Reassessing the Gender Wage Gap in Madagascar: Does Labor Force Attachment Really Matter?

CHRISTOPHE J. NORDMAN
IRD, DIAL, Paris

FRANÇOIS ROUBAUD
IRD, DIAL, Hanoi

I. Introduction
Returns to human capital have always been considered dominant explanations for labor compensation. However, before the 1980s, human capital accumulated in the labor market was hardly properly measured. The recommended estimate consisted in using the time spent in certain circumstances, that is, in the firm or the workplace. Since measures of actual experience were not available, estimates were established using potential experience, calculated as age minus years of schooling minus age on entering school. Refinements were proposed later as new surveys became available providing more detailed information about the time that individuals had actually devoted to their principal employment. Hence, Mincer and Jovanovic (1981) introduced the workers’ tenure in firms to take into account the return to specific training received. The longitudinal data available today allow calculating more or less exactly the time that an individual has dedicated to work and also isolating the experience acquired in various industries and/or jobs. Nowadays, studies using this type of measure are frequent in developed countries, indeed too frequent to be detailed here.

These issues are of great importance in assessing the extent of gender inequalities in labor markets. In developed countries, many attempts have been made to estimate the extent to which the average gender wage gap is due to

We would like to thank two anonymous referees and the editor, John Strauss, for their constructive comments and suggestions on previous drafts. We are also indebted to Ragui Assaad, Philippe de Vreyer, and François-Charles Wolff for their careful readings and suggestions on earlier drafts of this article. The usual disclaimer applies.

1 Mincer (1974/1993, 143) had already admitted that the representation of postschool investments in wage equations was the weak point of the theoretical architecture of his model: “The most important and urgent task is to refine the specification of the postschool investment category . . . to include details (variables) on a number of forms of investment in human capital.”

2 See, e.g., Kim and Polachek (1994), Light and Ureta (1995), or Myck and Paull (2004).
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). The problem is that measures of women’s experience are particularly prone to errors given women’s discontinuity in labor market participation. Potential experience may be a good approximation of true experience for men with high labor force attachment, but it is a poor proxy for less attached individuals, especially for women or minority groups, as they have a greater likelihood of interrupting their professional activities (Altonji and Blank 1999; Antecol and Bedard 2004). Proxy measures tend to overstate women’s actual work experience by not accounting for interruptions related to parenting or for any restrictions on the number of hours worked per week. Furthermore, empirical studies on developed countries have revealed that experience before an interruption has a lower return than experience after an interruption and that women who interrupt their careers generally receive less wage growth prior to the interruption. Hence, the coefficient of experience in the wage equation, but also that of education, may be systematically biased, notably for women (Dougherty 2003; Regan and Oaxaca 2006). Such biases in the estimates cannot be ignored since the returns to human capital are used in the standard decomposition techniques for gender wage gaps to measure the extent of gender-based wage discrimination (Blinder 1973; Oaxaca 1973). Some authors have in fact shown that missing or imprecise data on human capital factors can amplify the impact attributed to pure discrimination (or the unexplained part of the wage decomposition) to the detriment of the component relating to observed differences in individual characteristics between men and women. This would be the case if, for example, there was a classical measurement error in potential experience that would introduce attenuation biases on its return and if this error was greater for women, as one generally believes. Mincer and Polachek (1974) indeed show that estimating a woman’s wage equation using potential experience leads to an underestimation of the rate of return to experience. However, if interrupted work spells were to reduce the return to experience, then one would overestimate this return when relying on potential experience. It is then a priori unclear whether using proxy measures of experience would over- or underestimate what one generally attributes to discrimination.

In this article, we cast new light on these issues by using a series of first-hand surveys carried out in 1998 in the capital of Madagascar under the supervision of one of the authors. In the case of Africa, there is in fact very little

