capital income. We therefore chose to estimate modified earnings equations for independent workers taking into account the value of capital.

The construction of the earnings variable was based upon the following rules:

- For wage workers, earnings data is collected at the individual level and wage earnings are defined as the sum of net wages paid, other advantages (rent, clothes, transport or gas, etc.) and food provided by the employer earned as compensation for the main activity (secondary activities are excluded from our analysis[7]).

[7] We chose to exclude secondary wage activities from our analysis for reasons of homogeneity of our earnings measures. The gender dimension of multiple jobs holdings is left for further research.

- For self-employed workers, earnings are collected in two different sections depending on whether the self-employment activity is related to the operation of a farm or of a non-farm enterprise.
- In the case of non-farm self-employment, earnings are defined as the net income of non-farm enterprises (sales minus paid wages, non wage costs and taxes). This information is collected at the level of the firm but family members involved in the activity are listed. In the case of multiple family member participation, it is however not possible to attribute individual earnings to each member involved: the income is therefore attributed exclusively to head of the enterprise and other household members are treated as unpaid family workers.
- Since agricultural incomes cannot be assigned similarly to a single household member, these earnings are excluded from the analysis. In the participation equation agricultural self-employment is treated as a specific category.
- All earnings are divided by the number of hours worked in the corresponding activity.

Given that, as mentioned above, the two types of income (wages and earnings from self-employment) uncover different types of incomes and are measured using different rules and different parts of the questionnaire, we analyse separately gender earnings differences for wage employment (including farm salaried workers) and for non-farm self-employment.

3.2. Methods

The empirical analysis is carried out for the two years separately (2001 and 2005). We rely on three different types of approaches: First, we tackle the question of employment status and sector allocation across gender (section 4.1). After a preliminary discussion using descriptive statistics, we make use of multinomial logit models that allow disentangling the determinants of labour allocation across different institutional sectors: public employment, private formal wage employment, private informal wage employment, private informal self-employment and agricultural self-employment.[8]

Our analysis of gender differences then focuses on another main labour market outcome, namely earnings. Average earnings are first compared across gender. We then rely on estimations of Mincer-type earnings functions for men and women to decompose the earnings gap. The objective is to determine the extent to which the average gender wage gap is due to differences in human

[8] In a previous version of this study, we analysed the determinants of hours worked in productive activities and housework production across gender. Due to important heterogeneity issues in the estimation of hours worked, we preferred to drop this section which was arguably difficult to make sense of. The related results remain available from the authors upon request.

capital attributes such as schooling and work experience, versus differences between genders in wages paid for given attributes (Blau and Kahn, 2000).

The specifications of the earnings equations and an additional discussion on sample selection issues related to paid-work participation and sector choice are reported in Appendix A. In this appendix, we also present the most common approach to identifying sources of gender earnings gaps (Oaxaca-Blinder and Neumark decompositions) together with a full sectoral decomposition that takes explicitly into account the sectoral structures between genders in the measure of the gender earnings gaps (Appleton et al., 1999).

4. Results

We examine in turn two aspects of labour market performances of men and women in 2001 and 2005: (1) employment status, (2) earnings.[9]

4.1. Employment status

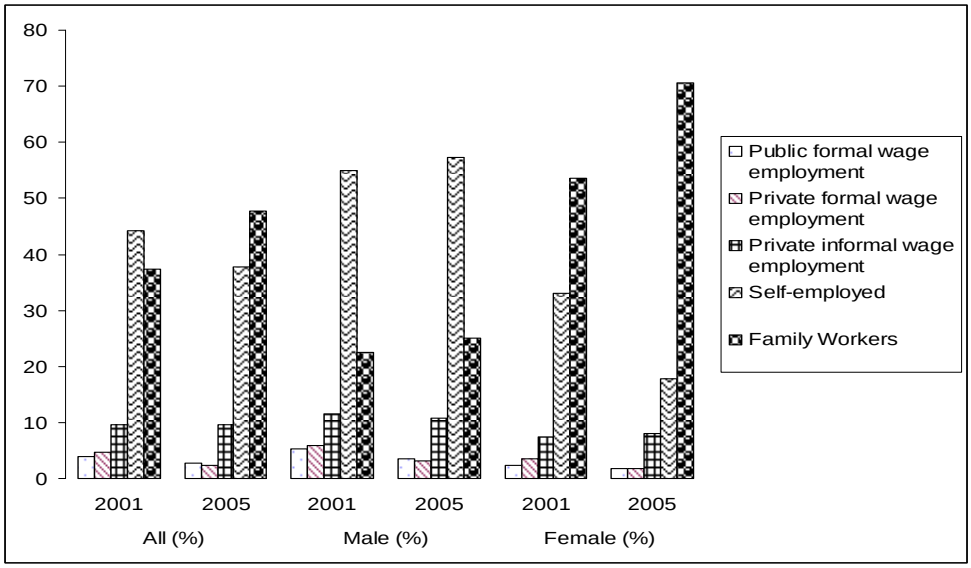
Before turning to the determinants of employment status across sectors and sexes, we describe global statistics of labour allocation in Madagascar.

[9] Summary statistics of the various variables used in these econometric analyses are reported in Table B1 and B2 in Appendix B.

4.1.1. Labour allocation across sectors

Statistics of employment status are reported in Tables C1, C2 and C3 in Appendix C. The main results are summarised in Figure 1 below.

Figure 1. Distribution of individuals aged 15 and above across all sectors of employment in Madagascar (%)



Source: Madagascar EPM 2001 & EPM 2005; authors' calculations.

Overall, the structure of employment has changed between 2001 and 2005. This is mainly due to the increase in the proportion of family workers (37.4 percent to 47.7 percent) and to the slight concomitant decrease in the share of self-employed workers (44.3 percent to 37.8 percent). This change in the structure of employment is mostly explained by the shift in women's labour allocation whose proportion in the category of family workers has substantially increased from 53.5 percent to 70.6 percent in four years. The expansion went along with the decline in the share of women in the category of self-employed workers. In fact, according to these figures, the nature of employment differs a lot between men and women:

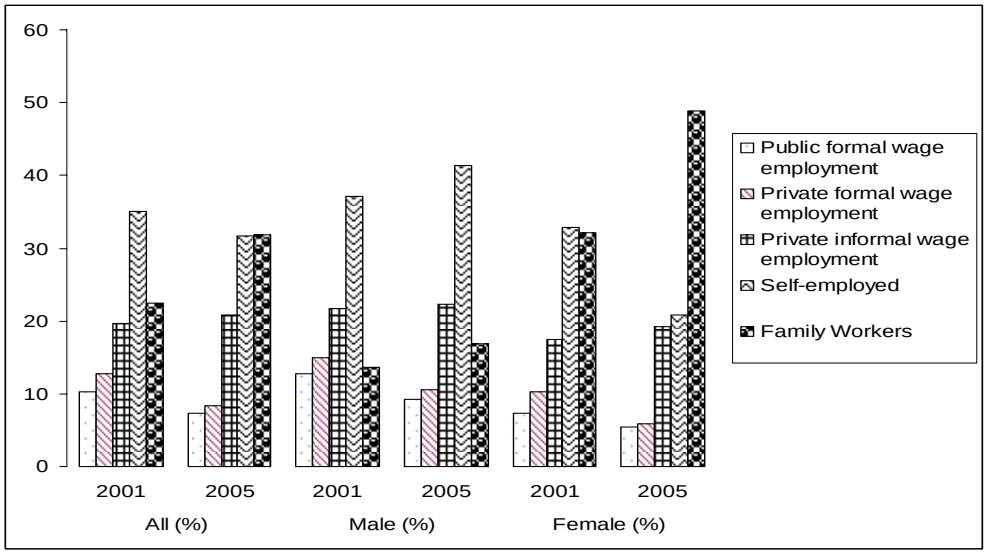
- Women are much more often family workers than men (70.6 percent versus 25.1 percent in 2005), and less often declare themselves as self-employed (17.8 percent versus 57.4 percent of men in 2005).
- Only 3.5 percent of women are employed in the formal sector, versus 6.7 percent of men.

The evolution in employment status can be explained in part by some of the shocks experienced by the Malagasy labour market between 2001 and 2005. More specifically, the final phase-out of the Multi-Fibre Arrangement in 2005 generated massive layoffs in the textile sector and induced self-employment in that sector to diminish.

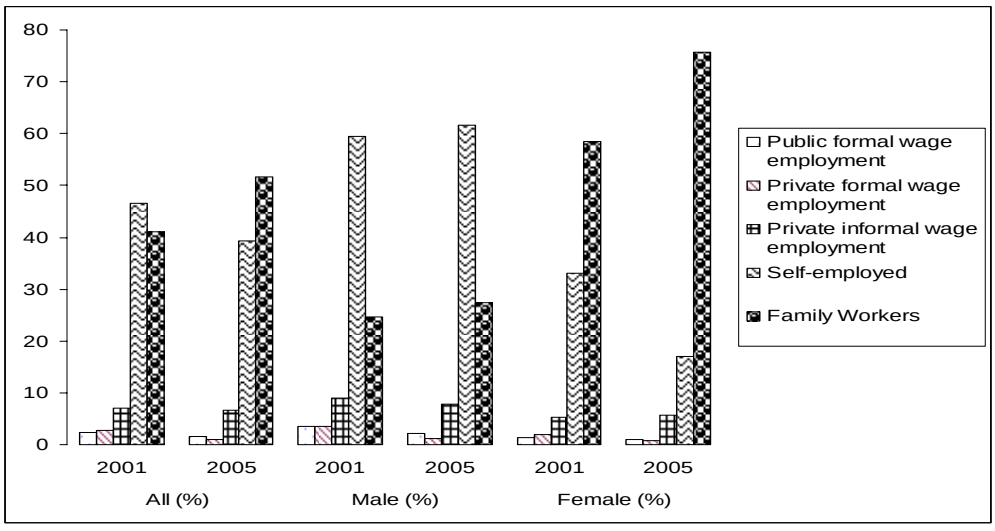
The distribution of labour greatly differs between rural and urban areas as well (Figure 2). First, private formal and informal wage workers are scarce in rural areas whilst their proportion is much higher in towns. Employment structure in rural location is thus essentially made of self-employed workers (39 percent in 2005) and family workers (51 percent in 2005). Men are much more likely to be self-employed than women in rural area (respectively 61 percent versus 17 percent in 2005) and women are found predominant in the category of family workers (75 percent versus 27 percent in 2005)[10].

Figure 2. Distribution of individuals aged 15 and above across all sectors of employment in urban and rural areas (%)

Urban Area



Rural Area



Source: Madagascar EPM 2001 & EPM 2005; author's calculations.

[10] Additional statistics reporting the distribution of workers across activity sectors and occupations can be found in Tables C1 to C3 in Annex C.

4.1.2. The determinants of labour allocation across sectors

We now turn to discussing the determinants of labour allocation across sectors using multinomial logit models. Our estimates proceed in the following way. First, gender specific multinomial logit models of labour allocation are carried out using three broad categories: "inactive, unemployed, family worker" (thus defining a category of "unpaid" individuals in the labour market), "non-farm paid employment" (including public, private formal and informal wage employment, and non-agricultural self-employment), and "agricultural self-employment". The results of these estimations are reported in Table C4 in Appendix C.

A second model refines the second modality of the preceding model (non-farm paid employment) in order to account for differentiated determinants of labour allocation, in particular for "public employment", "private formal wage employment", "private informal wage employment", and "private informal self-employment". The "agricultural self-employment" category is left unchanged. Tables C5 and C6 report the coefficient estimates of this multinomial logit model with six modalities. All the coefficients must be interpreted in relation to the reference category which is "unpaid" individuals.[11]

The list of covariates includes a set of human capital variables and individual demographics deemed to influence labour supply. Household characteristics are also accounted for as well as three variables reflecting physical capital endowments. These variables, namely the Log of other household members earnings per capita, the Log of the amount of land and value of livestock owned by the individual's household, are indeed good candidates to affect both the opportunity cost of labour, and labour allocation across sectors.

From Table C4, we observe the following results. First, unsurprisingly, education has differentiated effects on the sector 'choice'. While schooling attainment positively affects the likelihood of being in paid work for both males and females (the result being also robust to both years), the reverse is true for agricultural self-employment which is often negatively associated with higher levels of schooling, in particular for males. For women, however this negative association is actually not observed in particular for low levels of education. For instance, reaching the first cycle of secondary education is positively associated with access to self-employed agricultural employment for females in 2005.

[11] We performed Hausman-type tests proposed by Hausman and McFadden (1984) which provide evidence that the Independence of Irrelevant Alternatives (IIA) assumption is not violated for both male and female samples with the exception of males in public wage employment.

Second, other human capital indicators such as potential experience in the labour market and past vocational training are positively associated with access to paid employment (with a decreasing marginal effect for experience). Experience in the labour market is also positively related to agricultural self-employment for males and females as compared to unpaid individuals. Nonetheless, vocational training is significantly negatively associated with a job in agriculture for males in both years.

The marital status (married versus single or divorced or widow) presents an interesting pattern. For men, being married is associated with a greater likelihood of having access to a farm and non farm paid employment, whatever the considered sector. The reverse is observed for women whose marriage appears to be negatively associated to access to a paid job.