---

3 See, e.g., Mincer and Polachek (1974), Sandell and Shapiro (1980), Mincer and Ofek (1982), and Adair et al. (2002).

4 See Stanley and Jarell (1998), Weichselbaumer and Winter-Ebmer (2005), and Regan and Oaxaca (2006).
known about the gender wage gap. From a meta-analysis by Weichselbaumer and Winter-Ebmer (2005), one can evaluate that only 3% of the studies on gender wage gap stem from African data out of all the empirical literature since the 1960s. From the existing literature, there is a wide consensus on the presence of important inequalities between men and women, both for salaried and self-employed workers. However, no common cross-country pattern in the relative magnitudes of the gender wage gaps in the public, private formal, and informal sectors seems to emerge. In Madagascar, the only studies we are aware of are those of Nicita and Razzaz (2003) and Nordman and Wolff (2009a). The first authors investigate the gender wage gap in relation to the growing potential of the textile industry. From their earnings differential decomposition, they show that both the endowments and the unexplained part of the wage difference favor male workers, although the latter dominates the former. By contrast, using linked worker-firm data from the manufacturing sectors, Nordman and Wolff (2009a) 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 labor market.

Enhancing the gender gap literature on the poorest countries is therefore crucial for several reasons. First, as mentioned earlier, there are manifest shortcomings of studies on African countries, particularly due to the shortage of available information (Bennell 1996). Second, gender inequality is likely to be greater while markets do not function efficiently and the states lack resources for introducing corrective policies. Third, understanding the roots of inequalities between the sexes and reducing gender gaps have a central place in terms of policies in these countries (Goal 3 of the Millennium Development Goals is aimed at reducing gender inequalities). Fourth, the above-mentioned problems of labor market attachment for females are even greater than in developed countries. For instance, in the Malagasy case, the continual deterioration of the labor market and the partial freeze on public sector recruitment from the mid-1980s may have accentuated the circumstances (i.e., labor market entry and exit) that would give rise to measurement errors in labor force attachment, especially

---

5 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; Armitage and Sabot (1991) for Kenya and Tanzania; Appleton, Hoddinott, and Krishnan (1999) for Uganda, Côte d’Ivoire, and Ethiopia; Isenmenger and Roberts (1999) for South Africa; Siphambe and Thokweng-Bakwena (2001) for Botswana; Nicita and Razzaz (2003) for Madagascar; Nordman and Wolff (2009b) for Morocco; and Nordman and Wolff (2009a) for Madagascar and Mauritius.

6 An important limitation of Nicita and Razzaz’s study is that the authors proxy total experience by age and include very few regressors in their wage equations by sexes. As pointed out before, this may have serious consequences on the extent to which gender wage discrimination is appreciated.
for women, for whom the decrease in jobs in the public sector was particularly significant.

In this article, three main questions are addressed: What is the size of the gender wage gap in the urban labor market of Madagascar? What is the role played by labor force attachment measures (potential experience vs. actual experience) in the earnings determination process across genders? What are the implications for gender wage decompositions? Our approach consists of matching a labor force survey and a biographical survey in a view to obtaining detailed information on complete professional and family trajectories for a representative sample of the urban population of Antananarivo. In particular, we are able to combine the income from current employment, taken from the first survey, with the individuals’ labor market attachment over their entire life span, taken from the second. As far as we know, this is the first attempt at a detailed study of this sort in Africa. We thus propose different decompositions of the gender earnings gap that take into account alternatives to the standard methods for measuring workers’ labor force attachment.

The results show that using actual experience in lieu of potential experience in earnings functions leads us to reassess the returns to human capital. In particular, we reappraise downward women’s returns to education and experience with the use of actual measures for experience. In addition, with an actual labor force attachment measure, we obtain a significant increase in the portion of the gender earnings gap explained by observable characteristics, while the differences in average actual experience across sexes lead to markedly different estimates of the fraction of the gender gap that is explained by experience.

The remainder of this article is divided as follows. Section II briefly presents the data set, the background of the Malagasy labor market, and some descriptive statistics. Section III describes the empirical methods (earning functions and gender wage decompositions) and discusses some econometric issues related to the estimation of earnings functions. In Section IV we comment on the results. Section V concludes.

II. Data, Malagasy Context, and Descriptive Statistics

A. The Data: Matching Labor Force and Biographical Surveys

The data used have been obtained by matching two original surveys conducted in Madagascar in 1998 by the National Institute of Statistics (INSTAT) as part of the MADIO project (MADIO 1998, 1999; Roubaud 2000, 2002). The first, a labor force survey (LFS), was designed to collect detailed information on employment, unemployment, income, and working conditions in the Malagasy capital, Antananarivo. The second, a biographical survey, followed the trajectories of a representative sample of three cohorts of Tananarivians in three
different fields: migratory and residential, family and marital, and schooling and professional trajectories.