Finally, the additional household and property (land and livestock) variables are always highly significant. The variable indicating the sum of other household members' earnings is positively associated with the probability of having access to paid employment. Conversely, its effect is always negative on the 'choice' of an agricultural self-employed job. A possible explanation for these findings is that this variable is capturing an income effect of the household, i.e. reflecting the fact that workers in wealthier households are mostly found in non farm paid employment rather than in agricultural self-employment. Similarly, the opposite – and expected – effect is found for the land value variable: the higher the land value owned, the higher the probability of having a self-employed agricultural job. Interestingly, the magnitude of this effect is stronger for males than for females, especially in 2005. The same comment can be made as for the variable of livestock value in 2001 which exhibits positive coefficients for self-agricultural jobs and negative coefficients for paid jobs. However, the coefficient shifts sign for females in 2005 indicating a negative association between the value of the livestock and the probability to have a self-employed job in agriculture. In the meantime, the coefficient loses significance for self-employed agricultural males. This could reflect the improvement in the profitability of cropping activities that could have resulted in a shift away from cattle.

We now turn to more detailed estimates reported in Tables C5 (males) and C6 (females). For men and women alike, education has the strongest positive impact on the probability of accessing the public sector, followed by private formal wage employment and finally informal self-employment. This finding is robust to both years considered. Interestingly, then, education seems to be more favourable to having a self-employed job in the informal sector rather than a salaried job in this

sector. This is may be reflective of the fact that schooling is necessary to acquire managerial skills, even in informal activities. Note that the main difference across sexes is that education has a much stronger impact for females, especially in the formal sector of the economy, and that schooling is negatively associated with an informal wage employment in 2001 for women whereas, for men, the impact is insignificant.

The other human capital variables (vocational training, experience) exhibit expected signs (positive and concave profile for experience), with the exception of vocational training in agricultural self-employment where it is insignificant for females and even found to have a negative effect for men. Concerning marital status being married is again positively associated to being in paid employment for men, and negatively for women.

Finally, other household members' earnings are significantly and positively associated to having a wage employment while this variable is negatively related to self-employed jobs. This result is robust to both years and sexes (with the exception of females' informal self-employment). Also, the effect of the land value owned is consistent with expectation and across years and sexes: its effect is significantly negative for non-agricultural jobs and positive for agricultural self-employment. The same comment can be made for the livestock value, with the exception that its effect is not systematically positive for self-employed agricultural jobs in 2005 (notably, significantly negative for females).

We now turn to explaining workers' earnings in their jobs, thus disentangling the various determinants of earnings differentials across sectors and sexes.

4.2. Decomposing the gender earnings gap

Before turning to the gender earnings gaps decompositions, it is necessary to discuss simple descriptive statistics of the gender earnings gap across years. This is followed by an analysis of the determinants of earnings for wage and non wage employment (excluding agriculture) across gender and for the two years of the survey. We then comment on the results of the various gender earnings gap decompositions.

4.2.1. Gender earnings gaps in Madagascar

Both monthly and hourly gender earnings gaps are reported. Taking into account the hours worked by gender is important if one wants a proper view of the gender pay gap as there also exist important gender-specific time allocation choices. This is apparent in Table 2 that shows that men work on average longer wage hours than women. This holds true across wage employment sectors. Concerning non-farm self-employment, individuals appear to be working longer hours than in other sectors and the gender difference is smaller.[12]

Table 2: Monthly hours worked in Madagascar

	2001		2005	
	Males	**Females**	**Males**	**Females**
Wage Employment				
Full sample (15+)	185.9	162.7	198.2	168.1
Public formal wage employment	170.3	146.9	181.5	151.9
Private formal wage employment	189.9	179.8	218.1	197.2
Private informal wage employment	191.0	159.1	198.2	165.6
Non-Farm Self-employment				
Full sample (15+)	230.0	213.3	203.3	187.2

Source: Madagascar EPM 2001 & EPM 2005; authors' calculations.

Earnings gaps are here computed as the difference in average earnings of men and women expressed as a percentage of average men earnings[13]. Figures from Table 3 indicate that, for wage employment, the aggregate monthly earnings gap increased from 42.8 percent to 49.5 percent between 2001 and 2005, while the aggregate hourly earnings gap decreased slightly. The lower hourly earnings gap is coherent with the fact that men work longer hours in the wage and non-farm self-employment sector. Moreover, the concomitant increase in the monthly earnings gap and decrease in hourly earnings gap between the two years is reflective of the fact that the gender gap in hours worked increased between 2001 and 2005 in the formal sectors and in the non-farm self-employment sector (Table 2). More specifically, the growth in hours worked has been greater for men in all sectors but the informal wage sector.

[12] Data on housework hours collected in the 2005 survey indicate that, on total, women work much more hours than men: 38.8 weekly hours on average versus 18.9 for men. In previous analysis (not shown but available upon request), we disentangle the determinants of housework hours across gender. We find that being married strongly affects the number of hours worked at home for both males and females, but with an opposite effect. Married men work less hours at home whereas the reverse is true for married women. This result is robust across urban and rural areas. Another interesting pattern is revealed by the coefficient estimates on the number of children at different ages. While the number of young children (below 5) does not seem to affect men's labour intensity at home, it does so positively for women, as we could expect. The reverse pattern is observed, however, when we consider children aged 5 to 14. Then, men's hours of housework are sensitive (negatively) to the number of their children, while those of women are not.

[13] In the decomposition techniques that follow, the gap is defined instead as the difference in log earnings of men and women. This difference is identical to the coefficient of a female dummy in a regression of log earnings carried out over a pooled sample of wage workers with no other control variables.

Table 3: Gender earnings gaps (%) in Madagascar

	2001		2005	
	Monthly	**Hourly**	**Monthly**	**Hourly**
Wage Employment				
Full sample (15+)	42.8	26.4	49.5	24.6
Age groups				
15-24	11.0	6.7	20.6	-1.4
25-34	29.7	14.3	50.1	22.1
35+	52.7	28.5	53.4	29.8
Employment sectors				
Public formal wage employment	7.4	-3.8	35.0	13.1
Private formal wage employment	25.5	19.2	15.8	7.8
Private informal wage employment	52.2	27.4	45.5	18.3
Non-Farm Self-employment				
Full sample (15+)	99.0	83.1	93.3	69.6
Age groups				
15-24	97.8	107.1	88.9	66.0
25-34	78.6	63.6	70.2	41.3
35+	117.5	93.1	105.6	85.0

Source: Madagascar EPM 2001 & EPM 2005; authors' calculations.

Note: Gaps are computed as the difference in average earnings of men and women expressed as a percentage of average men earnings.

Although lower than the monthly earnings gap, the gender gap in *hourly* earnings is still significant in Madagascar. It was equal to 26.4 percent (resp. 24.6 percent) in 2001 (resp. 2005) for wage employment and to 83 percent (resp. 69 percent) in 2001 (resp. 2005) for non-farm self-employment.

Data from Table 3 also suggest that the earnings gap varies across cohorts: it is higher for older workers than for younger ones. In 2005, the hourly earnings gap is actually slightly negative (i.e. to the advantage of females) for the 15-24 cohort.

Finally, the size of the gap differs across wage sectors. For both years, it is highest in the informal wage sector. In 2001, it is smaller in the public sector and actually negative when one accounts for hours worked. In 2005, the smallest gap is in the private formal sector. For non-farm self-employed workers, the gap appears much higher but slightly decreased between the two years.

Whether these gaps are due to differences in endowments between males and females (the "explained" share of the gap) or to differences in returns to endowments (the "unexplained" portion of the gap, which may be attributed in part to discrimination) is an empirical question that is

addressed using the decomposition techniques presented in Appendix A. These techniques rely on the estimation of earnings equations which are presented in the following section.

4.2.2. Earnings determinants

In order to eliminate the effect of the number of hours worked on earnings, hourly earnings are used to analyse gender differences.[14] Earnings equations are estimated separately for men and for women over the sample of individuals with positive earnings.

Wage Employment

The sample of wage workers includes all wage workers and excludes self-employed workers, unpaid family workers as well as agricultural workers. The sample contains 1,845 men and 1,089 women in 2001 and includes 2,390 men and 1,474 women in 2005. Table D1 in Appendix D reports Ordinary Least Squared (OLS) as well as selectivity corrected earnings equations for 2001 and 2005. Selection into labour force participation is accounted for using the methods advocated in Appendix A, Section A2.

Let us first discuss the question of selection before turning to the main results. As indicated by the coefficients on the selection correction terms (Mill's ratios) in the Heckman versions of the different models[15], selection into labour force participation does not appear to be an issue here: the correction terms are never significantly different from zero for men and for women for both years. In other words, the mechanism of allocation between the two groups (individuals for which individual earnings can be computed versus other individuals) does not affect earnings significantly. As a result, the different coefficients on the human capital variables are only marginally modified from OLS to Heckman equations. We then focus our comments on the OLS estimates.

Table D1 shows evidence of significant and positive returns to human capital variables for both sexes and years. The coefficients on the three education dummies highlight an increasing premium to schooling attainment in reference to the category of workers with no schooling or incomplete primary education. There are some differences across gender and years though. First, in 2001, education returns are always larger for men than for women, in particular at low and high levels of

[14] Although monthly earnings are frequently used in this type of analysis, it may be problematic when the number of worked hours per month varies significantly across sexes, as is the case here, and if variations in hours reflect discriminatory practices and/or individual choices. Using hourly earnings is a way to avoid this problem and is equivalent to comparing gross wage rate across individuals, i.e. referring to the same quantity of work.
[15] See Appendix A, Section A3.

schooling attainment. This pattern holds true in 2005 except that education of female workers having achieved the first cycle of secondary schooling is given more value than that of their male counterparts. The experience-earnings profile is found to be slightly concave for both men and women (i.e. increasing, but less and less as workers age), with slightly greater returns for men in 2001. In 2005, the reverse pattern for experience is observed however, with greater return for women. This difference between 2001 and 2005 may in part reflect the increased labour market participation of women over this period (see Section 2) which may have accrued the market value of experience of those women already working relative to new entrants. Indeed, a strong increase of inexperienced workers in the labour market has presumably the consequence of enhancing the average returns to experience.

Among the other regressors introduced in the earnings functions, vocational training received in schools appears to be an important determinant of earnings for both males and females. Training is indeed likely to increase workers' productivity. For this reason, Weichselbaumer and Winter-Ebmer (2005) have shown that omitting it in wage equations by gender can result in serious biases in the calculation of the unexplained component of the gender wage gap.[16] The fact of being married affects positively the earnings of men in 2005 only while it has no impact on earnings elsewhere. On developed country data, marriage is usually found to have a positive impact on earnings, at least for men (Korenman and Neumark, 1991). However, the insignificant impact of marriage for females is also an expected result when one uses such cross-sectional dataset (Korenman and Neumark, 1992).[17]

We also present earnings equations estimated for each of the three wage employment sectors using both OLS and Lee's method to correct for sectoral selection (Tables D2 to D4 in Appendix D). A first result worth noting is that correcting for selectivity into the public sector is significant for males only (Table D2), while sectoral selection does not appear to affect the distribution of earnings in the two other wage employment sectors (private formal and informal). The only exception is for females in the informal wage sector in 2005 (Table D4). The significant negative effect of the selection term in this equation means that females' unobserved characteristics that positively affect

[16] However, as other human capital variables, training is not immune from the common criticism that it might be the result of individual choices and hence be correlated with individual ability.

[17] Economic theories of fertility and marriage suggest that marital status and number of children may be endogenous with respect to wages: women may be selected or may self-select into different marital or fertility states on the basis of unmeasured characteristics that are correlated with wages. Then, individual heterogeneity may lead to biased estimates of the "direct" effects of marriage and motherhood on wages. Therefore, one should be careful in inferring any causal relationship between marriage, motherhood and wages with such cross-sectional dataset.

their probability to participate in the informal wage sector in 2005 also influence their earnings levels, but negatively.

In the public sector, once sectoral selection is accounted for, the returns to education are almost null for both males and females. This may be the result of high entry costs into the public sector where earnings differentials have no direct relation with educational attainment. In other words, earnings in this sector are probably determined by a number of factors orthogonal to productive ability, so that the returns to education have a different interpretation in this sector than in the private ones[18]. Still, we rely on the OLS estimates in the following analysis (decompositions) given that sample selection does not appear to be an issue for females, and so as to preserve perfect comparability across the other sectors of the analysis where selection appears mostly insignificant.

Turning to the OLS estimates in the formal public and private sector, returns to education are higher for men in 2001, while the reverse is true in 2005, which is consistent with the previous finding using aggregate equations. In the informal wage sector, returns are greater for men in both years, especially at low and high levels of educational attainment.

Non-Farm Self-Employment

For the non farm self-employed (Table D5), the specification of the earnings equations is slightly different. Indeed, there are many other aspects deemed to influence self-employed workers'earnings other than their demographic characteristics and human capital endowments. We believe it is important to account for the micro-firm attributes as they arguably constitute crucial determinants of the dispersion of earnings in self-employment. For that purpose we include two variables: the first one indicates the eventual number of employees in the informal production unit while the second is a measure of the value of physical capital used in the workers' activity.[19] Two comments are in order.

First, the two measures of the micro-firm attributes are highly significant and exert a positive effect on the self-employed earnings differentials. This is an expected effect as they act as production factors in the earnings determination. Interestingly enough, we observe greater micro-firm attribute returns for men in 2001 and higher micro-firm attribute returns for women in 2005.

[18] Alternatively, we cannot exclude the possibility that our model in the public sector is poorly identified due to the difficulty of finding valid identifying instruments for the sectoral selection (see Appendix A, Section A2 for details).

[19] Other potential sources of earnings differentials across self-employed workers have been introduced in the regressions (such as access to credit or the rate of salaried workers in the informal production unit) and failed to provide meaningful results.

Second, returns to self-employed workers' education are significant and positive even after taking account of the micro-firm effects on earnings. However, returns are systematically higher for women in 2001 while, in 2005, they are higher for men at the intermediate level of schooling.

To summarize, our results on earnings determination across gender point to a number of stylized facts:

- Not surprisingly, human capital variables, particularly education, are strong predictors of earnings for both men and women and across years.
- This holds true across sectors of activity. In particular, returns to education are high in the non-farm self-employment sector, notably for higher levels of education and for women in both years.
- However, returns vary markedly across sectors and years and no clear sectoral or dynamic pattern emerges from our data.
- In line with similar work on Africa using different data sources (e.g. Söderbom et al., 2006; Kuepie et al., 2009; Nordman and Wolff, 2009a, 2009b), our results suggest that marginal returns to education are non-constant with a convex profile, i.e. increasing with the level of education.[20]
- The experience-earnings profile is found to be slightly concave for wage employment for both men and women, with somewhat greater returns for men in 2001, while the reverse is observed in 2005.
- Earnings functions for non-farm self-employed workers provide evidence that the quantity of labour and the amount of physical capital used in their activity are important determinants of their earnings. We find greater returns to these production factors for men in 2001, while a reverse pattern to the advantage of women is observed in 2005.

The results presented in this section are interesting in that they highlight gender-specific earnings determination processes. In particular, these estimates point to possible explanations of the differences in the earnings levels of men and women. As mentioned previously, the gender gap may be due to differences in the rewards for human capital attributes, but also to differences in average human capital characteristics across gender. The earnings equation analysis conducted above indicates that returns to attributes differ between genders but is unable to provide a synthetic

[20] This result is obtained by replacing the dummy variables indicating educational level achievements by a continuous variable for years of education as well as a quadratic term (years of education squared). We find that the sign of the quadratic term is positive, an indication of a convex profile of returns to education.

decomposition of these different effects. This decomposition will be carried out in the following section.

4.2.3. Gender earnings gaps decomposition

Gender earnings gap decompositions are presented in turn for wage and non wage employment based on the OLS earnings equations estimates presented in the previous section.

Wage Employment

Table E1 in Appendix E reports the decomposition of the gender gap for wage earnings in 2001 and 2005 respectively based on OLS estimations of the earnings equations. Indeed, given that sample selection did not appear to be a major issue in the previous section, the OLS estimations were preferred.[21] Two specifications are considered for the earnings equations. The first specification corresponds to the specification presented in the previous section where explanatory variables are limited to human capital endowments (education, experience and training), socio-demographics (marital status, ethnic group, religion) and geographical dummies indicating place of residence. In the second specification, variables describing job characteristics are added. They include dummies characterizing the type of occupation (executive, skilled or unskilled worker) and the nature of employment (permanent or temporary). Since it is debatable whether job characteristics such as occupations should be taken into account in earnings equations, we choose to introduce them in a separate decomposition. Indeed, controlling for occupations in earnings equations by sex amounts to considering the possibility of occupational segregation across gender and, for instance, the existence of high-paying occupations for men and low-paying occupations for women. The difficulty, however, is to establish whether these occupational outcomes are the result of discrimination practices from the employer or of gender-specific occupational choices.

In 2001, differences in socio-demographic characteristics, human capital endowments and geographical location explain 68.6 percent of the raw hourly earnings gap using Neumark's decomposition rule. Human capital endowments explain up to 51.3 percent. Among human capital variables, it is the difference in educational attainment that explains most of the gap (about 30 percent). This result stems from the fact that education returns are positive and that men have on

[21] A similar rationale for this choice is given by Appleton et al. (1999) in their paper analysing the gender gap in three African countries. They state "[We focus (…) on uncorrected estimates] partly for comparability with existing studies but also because of methodological controversies surrounding the selectivity corrections."

average more education than women. The distribution of experience and training between genders also contributes positively to explaining the earnings gap but at a much lower level than education.

Surprisingly, including job characteristics such as occupation and terms of employment actually leads to a small decrease of the explained share of the gap from 68.6 percent to 66.5 percent using Neumark's decomposition. As pointed out earlier, it is unclear whether the employment status is an outcome of employer practice or an outcome of individual choice and productivity differences. In other words, the share explained by job characteristics could be at least in part attributable to occupational segregation.

In 2005, the decomposition varies according to the specification of the earnings equation. Not taking into account occupations, the explained share of the gap amounts to 37.5 percent. This is an important decrease compared to the same decomposition computed for 2001 where the explained share of the gap attains 68.6 percent. This fall in the explained share is principally explained by the significant decrease in the explanatory power of human capital variables in 2005, in particular education and professional experience. These two variables explain indeed respectively only 11.2 percent and 9.9 percent of the gender earnings gap in 2005 whereas the respective proportions are 30.1 percent and 13.7 percent in 2001.

Introducing job characteristics increases the explained share up to 61.7 percent in 2001, a figure similar to the figure obtained for 2001. Among other observables, job characteristics explain 41.2 percent of the gap, hence much more than in 2001 where this proportion is only 23.8 percent.

The other significant contribution to explaining the earnings gap comes from the distribution of human capital endowments: the gender difference in endowments contributes to 14.9 percent of the gap. However, among human capital variables, education no longer is the main contributor.

By sector of wage employment

The Malagasy labour market is characterized by the coexistence of different types of wage employment sectors with different entry, exit, and wage setting rules. As noted earlier, the hourly gender gap appears negative (i.e. in favour of women) in the public sector in 2001 and relatively high in the informal wage employment sector for both years. Several results emerge from the decomposition of earnings by sector and for each surveyed year (Table E2 in Appendix E).

First, in any given wage employment sector, the gap is lower than the average gap over all wage employment sectors (except for informal wage employment in 2001), a possible indication of non-random gender allocation between wage employment sectors.

Second, the share of explained gap varies across sectors and years. In particular, looking at the decompositions without job characteristics, the patterns are somewhat different across the two years, especially for the formal sectors. For instance, while human capital endowments positively explain the gender gap in 2001 in the public sector, the pattern is reversed in 2005 as the contribution of human capital to the gender gap shifts sign and becomes negative. In other words, women have more favourable human capital characteristics in 2005 than in 2001 in the public sector (on average, women in the public sector are actually more educated than men in 2005). As for the informal wage sector, the explained share of the gap falls dramatically between the two years. This fall in the explained share probably reveals a greater heterogeneity in earnings and/or greater unobserved heterogeneity among the sample of workers in this sector in 2005. This result may of course be interpreted in light of the several shocks endured by the labour market between 2002 and 2005, a period where the explanatory power of traditional human capital attributes as determinants of earnings has declined. Third, job characteristics contribute positively to explaining the gap in most sectors and the explained share of the gaps generally increases with the inclusion of job characteristics in the earnings equations. The only exceptions are the informal wage sector in 2001 where job characteristics add nothing to the explanation of the gap and, more importantly, the formal wage sector in 2005 where the explained portion actually decreases from 43.7 to 21.0 percent once occupations and terms of employment are accounted for. This finding is somewhat difficult to explain and may be due to the fact that occupational distribution across gender is already partly the result of differences in educational attainment, therefore possibly creating colinearity issues in the earnings equations which include both human capital and job characteristics. The reader should then put more confidence into the decompositions that do not include job characteristics, especially where the results are difficult to interpret.

Full decomposition

As mentioned in the previous section, the fact that the gap in any given wage employment sector is usually lower than the aggregate gap suggests that gender location between sectors is not random. That of course is expected since observable characteristics determine sectoral allocation. For instance, more educated individuals tend to work in formal sectors, and this characteristic is not distributed evenly between genders. However, this gender specific sectoral location can possibly

also be the result of different effects of observable characteristics on sectoral location, a reflection either of choice or discrimination. In order to examine the contribution of different sectoral structures between men and women in Madagascar, we apply to our data sets a full decomposition approach developed by Appleton, Hoddinott and Krishnan (1999).

Table 4: Full Decomposition of the Gender Wage Gap (OLS estimates)

	2001	**%**	**2005**	**%**
Raw wage gap	0.232	100	0.220	100
Difference due to within-sector differences in earnings attributable to:				
A. Characteristics	0.090	38.7	0.020	8.9
B. Deviation in male returns	0.029	12.5	0.051	23.0
C. Deviation in female returns	0.047	20.4	0.074	33.8
Sub-total	**0.166**	**71.6**	**0.145**	**65.7**
Difference due to differences between sectoral location attributable to:				
D. Characteristics	0.079	34.1	0.069	31.2
E. Deviation in effect of characteristics on male location	-0.004	-1.9	0.002	1.1
F. Deviation in effect of characteristics on female location	-0.009	-3.9	0.005	2.0
Sub-total	**0.066**	**28.3**	**0.076**	**34.3**

Source: Madagascar EPM 2001 & EPM 2005; authors' calculations.

As explained in Appendix A (section A.3.2), the first three terms of this full decomposition (A, B and C) are similar to those found in the decompositions discussed previously (Neumark's) and account for the within-sector earnings gaps. The last three terms (D, E and F) measure the difference in earnings due to differences in distribution of male and female workers in the different sectors. More precisely, the last two terms account for differences in earnings resulting from the deviations between predicted and actual sectoral compositions of men and women not accounted for by differences in characteristics.

Results from Table 4 indicate that within-sector differences in earnings contribute to 71.6 percent of the gender gap in 2001. In 2005, this share is smaller but still represents 65.7 percent of the gap. Differences in characteristics account for more than half of that share in 2001, but only to 15 percent in 2005. Given that the "non discriminatory" wage structure is estimated on the pooled sample of males and females, it is possible to compare the "distance" between this non discriminatory wage structure and the returns to individual characteristics for men on one hand (this term is interpreted as "nepotism"[22]), and the distance between this non discriminatory wage structure and returns to individual characteristics for women (the so-called "pure discrimination") on the other hand. Our results suggest that both "nepotism" and "pure discrimination", using the

[22] Neumark (1988) refers to "nepotism" as this deviation in returns represents the distance between actual males' returns and lower returns that would be associated with competitive wages (the non-discriminatory benchmark of the pooled sample). See Appendix A, section A.3.1 for more details.

terminology of Neumark (1988, see Appendix A, Section A.4.1), contribute to the unexplained component of the gap with however a bigger share explained by the latter: the contribution of the deviation in females' return (C) to the unexplained share of the gender gap appears indeed higher than the contribution of the deviation in males' return (B).

Results also show however that gender specific sectoral location explains a significant share of the gender-earnings gap in both years. This is highlighted by the positive sums of the last three terms (D+E+F) for both years which suggest that the differences in sectoral locations are more favourable to men than to women. The gender earnings gap would have been 28.3 percent and 34.3 percent smaller, respectively for 2001 and 2005, if men and women had been "equally" distributed across the three sectors. These results are driven by the fact that the proportion of women is higher in both years in the informal wage employment sector where earnings are lower. Moreover, the increase in the sectoral location effect between the two years (from 28 to 34 percent) is reflective of the greater proportion of women in the lower paying wage sector in 2005 compared to 2001 (67 percent versus 59 percent of female wage workers).

Finally, the decomposition of the contribution of the sectoral location further indicates that characteristics explain an important part of sectoral location both in 2001 and in 2005. In other words, our results suggest that sectoral location differences are mostly attributable to differences in characteristics and not to difference in returns. This is apparent in the very small values of terms E and F in Table 4. On the contrary, differences in returns accounts for an important share of the difference in within-sector earnings both through "nepotism" (B) and "discrimination" (C). This stylized fact holds true across years although the unexplained share of gap (B+C) appears to have increased between 2001 and 2005

Non-Farm Self-Employment

As noted above, the gender gap in the non-farm self-employment sector is much higher than in wage employment sectors in both years. This stems in part from the way earnings from self-employment are computed since income of nonfarm enterprises was attributed entirely to the head of the enterprise. Male owned enterprises are likely to have at least one additional worker (the wife of the firm owner) than female owned enterprise. Indeed, descriptive statistics confirm that micro-firms owned by women are on average much smaller than those owned by men. In what follows, we take into account these differences in the decomposition of the earnings gap by including firm characteristics as determinants of the earnings equations.

As noted in the introduction, interpreting the unexplained part of the gender earnings gap solely by discriminatory practices against women is even more hazardous for non-wage activities than for wage work since "classical" discrimination from employers should not weigh on self-employed workers. These workers could however face discriminatory practices in access to physical capital or from their clients.

Two specifications are considered for the earnings functions: the first one includes individual and firm level productive characteristics, while in the second dummies indicating the branch of activity are added. The decomposition results presented in Table E3 reveal two things.