The joint use of these two surveys offers three key advantages for our study. First, this type of survey, whether on labor force or on individual trajectories, is extremely rare in the African context. Second, the data are of a far higher standard than those usually collected in household surveys in Africa (Rakotomanana, Ramilison, and Roubaud 2003). Finally, the fact that the sample used in the biographical survey was a subsample of the LFS means that the two surveys can be matched on an individual level, thereby enabling us to combine the original information gathered for each of them, particularly the earnings from current employment in the LFS and the entire social and professional trajectories in the biographical survey (individual’s household characteristics, employment, unemployment, and inactivity spells).

The LFS corresponds to the first phase of the 1-2-3 Survey on employment, informal sector, and consumption, carried out in Madagascar by INSTAT since 1995, as in a number of other developing countries in Africa and Latin America (Razafindrakoto and Roubaud 2003). The sample, drawn from a stratified two-stage area-based survey plan, is representative of all ordinary households in Antananarivo. In 1998, of the 3,002 households questioned, we counted 10,081 people of working age, of whom 5,822 individuals were currently employed, 361 were unemployed, and 3,998 were inactive. The definitions used (activity, unemployment, etc.) follow the international standards recommended by the UN International Labour Organization in this respect. For all those in work, we have a comprehensive set of data on the job characteristics. Special attention is given to capturing income derived from work. In the 1998 survey, out of a total of 5,298 active wage earners,7 3,445 declared their actual income and 1,853 declared their income bracket (expressed in multiples of the current minimum wage);8 only 13 individuals refused to provide information on their income, which is in itself an indicator of the quality of the survey. The survey also provides an estimate of the total benefits relating to the job (sundry bonuses, paid holidays, housing, benefits in kind, etc.), whether monetary or

7 The difference between the total employed individuals (5,822) and the employed individuals who declared positive earnings (5,298) corresponds to unpaid family workers.
8 For those workers, earnings were imputed by an econometric estimation based on an income equation. In a first step, an earnings model was estimated for the employed workers who disclosed their precise earnings based on their observed characteristics. In a second step, the predicted values from this model were imputed for the individuals with income brackets. Finally, random sampling was conducted for these latter individuals, and the result was added to the estimated income until the sum obtained came within the bracket declared by the interviewee. Sensitivity tests of this methodology over alternative techniques have been conducted and have shown that estimates of earnings equations are qualitatively unchanged.
nonmonetary, which are added to the direct income. As is the case in all surveys of this kind, measurement errors are greater for nonsalaried workers, particularly in the informal sector (Rakotomanana and Roubaud 1998). However, phase 2 of the 1-2-3 Survey (not used in this article), which pieces together all the production and income accounts for informal production units, helped confirm that the income declared in the LFS was in fact coherent.9

The biographical survey (Biomad98) follows on from the one carried out in France in 1981 by the French National Institute of Demographic Studies (Courgeau and Lelièvre 1992) and in a certain number of African capitals from the end of the 1980s (GRAB 1999; Antoine et al. 2004). These surveys are retrospective and are aimed at describing different aspects of urban integration processes: access to employment, access to housing, family formation, and demographic dynamics. This type of approach helps analyze interactions between family situations and residential and professional trajectories. By introducing a time factor, the biographical surveys can be used as a complement to setting up panel data. Although the retrospective nature of the surveys can impair the quality of the information collected due to memory problems on the part of the respondents,10 these surveys do have two key advantages: they are not subject to the problem of attrition, which is especially difficult to manage with panels, and they piece together the respondents’ entire trajectories.

The Biomad98 survey addressed three generations of individuals: those born between 1943 and 1952 (ages 45–54 at the time of the survey), between 1953 and 1962 (those ages 35–44), and between 1963 and 1972 (those ages 25–34). Among the individuals identified in the LFS, 2,403 biographical questionnaires were collected. In order to obtain a representative sample of the three generations and to enable separate analysis for men and women, we randomly

9 More specifically, in phase 2, the interviewers were asked to help the self-employed and employers reconstitute their earnings by recapping incomings and outgoings over a reference period to which the interviewee could relate. Following this exercise, non-wage earners’ incomes were translated into a monthly sum in the questionnaire. This monthly income was then divided by the number of hours worked per month (the number of hours worked per week is available in both phases of the 1-2-3 Surveys).