First, observable characteristics – both at the individual and the firm level – explain most of the observed gap. Including the branch of activity results in dramatically decreasing the unexplained share of the gap from 42.9 percent to 21.3 percent in 2001 and from 41.0 percent to 15.8 percent in 2005. Second, differences in human capital endowment explain some of the gender gap but much less than firm level characteristics: using the first specification, firm level characteristics in 2001 explain 47.1 percent of the gap vs. 16.3 percent for human capital endowment; in 2005, the respective contribution are 26.9 vs. 18.8 percent. Both the number of employees and the amount of capital invested in the firm appear to explain a significant part of the gap.

These results suggest that including firm level characteristics is important to properly decompose the gender earnings gap in the non-farm self-employment sector. It also points to a potential source of "discrimination" often ignored in the gender earnings gap literature which is access to physical capital (whether through gender biased inheritance rules or through discrimination in credit lending practices).[23]

5. Summary and concluding remarks

In this paper, we have examined two aspects of labour market performances of men and women in Madagascar in 2001 and 2005: (1) participation and sectoral allocation, and (2) earnings. Several results emerge.

[23] An argument against the discrimination hypothesis is that lower access to firm's physical capital may be caused by individual reinvestment choices. For instance, female household head traditionally spend more money on their children and household than male household head.

Regarding labour allocation, participation of women in the Malagasy labour market appears to be high and increased between 2001 and 2005. Overall, the structure of employment has changed between 2001 and 2005. The evolution in employment status can be explained in part by some of the shocks experienced by the Malagasy labour market between 2001 and 2005, namely the massive layoffs and contracting self-employment in the textile sector.

We found a strong positive impact of education on the probability of getting a paid job, for both males and females. This effect is also increasing with the education levels. For men and women alike, education has the strongest positive impact on the probability of accessing the public sector, followed by private formal wage employment and finally informal self-employment. Interestingly, education seems to be more favourable to having a self-employed job in the informal sector rather than a salaried job in this sector. This result is not inconsistent with the concept of dynamic entrepreneurship in the informal self-employment sector (Maloney, 2004), where entrepreneurial skills would be needed, as opposed to the informal salaried sector which would be more reflective of hidden unemployment, or a stepping stone towards better labour market opportunities in the future.

Regarding gender inequality in earnings, our results show that the average gender wage gap (i.e. for wage workers, including farm employment) is relatively small and stable over time. In non-farm self-employment, however, the gap is much higher and declined between 2001 and 2005. Earnings equations estimates indicate that human capital is an important determinant of earnings for both men and women and across sectors of employment. However, returns to human capital vary markedly across sectors and years and no clear sectoral or dynamic pattern emerges from the data.

Decomposition of the gender wage gap shows that differences in individual characteristics of men and women account for almost 70 percent of the gap in 2001. However, this share is down to less than 40 percent in 2005. When also taking into account job characteristics of men and women, differences in individual endowments and job characteristics across gender explain over 60 percent of the gap, and this share remains stable over time.

Across wage employment sectors, the gender gap appears to be the lowest in the public sector and the highest in the informal sector. Using full sectoral decomposition techniques, we provide evidence that gender specific sectoral location explains a significant share of the gender wage gap in both years. This result is mainly driven by the fact that the proportion of women is higher in the self-employed sector where earnings are lower. In a long-term perspective, the main characteristic

of the Malagasy labour market evolution was the partial freeze on public sector recruitment from the mid-1980s, which went hand in hand with a fall in the numbers of wage earners and an underlying rise in job precariousness. The decrease in jobs in the public sector was particularly significant for women (Antoine, Bocquier, Razafindratsima and Roubaud, 2000). Public sector downsizing has then probably worsened women's economic position as more women have moved away from the state sector to the private sector.

Augmented earnings equations estimates carried out for the non-farm self-employment sector suggest that the gap in this sector is driven by the very unequal distribution of micro-firm attributes between men and women. This results points to a potential source of "discrimination" often ignored in the gender gap literature which is access to physical capital, whether through gender biased inheritance rules or through discrimination in credit lending practices.

Between 2001 and 2005, Madagascar experienced several large scale shocks. Although these shocks had different impacts on the labour market participation of men and women, the gender wage gap remained relatively small and stable over time. The contribution of differences in returns to attributes did however increase. This increase could be related to an increased competition for fewer available wage jobs. Why this evolution did not result in an increase in the gender wage gap is due to the fact that most productive characteristics of male and female wage workers converged between the two years.

From a policy perspective, given the multifaceted aspect of gender disparities in the Malagasy labour market, efforts to reduce gender earnings gap will entail various types of policy:

- First, differences in human capital endowments must be reduced: if women and men human capital characteristics were similar, the gender earnings gap would be reduced by at least a third. This entails further efforts to enhance girls' schooling achievements, particularly at higher levels.
- However, differences in individual characteristics do not explain the full difference between men and women earnings. Although the unexplained share of the difference cannot be fully attributed to discrimination, further reduction of the gender gap will probably entail policies aimed at promoting access of women to quality jobs in the public and formal wage sectors, as well as policies to foster equal pay for equal jobs.
- Finally, the very large gaps observed in the non-farm self-employment sector – and the fact that these gaps are in large part explained by differences in micro-firm characteristics –

suggest that efforts must be made to allow women informal entrepreneurs to access physical capital. This source of earning differential is often ignored in the gender gap literature. Whether it arises because of gender biased inheritance rules, through discrimination in credit lending practices or just because of different individual reinvestment choices is an empirical question that should be further investigated. From a policy perspective, this result suggests that micro-credit directed specifically at women groups should be a part of any policy package designed to reduce gender differences.

Finally, from a methodological perspective, some comments are in order. The earnings models used in the decomposition analysis of this paper account for no more than 40 percent of the variation in the earnings of men and women. Then, an important variation in earnings remains unexplained by the observed workers' characteristics. The models might then be better fitted to the data by including other variables deemed to influence earnings. Typically, the data used comes from household surveys. For a long time, researchers have been unable to document the potential effect of job and firm characteristics – other than industry and firm size – on the wages of men and women. We still provide a first attempt to account for other determinants of individual earnings, in particular micro-firm attributes of the self-employed workers. But for wage workers, linked employer–employee surveys would allow researchers and policy makers to move beyond the individual worker to consider the importance of the workplace in wage determination. There is much to learn about the demand-side factors that may influence employers when they make decisions concerning hiring and promotions, or use gender to predict future work commitment.

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Appendix A: Concepts and methods

A1. Concepts (Council of Economic Advisers, 1998)

Gender discrimination may take a variety of forms, from practices that reduce the chances that a woman is hired to differences in pay for men and women who work side by side doing the same tasks equally well. There are a variety of theories about how and why women face discrimination in the labour market. An employer may dislike female employees or underestimate their abilities; customers may dislike female employees or underestimate their abilities; or male co-workers may resist working with women. These attitudes may not be directed toward all workers but may only focus on women in higher status occupations. For instance, male employees may not object to having women work for them but may object when women are their superiors. In addition, employers may engage in what is called "statistical discrimination", meaning that they assume an individual woman has the average characteristics of all women. For example, because women on average have higher turnover rates than men, an employer may assume that a given female job candidate is more likely to leave the firm than a similar male candidate.

Following the seminal contributions of Oaxaca (1973) and Blinder (1973), the measure of the degree of discrimination faced by women is often based on a decomposition of the gender pay gap between an “explained” gap and an “unexplained” gap. The explained gap is the gap that can be attributed to differences between male and female labour-related attributes (education, experience, etc.) while the unexplained portion of the pay gap is often interpreted as the result of discrimination. In this view, once differences between men and women in the relevant determinants of wages are taken into account, any remaining difference in pay must be due to discrimination. But this explanation may be too simplistic. To the extent that discrimination affects women’s educational, job, and family choices, the "unexplained" differential will understate the true effect of discrimination. And, to the extent that an analyst cannot adequately measure all the determinants of wages using available data, there may be significant unmeasured labour market skills that differ between men and women. For instance, if women’s labour market experience is less likely to be continuous (for example, due to childbearing), then just controlling for years of work may not fully control for the differential effects of experience on male and female wages. In this case, the "unexplained" differential will overstate the true effect of discrimination, because it includes the effect of relevant unmeasured factors that influence the relative productivity of male and female employees.

In the following, we discuss the econometric methods used for earnings determination and decomposition in this paper. We first present the chosen specification for earnings determination, then provide a discussion about the sample selection issue in a context of sectoral choice, and finally present different decomposition techniques traditionally used for analysing the gender earnings gaps.

A2. Earnings determination

Let the earning function take the form:

$$\ln w_i = \beta x_i + \varepsilon_i \qquad (1)$$

where $\ln w_i$ is the natural logarithm of the observed hourly earnings for individual *i*, x_i is a vector of observed characteristics, β is a vector of coefficients and ε_i is a disturbance term with an expected value of zero.

We estimate the log earning functions separately for males and females, and also for the different sectors. There is no universally accepted set of conditioning variables that should be included for describing the causes of gender labour market outcomes differentials. Yet, the consensus is that controls for productivity-related factors such as education, labour market experience and marital status should be included. However, it is debatable whether job characteristics, occupation and industry should be taken into account: if employers differentiate between men and women through their tendency to hire into certain occupations, then occupational assignment is an outcome of employer practices rather than an outcome of individual choice or productivity differences.[23]

We also incorporate in the earnings functions a few dummy variables aimed at capturing the worker's specific human capital (vocational training received in school), religion (catholic versus other religion), ethnicity (Merina, the dominant ethnic group, versus other ethnic groups), and the place of residence (a dummy for urban versus rural, and six indicators of provinces of residence). These last dummies are expected to capture spatial specificities in earnings determination: firstly, they capture price differences across regions which are significant given that weak infrastructures prevent the integration of regional markets for goods and labour; secondly, there are also important differences across regions in terms of economic and social development; thirdly, labour market regulation are different across regions given that regulating institutions are in part decentralised.

Education, a main variable in our study, is split into four dummies indicating the schooling level attained by workers, namely no schooling or incomplete primary education, beyond primary education (i.e. primary achieved but incomplete first cycle of secondary education), beyond first cycle of secondary education (i.e. incomplete second cycle of secondary school), and beyond secondary education (or higher education). Recent empirical literature on the returns to education in Africa has indeed shown that the marginal returns to schooling are non-linear[24] with a convex profile, i.e. increasing with the level of education. Using a series

[23] Conversely, one can argue that analyzes that omit occupation and industry may underestimate the importance of background and choice-based characteristics on labour market outcomes (Altonji and Blank, 1999).

[24] Constant rates of return to education are more and more challenged in both developed and developing countries (Card, 1999), especially in Africa (see Bigsten et al., 2000; Schultz, 2004; Söderbom et al., 2006; and Kuepie et al., 2009).

of dummy variables instead of a continuous variable for the years of schooling better allows for this non linearity in the returns to education.

In this paper, it is not possible to account for the workers' actual experience in the labour market, but only for potential experience which can be viewed as reflecting the 'gross' time that individuals have spent while in the labour force (measured as age minus years of schooling minus six – the legal age at school entry). This is a possible limitation of our study since, as argued in the empirical literature, differences in labour force attachment across gender are important to explain the extent of the gender wage gap. Indeed, measures of women's work experience are particularly prone to errors given their discontinuity in labour market participation (for child care for instance). Using proxy measures such as potential experience may lead to overestimate the amount of experience for females, while it might be a good approximation of true experience for men with higher labour force attachment. Nordman and Roubaud (2009) show for Madagascar, however, that the corresponding potential bias in the estimates of the returns to experience depends on the institutional sector and on whether other labour force attachment variables can also be controlled for (the number of work interruptions, unemployment, spells of inactivity, etc.). In absence of such measures, potential experience might be a better proxy than the solely used actual experience since including this variable may introduce additional endogeneity problem in the estimation of the earnings function.[25]

We also estimate earnings functions for the category of self-employed workers.[26] Apart from the probability of greater measurement errors, estimating earnings with standard human capital wage functions for these workers is problematic as other factors not taken into account in the equation, such as the amount of capital or access to credit, are likely to have a significant impact on their incomes. This is the reason why, for modelling their earnings, we perform additional regressions including the log of value of capital and number of potential employees used in their activity.

A.3 Sample selection

Concerns arise over possible sample selection biases in the estimations. Strictly speaking, there are two sources of selectivity bias involved. One arises from the fact that wage-earners are only observed when they work, and not everyone is working. The second comes from the selective decision to engage in public wage employment rather than private wage employment or the informal sector. We use Heckman's two-step procedure to address the first issue. In the first stage, probit estimates of the probability of participation are separately performed for males and females. We then include the appropriate estimated correction term

[25] Regan and Oaxaca (2006) show that using potential versus actual experience in earnings models is best viewed as a model misspecification problem rather than a classical errors-in-variable framework. Instrumental variable techniques are the traditional approach taken to correct classical measurement error. Then, as underline Regan and Oaxaca (2006), instrumenting potential experience would not solve the model specification problem.

[26] Remember that, in our study, the self-employed workers are independent individuals working in informal non-agricultural activities.

(Inverse Mill's Ratios, IMR) into the second-stage earnings equations, for males and females respectively. The inclusion of the correction term ensures that the OLS gives consistent estimates of the augmented earnings functions.

One way to account for the second issue is to determine whether the returns to characteristics of a wage-earner differ from one institutional sector to another. However, given the over-representation of men in the public sector in both years 2001 and 2005, the decision to work in a particular sector may not be determined exogenously. Apart from the observed characteristics discussed above, it may correlate with unobserved characteristics. We use Lee's two-stage approach to take into account the possible effect of endogenous selection in different sectors on earnings (Lee, 1983). In the first stage, multinomial logit models of individual *i*'s participation in sector *j* are used to compute the correction terms λ_{ij} from the predicted probabilities P_{ij}. The appropriate correction term is then included in the respective earnings equation as an additional regressor in the second stage. [27]

Lee's method has been recently criticised because it relies upon a strong assumption regarding the joint distribution of error terms of the equations of interest (see Bourguignon, Fournier and Gurgand, 2007). However, the existing alternative methods we tried, such as Dubin and McFadden's or Dahl's, did not appear more efficient given the limited size of our sectoral sub-samples.[28] Another potential problem is that the multinomial logit may suffer from the Independence of Irrelevant Alternatives assumption (IIA), which in most cases is questionable. We perform Hausman-type tests proposed by Hausman and McFadden (1984) which all provide evidence that the IIA assumption is not violated for both the male and female samples.

A multinomial logit model with five categories is then specified. It includes non-participation in paid employment (as the base category), public wage employment, private formal wage employment, private informal wage employment and self-employed workers. In both Heckman's and Lee's procedures, identification is achieved by the inclusion of three additional individual variables in the first stage selection equations which are omitted in the second stage earnings regressions: the log income of other household members, the log of the surface of land potentially owned by the worker and the log of the individual's value of potential livestock. Our assumption is that these variables have arguably no reason to influence earnings level as these incomes stem from non-agricultural activities. For women and men alike, these instruments do appear to be strong predictors of both participation and sector choice. Relying on the distributional assumptions of the selection correction models, we tested the appropriateness of this identification strategy using Wald tests of joint significance of the identifying variables in the first stage and insignificance in the

[27] The presence of the additional constructed selectivity correction terms renders the standard errors incorrect. Standard errors are then bootstrapped to provide asymptotically consistent values.
[28] Indeed, based on Monte-Carlo simulations, Bourguignon et al. (2007) conclude that Lee's method is adapted to very small samples.

second stage of the analysis for males and females in the different sectors. The tests highlight the appropriateness of their choice as excluding conditions.[29]

A.4 Gender earnings gap decomposition techniques

A.4.1. Oaxaca and Neumark's traditional earnings decompositions

The most common approach to identifying sources of gender wage gaps is the Oaxaca-Blinder decomposition. Two separate standard Mincerian log earnings equations are estimated for males and females. The Oaxaca decomposition is:

$$\overline{\ln w_m} - \overline{\ln w_f} = \beta_m(\bar{x}_m - \bar{x}_f) + (\beta_m - \beta_f)\bar{x}_f \qquad (2)$$

where w_m and w_f are the means of males and females' earnings, respectively; x_m and x_f are vectors containing the respective means of the independent variables for males and females; and β_m and β_f are the estimated coefficients. The first term on the right hand side captures the earnings differential due to different characteristics of males and females. The second term is the earnings gap attributable to different returns to those characteristics or coefficients.

It can be argued that, under discrimination, males are paid competitive wages but females are underpaid. If this is the case, the male coefficients should be taken as the non-discriminatory wage structure, as in equation (2). Conversely, if employers pay females competitive wages but pay males more (nepotism), then the female coefficients should be used as the non-discriminatory wage structure. Therefore, the issue is how to determine the wage structure β^* that would prevail in the absence of discrimination. This choice poses the well-known index number problem given that we could use either the male or the female wage structure as the non-discriminatory benchmark. While *a priori* there is no preferable alternative, the decomposition can be quite sensitive to the selection made. The literature has proposed different weighting schemes to deal with the underlying index problem (Oaxaca, 1973; Reimers, 1983; Cotton, 1988). We use that of Neumark (1988) who proposes a general decomposition of the gender wage differential such as:

$$\overline{\ln w_m} - \overline{\ln w_f} = \beta^*(\bar{x}_m - \bar{x}_f) + [(\beta_m - \beta^*)\bar{x}_m + (\beta^* - \beta_f)\bar{x}_f] \qquad (3)$$

This decomposition can be reduced to Oaxaca's two special cases if it is assumed that there is no discrimination in the male wage structure, i.e. $\beta^* = \beta_m$, or if it is assumed that $\beta^* = \beta_f$. Neumark shows that β^* can be estimated using the weighted average of the wage structures of males and females and advocates using the pooled sample to estimate β^*. The first term is the gender wage gap attributable to

[29] Note that these tests are made possible because, under the normality assumption, the inverse Mills' ratio in sample selection models is a non-linear function of the variables included in the first-stage probit and multinomial equations. Hence, the selection models are still identified even without exclusion restrictions due to this non-linearity (Olsen, 1980).

differences in characteristics. The second and the third terms capture the difference between the actual and pooled returns for men and women, respectively.

While the improvement proposed by Neumark's decomposition is attractive, it fails to account for differences in sectoral structures between gender groups. This is why we also turn to Appleton, Hoddinott and Krishnan (1999)'s sectoral decomposition.

A.4.2. A full sectoral decomposition

This decomposition technique takes into account sectoral structures between genders. Appleton et al. (1999) adopt a similar approach to that of Neumark and decompose the gender earnings gap into three components. Since this technique is based on Neumark's decomposition, it does not suffer from the index number problem encountered by previous authors who attempted to account for differences in occupational choices (Brown et al., 1980). Let $\overline{W_m}$ and $\overline{W_f}$ be the means of the natural logs of male and female earnings and $\overline{p}_{mj}$ and $\overline{p}_{fj}$ be the sample proportions of men and women in sector *j* respectively. Similarly to Neumark (1988), Appleton et al. (1999) assume a sectoral structure that would prevail in the absence of gender differences in the impact of characteristics on sectoral choice ($\overline{p}_j^*$, the proportion of employees in sector *j* under this common structure). They then decompose the difference in proportions employed in three sectors such as:

$$\overline{W_m} - \overline{W_f} = \sum_{j=1}^{3} \overline{p}_j^* (\overline{W_{mj}} - \overline{W_{fj}}) + \sum_{j=1}^{3} \overline{W_{mj}} (\overline{p}_{mj} - \overline{p}_j^*) + \sum_{j=1}^{3} \overline{W_{fj}} (\overline{p}_j^* - \overline{p}_{fj}) \qquad (4)$$

A multinomial logit model is used to specify the selection process of an individual into the different sectors. If q_i is a vector of *i*'s relevant characteristics, the probability of a worker *i* being in sector *j* is given by:

$P_{ij} = \exp(\gamma_{ij} q_i) / \sum_{j=1}^{3} \exp(\gamma_{ij} q_i)$ with $i = m, f$.

If the distribution of men and women across sectors is determined by the same set of coefficients γ_j^*, then the probability of a worker with characteristics q_i being in sector *j* is:

$P_{ij}^* = \exp(\gamma_j^* q_i) / \sum_{j=1}^{3} \exp(\gamma_j^* q_i)$.

Hence, by estimating pooled and separate multinomial logit models for men and women, it is possible to derive the average probability for male and female workers in the different sectors. These mean probabilities are denoted by $\overline{p}_{ij}^*$. The relationship between γ^* and γ_i is similar to that of β^* and β_j in Neumark's decomposition. Embedding the self-selection process in (4), the full decomposition can be written in the following way:

$$\overline{W}_m - \overline{W}_f = \sum_{j=1}^{3} \overline{p}_j^* (\overline{x}_{mj} - \overline{x}_{fj})\beta_j + \sum_{j=1}^{3} \overline{p}_j^* \overline{x}_{mj} (\beta_{mj} - \beta_j) + \sum_{j=1}^{3} \overline{p}_j^* \overline{x}_{fj} (\beta_j - \beta_{fj})$$
$$+ \sum_{j=1}^{3} \overline{W}_{mj} (\overline{p}_{mj}^* - \overline{p}_j^*) + \sum_{j=1}^{3} \overline{W}_{fj} (\overline{p}_j^* - \overline{p}_{fj}^*) + \sum_{j=1}^{3} \overline{W}_{mj} (\overline{p}_{mj} - \overline{p}_{mj}^*) + \sum_{j=1}^{3} \overline{W}_{fj} (\overline{p}_{fj}^* - \overline{p}_{fj}). \quad (5)$$

The first three terms are similar to Neumark decompositions of within-sector earnings gaps. The fourth and fifth terms measure the difference in earnings due to differences in distribution of male and female workers in different sectors. The last two terms account for differences in earnings resulting from the deviations between predicted and actual sectoral compositions of men and women not accounted for by differences in characteristics.

Appendix B: Summary statistics of the variables used in the econometric analysis

Table B1: Summary Statistics of the variables used in the labour allocation models

	2001		2005	
	Males	**Females**	**Males**	**Females**
Under primary education	55.8%	60.7%	68.3%	72.5%
Beyond primary education	23.2%	23.3%	21.0%	20.4%
Beyond first cycle of secondary education	14.7%	12.0%	8.6%	6.0%
Beyond secondary education	6.3%	4.0%	2.1%	1.2%
Potential experience	22.5	22.7	24.3	24.1
Training	13.5%	8.0%	7.0%	5.6%
Married	60.0%	54.4%	60.8%	57.9%
Non christian	8.9%	8.8%	16.7%	15.5%
Merina	37.0%	36.6%	23.1%	22.0%
Urban	59.0%	62.7%	49.4%	51.0%
Observations	6,409	7,197	14,635	15,624

Source: Madagascar EPM 2001 & EPM 2005; authors'calculations. Individuals aged 15 and above.

Table B2: Summary Statistics of the variables used in the earnings equations

	Wage Workers				Non-Farm Self-Employed Workers			
	2001		2005		2001		2005	
	Males	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
Under primary education	39.9%	46.3%	48.0%	52.1%	59.2%	66.2%	67.0%	79.1%
Beyond primary education	24.5%	26.3%	24.3%	24.9%	23.4%	23.4%	22.8%	15.9%
Beyond first cycle of secondary education	24.4%	19.0%	20.4%	15.3%	13.2%	8.9%	8.4%	4.2%
Beyond secondary education	11.2%	8.4%	7.3%	7.7%	4.2%	1.5%	1.8%	0.8%
Potential experience	23.1	21.4	23.8	22.7	n.a.	n.a.	n.a.	n.a.
Training	25.5%	18.7%	20.0%	16.4%	n.a.	n.a.	n.a.	n.a.
Married	74.2%	47.8%	75.0%	53.1%	86.7%	56.5%	90.1%	54.8%
Non christian	8.4%	7.9%	7.6%	5.2%	10.2%	6.9%	9.4%	11.4%
Merina	51.5%	54.0%	52.1%	52.4%	39.0%	29.6%	43.2%	29.5%
Urban	44.0%	50.0%	50.0%	49.5%	28.8%	33.5%	31.9%	25.6%
Number of employees	n.a.	n.a.	n.a.	n.a.	2.1	1.4	1.2	1.1
Value of Capital	n.a.	n.a.	n.a.	n.a.	311 311	74 799	318 901	47 500
Observations	1,845	1,089	2,390	1,474	632	619	1,630	1,573

Source: Madagascar EPM 2001 & EPM 2005; authors'calculations. Individuals aged 15 and above.

Appendix C: Determinants of Sectoral Allocation

Table C1: Nature and Terms of Employment in Total Employment in Madagascar

	All (%)		Male (%)		Female (%)	
	2001	**2005**	**2001**	**2005**	**2001**	**2005**
Type of employment						
Public formal wage employment	3.9	2.7	5.3	3.6	2.4	1.8
Private formal wage employment	4.7	2.4	5.8	3.1	3.5	1.7
Private informal wage employment	9.6	9.5	11.5	10.8	7.5	8.1
Self-employed	44.3	37.8	55.0	57.4	33.0	17.8
Family Workers	37.4	47.7	22.4	25.1	53.5	70.6
Activity sector						
Primary production activity	73.9	80.4	72.5	79.8	75.3	81.1
Manufacturing	5.6	2.3	5.6	2.9	5.6	1.7
Electricity. gas & water supply	1.1	0.2	2.0	0.3	0.1	0.0
Construction	0.7	1.3	0.7	2.5	0.6	0.1
Trade	6.1	5.3	3.9	3.9	8.5	6.8
Hotel and restaurants	1.2	0.7	0.8	0.7	1.5	0.8
Transport. storage & communications	1.8	0.9	3.4	1.7	0.0	0.0
Financial and business activities	0.1	0.1	0.1	0.1	0.0	0.0
Public administration	3.7	2.5	4.4	3.2	2.9	1.7
Other services	5.6	3.6	5.7	2.3	5.4	4.9
Education and Health	0.4	0.3	0.8	0.7	0.0	0.0
Other	0.0	2.4	0.0	2.0	0.0	2.9
Occupation category						
Managers	3.2	1.5	4.3	2.0	1.9	0.9
Skilled employed	5.8	5.1	7.3	6.8	4.2	3.3
Unskilled employed	9.4	8.1	11.1	8.7	7.5	7.4
Self-employed	44.3	37.8	55.0	57.4	33.0	17.8
Family workers	37.4	47.7	22.4	25.1	53.5	70.6
Type of contract						
Permanent employment	82.6	85.2	82.9	86.2	82.2	84.2
Temporary employment	17.4	14.8	17.1	13.8	17.8	15.8

Source: Madagascar EPM 2001 & EPM 2005. *Note:* Individuals aged 15 and above.