10 One may want to check whether memory and recall bias on labor market history could affect the gender wage gap measures. If recall problems are worse for men than for women, and if the former actually overevaluate their actual experience, recall bias may lead to underestimating what one attributes to discrimination by using actual rather than potential experience. However, if females have more events to recall than males and hence have the same tendency to overevaluate their actual experience, an overestimation of the unexplained part of the gap may be expected, all else being equal. It seems therefore hazardous to predict the sign of the impact of recall problems on what one attributes to discrimination. Note that the memory problem in biographical surveys should not be overstated, as was shown by Poulain, Riandey, and Firdion (1992) in their paper matching biographical survey data and administrative registers at the individual level in Belgium.
selected 400 individuals surveyed in the LFS for each of the six cohorts, stratified by generation and by gender. New weights have been calculated to extrapolate the Biomad98 data to be representative of the Tananarivian population between 25 and 54 years old.

Matching these two sources of information allowed us to build a unique data set containing biographical-type information on the individuals’ socio-economic characteristics together with a series of variables on their activity, labor incomes, and job characteristics. The labor supply, or paid-work participation, has been defined as individuals who have worked at least 1 hour during the reference week and who report positive earnings at the time of the interview. For those individuals who have declared positive earnings (1,928 out of 2,403 individuals), we have identified three institutional sectors of paid-work participation: public wage employment, formal private wage employment, and self-employment or informal sector, the latter defined as those working in production units that are not registered or that do not publish accounts. After dropping all the observations with missing values, the samples of paid-work participants comprise 823 women and 1,051 men.

These matched data allow us to construct several measures of actual (rather than potential) work experience. Potential experience is simply age minus years of education minus six. Actual experience is measured as months worked at the time of the Biomad98 interview and is converted into years of experience.

B. Malagasy Background and Descriptive Analysis

Over the past 15 years or so, Madagascar has embarked on a process of economic liberalization like many African countries undergoing structural adjustment. Over the long term, Madagascar is distinguished by a constant decline in household living standards, which in 1996 reached the lowest point since independence. From the mid-1990s, the reform process began to bear fruit. In 1998, the period referred to in this article, there had already been a very significant recovery in urban areas, especially in the capital. In 3 years, from 1995 to 1998, the average real labor income grew by 35% and the median income by 51%. The incidence of extreme poverty (with the poverty line at US$1 in purchasing power parity) fell from 39% to 28%. In terms of gender,
women’s activity rate fell, corresponding to the withdrawal from the labor market of large numbers of women who had been forced to work to provide additional income for their households during a severe crisis. At the same time, the income differential between men and women was reduced (Razafindrakoto and Roubaud 1999; Glick, Randrianasolo, and Roubaud 2003).13

Despite improvements in the situation, the 3 years of recovery were not enough to erase several decades of continual deterioration in the labor market. In the long-term perspective that interests us here, the main characteristic of labor 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 et al. 2000). In our data, the patterns of participation and sectoral distributions differ sharply across gender. The participation rate is much lower for women (95% vs. 78%), while unemployment is not significantly different by sex (3%). Among occupied workers (92% and 75% of males and females, respectively), women are concentrated in low-quality jobs in the informal sector, which represents 44% and 55% of occupied males and females, respectively. Consequently, their presence in the public sector is eight points lower than for men (25% vs. 17%).

Descriptive statistics for paid-work participants are shown in table 1. Men and women also bring different work experience to the labor market. The Mincer proxy for potential work experience shows little difference in the work experience of men and women (22.6 years and 24 years, respectively) as the average age is the same while the average years of completed education are about 1 year lower for women. A different story emerges when actual experience is applied. The average actual work experience is 20.5 years for men as compared with 17.1 years for women.