Table C2: Nature and Terms of Employment in Total Employment in Urban Areas

	All (%)		Male (%)		Female (%)	
	2001	**2005**	**2001**	**2005**	**2001**	**2005**
Type of employment						
Public formal wage employment	10.2	7.4	12.7	9.2	7.3	5.4
Private formal wage employment	12.7	8.3	14.9	10.5	10.2	5.8
Private informal wage employment	19.7	20.8	21.7	22.3	17.5	19.2
Self-employed	35.1	31.7	37.1	41.3	32.9	20.9
Family Workers	22.4	31.9	13.7	16.8	32.2	48.8
Activity sector						
Primary production activity	37.4	45.8	36.4	43.5	38.5	48.3
Manufacturing	12.9	7.1	13.2	8.6	12.6	5.3
Electricity. gas & water supply	2.8	0.6	5.1	1.1	0.2	0.1
Construction	1.5	4.0	1.9	7.4	1.0	0.2
Trade	14.1	14.5	9.5	10.9	19.4	18.4
Hotel and restaurants	2.6	2.4	1.4	2.3	3.9	2.4
Transport. storage & communications	4.4	3.0	8.1	5.5	0.1	0.2
Financial and business activities	0.4	0.2	0.5	0.3	0.2	0.2
Public administration	9.6	6.6	10.6	8.0	8.4	5.0
Other services	13.3	6.8	11.2	5.1	15.7	8.7
Education and Health	1.1	0.7	2.1	1.4	0.1	0.0
Other	0.0	8.3	0.0	5.8	0.0	11.2
Occupation category						
Managers	8.4	4.7	10.8	5.8	5.4	3.4
Skilled employed	14.9	15.5	18.3	19.8	11.1	10.7
Unskilled employed	19.3	16.3	20.1	16.3	18.4	16.2
Self-employed	35.2	31.7	37.1	41.3	32.9	20.9
Family workers	22.4	31.9	13.7	16.8	32.2	48.8
Type of contract						
Permanent employment	78.8	86.7	79.3	87.7	78.1	85.6
Temporary employment	21.2	13.3	20.7	12.3	21.9	14.4

Source: Madagascar EPM 2001 & EPM 2005. *Note:* Individuals aged 15 and above.

Table C3: Nature and Terms of Employment in Total Employment in Rural Areas

	All (%)		Male (%)		Female (%)	
	2001	**2005**	**2001**	**2005**	**2001**	**2005**
Type of employment						
Public formal wage employment	2.4	1.5	3.5	2.1	1.3	0.9
Private formal wage employment	2.8	0.9	3.6	1.1	2.0	0.7
Private informal wage employment	7.1	6.7	8.9	7.8	5.2	5.6
Self-employed	46.6	39.3	59.5	61.6	33.1	17.1
Family Workers	41.1	51.6	24.6	27.3	58.5	75.7
Activity sector						
Primary production activity	82.8	89.0	81.7	89.3	83.9	88.8
Manufacturing	3.9	1.1	3.7	1.4	4.0	0.8
Electricity. gas & water supply	0.7	0.0	1.3	0.1	0.1	0.0
Construction	0.5	0.6	0.4	1.2	0.5	0.1
Trade	4.2	3.1	2.5	2.1	6.0	4.1
Hotel and restaurants	0.8	0.3	0.7	0.3	0.9	0.4
Transport. storage & communications	1.2	0.4	2.3	0.7	0.0	0.0
Financial and business activities	0.0	0.0	0.0	0.0	0.0	0.0
Public administration	2.2	1.4	2.8	1.9	1.6	0.9
Other services	3.7	2.8	4.3	1.6	3.0	4.0
Education and Health	0.2	0.2	0.5	0.5	0.0	0.0
Other	0.0	1.0	0.0	1.0	0.0	0.9
Occupation category						
Managers	1.9	0.7	2.6	1.0	1.0	0.4
Skilled employed	3.5	2.5	4.6	3.4	2.4	1.5
Unskilled employed	6.9	6.0	8.8	6.7	5.0	5.3
Self-employed	46.6	39.3	59.5	61.6	33.1	17.1
Family workers	41.1	51.6	24.6	27.3	58.5	75.7
Type of contract						
Permanent employment	83.5	84.8	83.8	85.8	83.1	83.9
Temporary employment	16.5	15.2	16.2	14.2	16.9	16.1

Source: Madagascar EPM 2001 & EPM 2005. *Note:* Individuals aged 15 and above.

Table C4: The Determinants of Labour allocation Across Paid Employment and Agricultural Self-Employment (Multinomial Logit Models)

	2001				2005			
	Males		Females		Males		Females	
	Paid Employment	Agricultural self-employment	Paid Employment	Agricultural self-employment	Paid Employment	Agricultural self-employment	Paid Employment	Agricultural self-employment
Beyond primary education	0.496***	-0.477***	0.389***	0.079	0.526***	0.007	0.446***	0.261**
(Reference category: no schooling or primary incomplete)	(4.56)	(-3.43)	(4.79)	(0.61)	(5.91)	(0.07)	(6.63)	(2.36)
Beyond first cycle of secondary education	0.561***	-1.175***	0.593***	-0.502*	0.685***	-0.626***	1.034***	-0.214
	(4.20)	(-5.68)	(5.85)	(-1.95)	(5.66)	(-4.130)	(10.76)	(-0.81)
Beyond secondary education	0.899***	-1.405***	0.636***	-0.852	1.173***	-0.631*	1.677***	-0.697
	(4.72)	(-3.44)	(4.16)	(-1.41)	(5.01)	(-1.82)	(9.01)	(-0.66)
Potential experience	0.222***	0.192***	0.186***	0.161***	0.273***	0.250***	0.199***	0.247***
	(20.40)	(15.77)	(22.46)	(15.14)	(30.16)	(31.24)	(28.72)	(28.75)
Potential experience squared	-0.004***	-0.003***	-0.003***	-0.002***	-0.004***	-0.003***	-0.003***	-0.003***
	(-20.14)	(-15.01)	(-19.65)	(-12.70)	(-27.67)	(-27.84)	(-24.79)	(-24.63)
Training	0.821***	-0.589***	1.139***	0.303	1.084***	-0.530***	1.077***	-0.180
	(6.21)	(-2.92)	(10.82)	(1.28)	(8.46)	(-3.38)	(12.04)	(-1.02)
Married	2.137***	3.379***	-0.817***	-0.921***	2.221***	3.689***	-1.398***	-2.864***
	(20.59)	(26.37)	(-11.34)	(-10.05)	(28.20)	(48.48)	(-23.32)	(-36.73)
Non christian	0.259*	-0.134	0.058	0.067	-0.053	0.084	-0.061	0.004
	(1.80)	(-0.76)	(0.55)	(0.44)	(-0.54)	(0.94)	(-0.74)	(0.04)
Merina	0.350***	0.127	0.085	0.064	0.296**	0.042	0.085	-0.251
	(2.64)	(0.66)	(0.87)	(0.35)	(2.46)	(0.31)	(0.93)	(-1.635)
Urban	0.279***	-1.151***	0.359***	-0.818***	0.241***	-0.385***	0.051	-0.267***
	(2.77)	(-10.35)	(4.38)	(-8.41)	(3.32)	(-5.52)	(0.86)	(-3.84)
Other household members earnings per capita (log)	0.022***	-0.075***	0.021***	-0.037***	0.046***	-0.072***	0.043***	-0.043***
	(4.81)	(-10.99)	(5.79)	(-6.75)	(10.85)	(-12.92)	(13.69)	(-7.241)
Land area (log)	-0.048***	0.060***	-0.055***	0.051***	-0.093***	0.313***	-0.087***	0.188***
	(-5.18)	(6.72)	(-6.68)	(6.91)	(-12.71)	(18.54)	(-16.97)	(11.31)
Livestock value (log)	-0.020***	0.024***	-0.024***	0.013***	-0.034***	-0.003	-0.030***	-0.021***
	(-4.45)	(5.09)	(-6.50)	(3.11)	(-10.04)	(-0.982)	(-11.14)	(-6.412)
Constant	-4.012***	-4.590***	-3.570***	-2.952***	-4.382***	-6.744***	-3.265***	-5.365***
	(-20.27)	(-17.24)	(-23.12)	(-12.40)	(-25.38)	(-32.25)	(-25.26)	(-23.78)
Observations	6,409		7,197		14,635		15,624	
Pseudo R-squared	0.49		0.20		0.55		0.27	

Source: Madagascar EPM 2001 & EPM 2005. Individuals aged 15 and above.
Notes: The multinomial logits are performed for each sex. The reference category is "Inactive – Unemployed – Family workers". Dummies for location are also included in the models.
Robust t statistics in parentheses: * significant at 10%, ** significant at 5%, *** significant at 1%.

Table C5: The Determinants of Labour Allocation Across Sectors for Males (Multinomial Logit Models)

	2001					2005				
	Public employment	**Private formal wage employment**	**Private informal wage employment**	**Private informal self-employment**	**Agricultural self-employment**	**Public employment**	**Private formal wage employment**	**Private informal wage employment**	**Private informal self-employment**	**Agricultural self-employment**
Beyond primary education	1.528***	0.901***	0.174	0.410***	-0.418***	1.410***	1.287***	0.169*	0.610***	0.060
	(7.79)	(5.63)	(1.41)	(2.89)	(-3.00)	(8.75)	(7.71)	(1.68)	(5.42)	(0.63)
Beyond first cycle of sec. education	2.233***	1.151***	0.016	0.342**	-0.997***	2.696***	1.881***	-0.022	0.467***	-0.372**
	(10.58)	(6.36)	(0.10)	(1.97)	(-4.76)	(15.20)	(9.85)	(-0.15)	(2.93)	(-2.37)
Beyond secondary education	3.169***	1.716***	-0.024	0.501**	-1.091***	3.918***	2.860***	-0.172	0.903***	-0.088
	(11.89)	(7.30)	(-0.10)	(1.99)	(-2.65)	(13.17)	(9.35)	(-0.57)	(2.91)	(-0.24)
Potential experience	0.341***	0.234***	0.203***	0.207***	0.195***	0.382***	0.344***	0.248***	0.263***	0.252***
	(15.12)	(13.35)	(15.14)	(13.46)	(15.91)	(19.94)	(16.79)	(22.89)	(21.31)	(31.32)
Potential experience squared	-0.005***	-0.004***	-0.003***	-0.003***	-0.003***	-0.005***	-0.005***	-0.004***	-0.004***	-0.003***
	(-13.21)	(-12.52)	(-15.11)	(-13.13)	(-15.08)	(-16.79)	(-14.19)	(-21.06)	(-19.27)	(-27.86)
Training	1.227***	1.182***	0.547***	0.674***	-0.561***	1.724***	1.427***	0.948***	0.754***	-0.492***
	(7.21)	(7.55)	(3.63)	(4.14)	(-2.77)	(10.68)	(8.26)	(6.65)	(4.78)	(-3.09)
Married	2.708***	2.166***	1.917***	2.336***	3.357***	2.582***	2.247***	1.868***	2.735***	3.686***
	(12.17)	(13.62)	(15.47)	(15.93)	(26.26)	(15.15)	(13.36)	(20.11)	(23.79)	(48.43)
Non christian	-0.098	0.050	0.294*	0.337*	-0.154	-0.293	-0.353	-0.088	0.133	0.092
	(-0.41)	(0.24)	(1.86)	(1.84)	(-0.87)	(-1.55)	(-1.63)	(-0.76)	(1.08)	(1.03)
Merina	-0.354*	0.249	0.433***	0.578***	0.103	-0.222	0.062	0.279**	0.610***	0.066
	(-1.81)	(1.42)	(2.87)	(3.37)	(0.54)	(-1.21)	(0.33)	(2.08)	(4.09)	(0.48)
Urban	0.122	0.547***	0.238**	0.227*	-1.163***	0.046	0.880***	0.083	0.434***	-0.361***
	(0.70)	(3.34)	(2.01)	(1.67)	(-10.43)	(0.35)	(5.32)	(0.99)	(4.49)	(-5.16)
Other household members earnings per capita (log)	0.012*	0.012*	0.044***	-0.009	-0.077***	0.021***	0.038***	0.073***	-0.004	-0.079***
	(1.77)	(1.91)	(8.37)	(-1.52)	(-11.21)	(3.06)	(5.28)	(15.74)	(-0.78)	(-14.02)
Land area (log)	-0.045***	-0.071***	-0.043***	-0.044***	0.061***	-0.091***	-0.103***	-0.094***	-0.083***	0.314***
	(-2.59)	(-4.34)	(-3.80)	(-3.39)	(6.80)	(-8.21)	(-9.00)	(-11.90)	(-9.13)	(18.57)
Livestock value (log)	-0.011	-0.019***	-0.019***	-0.025***	0.024***	-0.030***	-0.045***	-0.031***	-0.038***	-0.004
	(-1.39)	(-2.62)	(-3.56)	(-4.03)	(5.13)	(-5.12)	(-6.67)	(-7.94)	(-8.57)	(-1.08)
Constant	-8.891***	-6.199***	-4.282***	-5.466***	-4.641***	-9.329***	-8.361***	-4.066***	-6.642***	-6.934***
	(-20.92)	(-19.90)	(-18.50)	(-19.60)	(-17.34)	(-25.97)	(-23.57)	(-20.93)	(-27.06)	(-32.67)
Observations			6,409					14,635		
Pseudo R-squared			0.37					0.47		

Source: Madagascar EPM 2001 & EPM 2005. Individuals aged 15 and above.
Notes: The reference category is "Inactive – Unemployed – Family workers". Dummies for location are also included in the models.
Robust t statistics in parentheses: * significant at 10%, ** significant at 5%, *** significant at 1%.

Table C6: The Determinants of Labour Allocation Across Sectors for Females (Multinomial Logit Models)

	2001					2005				
	Public employment	**Private formal wage employment**	**Private informal wage employment**	**Private informal self-employment**	**Agricultural self-employment**	**Public employment**	**Private formal wage employment**	**Private informal wage employment**	**Private informal self-employment**	**Agricultural self-employment**
Beyond primary education	1.644***	0.912***	-0.228*	0.544***	0.100	2.272***	1.433***	-0.092	0.572***	0.279**
	(6.87)	(5.09)	(-1.89)	(5.07)	(0.77)	(9.90)	(6.61)	(-0.99)	(6.22)	(2.53)
Beyond first cycle of sec. education	2.913***	1.450***	-0.433***	0.471***	-0.434*	4.214***	2.646***	-0.043	0.718***	-0.101
	(11.72)	(7.47)	(-2.62)	(3.24)	(-1.69)	(17.72)	(11.31)	(-0.28)	(4.94)	(-0.38)
Beyond secondary education	3.486***	1.645***	-0.421*	-0.341	-0.722	5.553***	3.641***	0.421	0.408	-0.439
	(11.41)	(6.75)	(-1.68)	(-1.12)	(-1.20)	(16.91)	(11.39)	(1.47)	(1.03)	(-0.42)
Potential experience	0.388***	0.216***	0.160***	0.167***	0.160***	0.306***	0.248***	0.198***	0.185***	0.245***
	(12.71)	(11.95)	(12.49)	(14.94)	(15.05)	(13.73)	(10.39)	(18.81)	(20.47)	(28.63)
Potential experience squared	-0.006***	-0.003***	-0.003***	-0.002***	-0.002***	-0.004***	-0.004***	-0.003***	-0.002***	-0.003***
	(-10.18)	(-9.77)	(-11.57)	(-12.72)	(-12.58)	(-10.13)	(-8.02)	(-16.88)	(-17.27)	(-24.49)
Training	1.820***	1.445***	0.694***	1.019***	0.311	1.853***	1.635***	0.638***	0.981***	-0.191
	(10.07)	(9.07)	(4.22)	(7.16)	(1.33)	(11.38)	(9.15)	(4.74)	(8.07)	(-1.08)
Married	-1.058***	-1.268***	-1.157***	-0.327***	-0.902***	-1.139***	-1.302***	-1.592***	-1.243***	-2.852***
	(-5.95)	(-8.49)	(-10.60)	(-3.40)	(-9.84)	(-6.87)	(-7.30)	(-18.92)	(-15.68)	(-36.61)
Non christian	-0.707**	-0.196	0.265*	0.080	0.068	-0.520	-0.433	-0.307**	0.144	0.008
	(-2.14)	(-0.83)	(1.77)	(0.57)	(0.45)	(-1.55)	(-1.25)	(-2.38)	(1.42)	(0.09)
Merina	-0.009	0.186	0.252*	-0.098	0.062	-0.353*	0.104	0.079	0.195	-0.246
	(-0.04)	(1.02)	(1.70)	(-0.72)	(0.34)	(-1.66)	(0.48)	(0.63)	(1.56)	(-1.60)
Urban	0.338	0.471**	0.359***	0.352***	-0.822***	-0.005	0.191	-0.192**	0.251***	-0.262***
	(1.41)	(2.24)	(2.75)	(3.25)	(-8.45)	(-0.03)	(0.98)	(-2.33)	(3.13)	(-3.78)
Other household members earnings per capita (log)	0.021**	0.031***	0.052***	-0.002	-0.037***	0.016*	0.042***	0.084***	0.008*	-0.044***
	(2.29)	(3.81)	(8.73)	(-0.41)	(-6.79)	(1.83)	(4.48)	(18.52)	(1.95)	(-7.28)
Land area (log)	-0.062**	-0.058***	-0.062***	-0.044***	0.051***	-0.084***	-0.104***	-0.082***	-0.091***	0.187***
	(-2.39)	(-2.64)	(-4.61)	(-4.06)	(6.97)	(-6.37)	(-7.80)	(-11.79)	(-13.05)	(11.29)
Livestock value (log)	-0.012	-0.036***	-0.017***	-0.030***	0.013***	-0.023***	-0.029***	-0.029***	-0.031***	-0.021***
	(-1.21)	(-3.31)	(-2.83)	(-6.08)	(3.10)	(-2.95)	(-3.38)	(-7.47)	(-8.49)	(-6.41)
Constant	-10.069***	-5.864***	-3.930***	-4.534***	-2.971***	-9.331***	-6.876***	-3.156***	-4.766***	-5.380***
	(-19.24)	(-17.05)	(-16.54)	(-20.58)	(-12.44)	(-22.56)	(-19.04)	(-17.83)	(-25.17)	(-23.79)
Observations			7,197					15,624		
Pseudo R-squared			0.19					0.26		

Source: Madagascar EPM 2001 & EPM 2005. Individuals aged 15 and above.
Notes: The reference category is "Inactive – Unemployed – Family workers". Dummies for location are also included in the models.
Robust t statistics in parentheses: * significant at 10%, ** significant at 5%, *** significant at 1%.

Appendix D: Wage Employment Earnings Equations

Table D1: Log Hourly Earnings Equations for Wage Employment

	2001				2005			
	Men		Women		Men		Women	
	OLS	Heckman	OLS	Heckman	OLS	Heckman	OLS	Heckman
Beyond primary	0.548***	0.527***	0.267***	0.254***	0.319***	0.323***	0.256***	0.257***
education	(6.50)	(6.09)	(3.19)	(3.03)	(6.13)	(6.28)	(3.60)	(3.62)
Beyond first cycle	0.778***	0.727***	0.762***	0.735***	0.568***	0.583***	0.683***	0.701***
of secondary education	(8.38)	(7.81)	(7.87)	(7.69)	(8.57)	(8.65)	(8.52)	(8.52)
Beyond secondary	1.369***	1.295***	1.111***	1.053***	1.217***	1.239***	1.170***	1.211***
education	(14.97)	(11.59)	(9.52)	(8.36)	(11.69)	(11.78)	(10.58)	(10.33)
Potential experience	0.033***	0.027**	0.026***	0.019*	0.027***	0.031***	0.038***	0.043***
	(2.77)	(1.97)	(3.03)	(1.76)	(3.87)	(3.92)	(5.14)	(5.14)
Potential experience	-0.000**	-0.000	-0.000**	-0.000	-0.000**	-0.000**	-0.000***	-0.001***
squared	(-2.00)	(-1.26)	(-2.06)	(-0.97)	(-2.19)	(-2.39)	(-3.66)	(-3.85)
Training	0.223***	0.187***	0.348***	0.301***	0.381***	0.402***	0.228***	0.260***
	(3.59)	(2.60)	(3.62)	(3.07)	(6.68)	(6.69)	(2.90)	(3.09)
Married	0.121	0.117	0.038	0.075	0.233***	0.237***	0.037	0.020
	(1.17)	(1.13)	(0.61)	(1.01)	(4.27)	(4.33)	(0.71)	(0.36)
Non christian	-0.027	-0.034	-0.077	-0.082	-0.134*	-0.136*	-0.253*	-0.262**
	(-0.36)	(-0.45)	(-0.98)	(-1.03)	(-1.80)	(-1.84)	(-1.92)	(-1.99)
Merina	0.023	0.016	0.166*	0.145	-0.019	-0.019	-0.055	-0.051
	(0.22)	(0.15)	(1.69)	(1.44)	(-0.31)	(-0.30)	(-0.76)	(-0.71)
Urban	0.141**	0.111*	0.136**	0.109	0.177***	0.196***	0.281***	0.294***
	(2.51)	(1.76)	(1.98)	(1.42)	(4.16)	(4.65)	(5.28)	(5.40)
Mill's ratio		-0.126		-0.129		*0.055*		*0.079*
		(-1.32)		(-1.07)		(1.23)		(1.16)
Constant	4.704***	4.939***	4.667***	4.931***	4.990***	4.885***	4.870***	4.727***
	(31.58)	(19.79)	(32.46)	(17.05)	(47.29)	(35.57)	(41.54)	(27.13)
Observations	1,845	1,845	1,089	1,089	2,390	2,390	1,474	1,474
R-squared	0.33	0.33	0.34	0.34	0.32	0.32	0.32	0.32

Source: Madagascar EPM 2001 & EPM 2005. Individuals aged 15 and above.

Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Dummies for location are also included in the models.

Table D2: Log Hourly Earnings Equations for Public Wage Employment

	2001				2005			
	Men		Women		Men		Women	
	OLS	Lee	OLS	Lee	OLS	Lee	OLS	Lee
Beyond primary education	0.407**	-0.237	-0.391	-0.368	0.509***	0.159	0.652**	0.447
	(2.01)	(-0.88)	(-1.65)	(-0.73)	(3.66)	(1.41)	(2.36)	(1.37)
Beyond first cycle of secondary education	0.600**	-0.200	0.276**	0.062	0.506***	0.077	0.923***	0.639
	(2.37)	(-0.52)	(2.01)	(0.10)	(3.34)	(0.41)	(3.21)	(1.21)
Beyond secondary education	1.074***	0.152	0.613***	0.442	1.151***	0.523**	1.348***	0.992
	(5.25)	(0.29)	(3.40)	(0.61)	(6.57)	(2.23)	(4.36)	(1.53)
Potential experience	0.044	-0.020	-0.001	-0.014	0.019	-0.001	0.017	0.020
	(0.96)	(-0.49)	(-0.04)	(-0.21)	(1.30)	(-0.04)	(0.72)	(0.66)
Potential experience squared	-0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(-0.60)	(0.55)	(0.38)	(0.30)	(0.17)	(0.90)	(0.53)	(0.28)
Training	0.178	-0.204	0.167	0.111	0.251**	0.023	0.245*	0.020
	(1.09)	(-1.40)	(1.43)	(0.49)	(2.19)	(0.23)	(1.93)	(0.12)
Married	-0.259	-0.306	0.247**	0.269	-0.131	-0.064	0.264	0.140
	(-0.59)	(-1.48)	(2.34)	(1.42)	(-0.72)	(-0.53)	(1.63)	(1.31)
Non christian	-0.058	0.029	-0.039	0.072	-0.036	0.078	0.109	0.215
	(-0.38)	(0.21)	(-0.21)	(0.24)	(-0.22)	(0.64)	(0.40)	(1.16)
Merina	0.099	0.258*	0.328	0.316	0.016	0.105	0.051	0.082
	(0.42)	(1.67)	(1.44)	(0.93)	(0.11)	(1.17)	(0.32)	(0.70)
Urban	0.229**	0.123	0.251**	0.131	0.269***	0.178**	0.139	0.121
	(2.23)	(0.91)	(2.31)	(0.68)	(2.89)	(2.39)	(1.11)	(1.00)
Mill's ratio		0.727*		0.183		0.379**		0.135
		(1.76)		(0.43)		(2.38)		(0.45)
Constant	4.919***	7.930***	5.397***	6.095***	5.534***	6.727***	4.657***	5.283***
	(7.83)	(4.63)	(24.39)	(3.01)	(19.42)	(11.10)	(11.72)	(3.92)
Observations	434	434	212	212	586	586	273	273
R-squared	0.17	0.22	0.27	0.20	0.20	0.21	0.34	0.31

Source: Madagascar EPM 2001 & EPM 2005. Individuals aged 15 and above.

Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Dummies for location are also included in the models.

Table D3: Log Hourly Earnings Equations for Formal Wage Employment

	2001				2005			
	Men		Women		Men		Women	
	OLS	Lee	OLS	Lee	OLS	Lee	OLS	Lee
Beyond primary education	0.568***	0.384***	0.084	0.316**	0.243*	0.101	0.258*	0.192
	(3.22)	(3.25)	(0.66)	(2.55)	(1.72)	(0.74)	(1.76)	(1.13)
Beyond first cycle of secondary education	0.753***	0.603***	0.307**	0.599***	0.293**	0.242	0.304**	0.382
	(6.45)	(4.79)	(2.21)	(3.84)	(2.32)	(1.60)	(2.00)	(1.53)
Beyond secondary education	1.473***	1.330***	0.825***	1.192***	0.866***	0.753***	0.905***	0.867**
	(9.43)	(8.06)	(5.22)	(6.53)	(5.22)	(3.72)	(4.82)	(2.39)
Potential experience	0.014	0.022	0.032***	0.035**	0.015	0.027	0.038**	0.029
	(0.76)	(1.41)	(3.08)	(2.13)	(0.97)	(1.52)	(2.00)	(1.03)
Potential experience squared	-0.000	-0.000	-0.000*	-0.000	-0.000	-0.001	-0.000	-0.000
	(-0.06)	(-0.68)	(-1.67)	(-1.17)	(-0.90)	(-1.63)	(-1.12)	(-0.65)
Training	0.152*	0.171*	0.181*	0.224**	0.325***	0.153*	0.212*	0.282*
	(1.79)	(1.81)	(1.91)	(2.10)	(2.95)	(1.65)	(1.81)	(1.67)
Married	0.269**	0.117	-0.247***	-0.156	0.285**	0.165	-0.278**	-0.274**
	(2.01)	(0.99)	(-3.02)	(-1.44)	(2.05)	(1.61)	(-2.48)	(-2.22)
Non christian	0.197	0.166	-0.097	-0.018	0.021	-0.075	0.391	0.066
	(1.37)	(1.03)	(-0.63)	(-0.12)	(0.14)	(-0.59)	(1.27)	(0.26)
Merina	0.032	-0.035	0.183	0.093	0.090	0.190*	0.044	0.339**
	(0.17)	(-0.36)	(1.43)	(0.73)	(0.65)	(1.81)	(0.34)	(2.05)
Urban	0.045	0.057	0.059	0.044	-0.035	-0.183	0.362***	0.387**
	(0.44)	(0.43)	(0.75)	(0.38)	(-0.30)	(-1.38)	(2.90)	(2.41)
Mill's ratio		0.018		0.022		0.172		-0.114
		(0.08)		(0.10)		(1.11)		(-0.40)
Constant	4.896***	5.111***	5.125***	4.891***	5.420***	5.826***	5.310***	4.930***
	(23.89)	(7.46)	(27.70)	(7.58)	(18.88)	(10.31)	(19.46)	(5.24)
Observations	532	532	302	302	395	395	209	209
R-squared	0.32	0.29	0.28	0.32	0.23	0.25	0.38	0.26

Source: Madagascar EPM 2001 & EPM 2005. Individuals aged 15 and above.
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Dummies for location are also included in the models.

Table D4: Log Hourly Earnings Equations for Informal Wage Employment

	2001				2005			
	Men		Women		Men		Women	
	OLS	Lee	OLS	Lee	OLS	Lee	OLS	*Lee*
Beyond primary education	0.442***	0.418***	0.101	0.198***	0.139**	0.176***	-0.015	0.064
	(4.10)	(5.97)	(1.08)	(2.69)	(2.50)	(3.79)	(-0.18)	(1.03)
Beyond first cycle of secondary education	0.616***	0.534***	0.627**	0.522***	0.407***	0.414***	0.348***	0.263***
	(5.61)	(6.35)	(2.32)	(4.40)	(4.50)	(5.94)	(3.05)	(2.87)
Beyond secondary education	1.136***	1.084***	0.803***	0.818***	1.057***	1.056***	0.782***	0.920***
	(8.44)	(8.42)	(3.16)	(3.38)	(5.22)	(7.09)	(3.80)	(3.74)
Potential experience	0.027*	0.028***	0.010	0.028**	0.020**	0.030***	0.027***	0.021***
	(1.88)	(3.34)	(0.82)	(2.52)	(2.41)	(4.60)	(3.28)	(2.98)
Potential experience squared	-0.000*	-0.000***	-0.000	-0.000**	-0.000	-0.000***	-0.000***	-0.000***
	(-1.70)	(-2.63)	(-0.51)	(-2.12)	(-1.52)	(-3.75)	(-2.75)	(-2.62)
Training	0.249**	0.136*	0.561*	0.224**	0.321***	0.254***	0.075	0.219**
	(2.47)	(1.90)	(1.92)	(1.98)	(4.66)	(4.69)	(0.64)	(2.55)
Married	0.110	0.192**	0.106	0.001	0.223***	0.209***	0.073	0.031
	(0.84)	(2.55)	(1.17)	(0.02)	(3.39)	(4.38)	(1.23)	(0.62)
Non christian	-0.022	-0.038	0.027	0.012	-0.148*	-0.082	-0.393***	-0.367***
	(-0.25)	(-0.50)	(0.29)	(0.12)	(-1.72)	(-1.23)	(-2.95)	(-3.83)
Merina	0.020	-0.052	-0.014	0.058	-0.011	0.133**	-0.036	0.048
	(0.18)	(-0.55)	(-0.10)	(0.43)	(-0.18)	(2.32)	(-0.39)	(0.60)
Urban	0.157**	0.133	0.080	0.098	0.147***	0.151***	0.283***	0.163***
	(2.02)	(1.52)	(0.68)	(0.96)	(3.12)	(3.64)	(4.58)	(3.18)
Mill's ratio		0.029		-0.161		-0.033		-0.129**
		(0.25)		(-1.07)		(-0.82)		(-2.08)
Constant	4.832***	4.860***	4.944***	4.501***	5.128***	4.816***	5.033***	4.879***
	(25.53)	(18.45)	(22.53)	(11.59)	(42.58)	(41.54)	(35.08)	(29.21)
Observations	868	868	555	555	1,409	1,409	992	992
R-squared	0.29	0.24	0.25	0.21	0.24	0.21	0.19	0.13

Source: Madagascar EPM 2001 & EPM 2005. Individuals aged 15 and above.
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Dummies for location are also included in the models.

Table D5: Log Hourly Earnings Equations for Non-Farm Self-Employment

	2001				2005			
	Men		Women		Men		Women	
	OLS	Heckman	OLS	Heckman	OLS	Heckman	OLS	Heckman
Enterprise characteristics								
Log(number of employees)	0.427***	0.427***	0.418**	0.421**	0.750***	0.750***	0.913***	0.910***
	(3.27)	(3.25)	(2.55)	(2.57)	(6.25)	(6.25)	(4.03)	(4.01)
Log(value of physical capital)	0.058***	0.058***	0.031**	0.030**	0.029***	0.029***	0.032***	0.031***
	(3.93)	(3.90)	(2.20)	(2.16)	(3.67)	(3.66)	(3.95)	(3.91)
Individual characteristics								
Beyond primary education	0.407**	0.405*	0.534***	0.450**	0.135	0.202	0.428***	0.291
	(2.26)	(1.95)	(3.50)	(2.13)	(1.30)	(1.32)	(4.24)	(1.17)
Beyond first cycle of secondary education	0.815***	0.814***	1.006***	0.957***	0.558***	0.534***	0.284	0.140
	(4.39)	(4.27)	(4.22)	(3.83)	(3.53)	(3.28)	(1.55)	(0.48)
Beyond secondary education	0.720***	0.720***	2.052*	2.139**	1.035***	0.911***	1.550***	1.202
	(3.16)	(3.16)	(1.94)	(2.00)	(3.74)	(2.63)	(3.06)	(1.54)
Married	-0.095	-0.102	0.070	0.071	-0.225*	0.262	0.174**	0.083
	(-0.52)	(-0.26)	(0.53)	(0.54)	(-1.83)	(0.32)	(2.28)	(0.51)
Non christian	-0.272	-0.273	0.188	0.229	-0.012	-0.060	-0.032	-0.056
	(-1.00)	(-1.01)	(0.81)	(0.99)	(-0.11)	(-0.45)	(-0.25)	(-0.42)
Merina	0.332	0.329	0.164	0.159	0.020	0.171	0.035	0.131
	(1.57)	(1.37)	(0.73)	(0.71)	(0.16)	(0.61)	(0.24)	(0.61)
Urban	0.219*	0.218	0.319***	0.240	0.300***	0.426*	0.375***	0.472***
	(1.78)	(1.54)	(2.60)	(1.39)	(3.68)	(1.86)	(4.82)	(2.70)
Mill's ratio		-0.012		-0.549		0.620		1.142
		(-0.02)		(-0.57)		(0.60)		(0.59)
Constant	4.538***	4.567***	4.206***	5.333***	5.552***	3.994	4.873***	2.794
	(14.69)	(3.05)	(16.08)	(2.67)	(31.55)	(1.53)	(30.36)	(0.80)
Observations	632	632	619	619	1,630	1,630	1,573	1,573
R-squared	0.22	0.22	0.21	0.21	0.15	0.15	0.17	0.17

Source: Madagascar EPM 2001 & EPM 2005. Individuals aged 15 and above.
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Dummies for location are also included in the models.

Appendix E: Earnings Gap Decompositions for Wage Workers

Table E1: Neumark's Decomposition of the Gender Log Hourly Earnings Gap (OLS estimates)

	2001		2005	
Gender log hourly earnings gap to be decomposed	**0.234**		**0.220**	
First specification (not accounting for job characteristics)				
Difference due to:				
Explained (%)	**68.6**		**37.5**	
Human Capital characteristics	51.3		26.5	
Of which Education		30.1		11.2
Experience		13.7		9.9
Training		7.6		5.4
Unexplained (%)	**31.4**		**62.5**	
Total (%)	**100**		**100**	
Second specification (accounting for job characteristics)				
Difference due to:				
Explained (%)	**66.5**		**61.7**	
Human Capital characteristics	32.1		14.9	
Of which Education		17.7		5.0
Experience		9.0		7.3
Training		5.4		2.6
Job characteristics	23.4		39.1	
Of which Occupation		*23.8*		*41.2*
Terms of employment		*-0.4*		*-2.1*
Unexplained (%)	**33.5**		**38.3**	
Total (%)	**100**		**100**	

Source: Madagascar EPM 2001 & EPM 2005; authors' calculations.

Table E2: Neumark's Decomposition of the Gender Log Hourly Earnings Gap by Wage Employment Sector (OLS estimates)

	2001			2005		
	Public Wage Employment	**Formal Wage Employment**	**Informal Wage Employment**	**Public Wage Employment**	**Formal Wage Employment**	**Informal Wage Employment**
Gender log hourly earnings gap to be decomposed	**-0.039**	**0.176**	**0.242**	**0.123**	**0.075**	**0.168**
First specification (not accounting for job characteristics)						
Difference due to:						
Explained (%)	**-29.5**	**17.5**	**65.6**	**9.3**	**43.7**	**11.0**
Human Capital characteristics	34.1	20.0	45.8	-24.4	-2.4	10.1
Of which Education	1.0	-13.3	28.0	-19.9	-64.8	2.0
Experience	34.3	32.4	5.5	-11.0	71.8	4.8
Training	-1.2	0.9	12.3	6.6	-9.4	3.3
Unexplained (%)	**129.5**	**82.5**	**34.4**	**90.7**	**56.3**	**89.0**
Total (%)	**100**	**100**	**100**	**100**	**100**	**100**
Second specification (accounting for job characteristics)						
Difference due to:						
Explained (%)	**-48.7**	**29.8**	**65.4**	**45.3**	**21.0**	**35.1**
Human Capital characteristics	17.4	10.9	34.6	-16.2	2.6	7.6
Of which Education	-8.8	-9.7	19.0	-12.9	-46.3	1.1
Experience	27.2	20.1	4.5	-6.9	54.5	4.7
Training	-1.0	0.4	11.1	3.6	-5.5	1.8
Job characteristics	43.2	11.0	15.3	40.9	-7.8	27.6
Of which Occupation	5.2	9.8	18.2	36.9	-9.0	32.9
Terms of employment	38.0	1.2	-3.0	4.0	1.3	-5.4
Unexplained (%)	**148.7**	**70.2**	**34.6**	**54.7**	**79.0**	**64.9**
Total (%)	**100**	**100**	**100**	**100**	**100**	**100**

Source: Madagascar EPM 2001 & EPM 2005; authors' calculations.

Table E3: Neumark's Decomposition of the Gender Mean Log Hourly Earnings Gap in the Non-Farm Self-Employment Sector (OLS estimates)

	2001		2005	
Gender log hourly earnings gap to be decomposed	**0.605**		**0.528**	
First specification (not accounting for branch of activity)				
Difference due to:				
Explained (%)	**57.1**		**59.0**	
Human Capital characteristics	16.3		18.8	
Of which Education		16.3		18.8
Enterprise characteristics	47.1		26.9	
Of which Log (nb of employees)		27.2		11.1
Log (value of capital)		19.9		15.7
Unexplained (%)	**42.9**		**41.0**	
Total (%)	**100**		**100**	
Second specification (accounting for branch of activity)				
Difference due to:				
Explained (%)	**78.7**		**84.2**	
Human Capital characteristics	8.7		17.4	
Of which Education		8.7		17.4
Enterprise characteristics	77.0		56.3	
Of which Log(nb of employees)		34.3		11.1
Log(value of capital)		9.5		12.7
Sector		33.2		32.6
Unexplained (%)	**21.3**		**15.8**	
Total (%)	**100**		**100**	

Source: Madagascar EPM 2001 & EPM 2005; authors' calculations.