Looking at the sample by cohort gives a more precise view of the biases caused by only taking into account potential experience. The bias is highest

13 Using data for Tana over the period 1995–2001, Glick et al. (2003) reveal a fairly remarkable transformation of female employment patterns during a relatively short period. Women shifted out of private informal wage employment and into formal employment in Zone Franche enterprises (see Cling, Razafindrakoto, and Roubaud 2005), which rose from 5% to 15% of all female employment. Together with the fact that informal sector wages—though low—rose fastest during the period 1997–2000, this reallocation explains in part the larger increase in female earnings than male’s in Tana for this period. This trend benefited women more than men, even though the share of informal wage work in women’s total employment was falling during these years, because women were still disproportionately employed in this sector. The contested presidential elections in December 2001, followed by the open political crisis that continued throughout the first 6 months of 2002, jeopardized economic improvements, and living standards once again fell sharply. Since then, the country has been trying as best it can to recover.
### TABLE 1
MAIN DESCRIPTIVE STATISTICS FOR PAID-WORK PARTICIPANTS

| Variable                                             | Males         | Females        |
|------------------------------------------------------|---------------|----------------|
|                                                     | Mean          | SD             | Mean          | SD             |
| Hourly earnings (in Malagasy francs)                | 2.21          | 4.56           | 1.52          | 2.84           |
| Average age                                         | 40.65         | 8.08           | 40.71         | 8.24           |
| Average schooling successfully completed (in years)  | 8.89          | 4.39           | 7.91          | 4.34           |
| Average schooling (time spent in school, in years)  | 11.72         | 5.87           | 10.26         | 5.73           |
| Potential work experience (age minus schooling minus 6) | 22.55         | 10.25          | 23.98         | 10.73          |
| Actual labor market experience (in years)            | 20.54         | 9.71           | 17.15         | 10.50          |
| Tenure with the current employer (in years)          | 9.27          | 8.43           | 8.10          | 8.06           |
| Unemployment periods (in years)                       | 1.13          | 2.18           | .82           | 1.90           |
| Inactivity periods (in years)                         | 5.53          | 4.12           | 10.84         | 9.47           |
| Catholic (1 if yes, 0 otherwise)                      | .38           | .48            | .38           | .48            |
| Merina (1 if yes, 0 otherwise)                        | .88           | .31            | .90           | .29            |
| Married (1 if yes, 0 otherwise)                       | .82           | .38            | .64           | .48            |
| Formal training received in the current job (1 if yes, 0 otherwise) | .14 | .35 | .09 | .29 |
| Number of hours worked per week                       | 45.44         | 16.84          | 40.30         | 17.41          |
| Presence of union in the current job (1 if yes, 0 otherwise) | .21 | .41 | .16 | .37 |
| Father’s education (in years)                         | 5.03          | 3.40           | 4.89          | 3.19           |
| Public employment (1 if yes, 0 otherwise)             | .25           | .43            | .17           | .38            |
| Formal private employment (1 if yes, 0 otherwise)     | .30           | .46            | .28           | .45            |
| Self-employment or informal sector (1 if yes, 0 otherwise) | .44 | .49 | .55 | .49 |

**Sources.** 1-2-3 Surveys, Phase 1, 1998, Biomad98, MADIO; authors’ calculations.

for women in the eldest generation. While the difference between potential and actual experience is 4.2 years for the youngest generation of women (born between 1963 and 1972), it increases to 11.8 for the eldest (1943–52). For men, the gap is more or less constant across the cohorts (around 2 years). This result is explained by the accelerated demographic transition process in the Malagasy capital (Antoine et al. 2000), in particular, the fact that the number of descendants has fallen significantly in the past 3 decades.

### III. Econometric Methods

#### A. Earnings Determination

Traditional gender wage decompositions rely on estimations of Mincer-type earnings functions for men and women. Let the earnings function take the form:

\[
\ln w_i = \beta x_i + \varepsilon_i, \quad (1)
\]

where \(\ln w_i\) is the natural logarithm of the observed hourly earnings for individual \(i\), \(x_i\) is a vector of observed characteristics, \(\beta\) is a vector of coefficients, and \(\varepsilon_i\) is a disturbance term with an expected value of zero.
We estimate the log earnings functions separately for males and females. There is no universally accepted set of conditioning variables that should be included for describing the causes of gender labor market outcomes differentials. Yet, the consensus is that controls for productivity-related factors such as education, labor 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. We also incorporate in the earnings functions a dummy for formal training received during the current employment and paid for by the employer since it is likely to increase workers’ productivity. Similarly, parental schooling proxied by the father’s years of education is introduced as a complement to our human capital measures. Other controls include dummies on religious and ethnic status, a dummy for the presence of a union in the current job, and the number of hours worked per week.

Thanks to the longitudinal information available in the biographical survey, years of labor market experience, which are commonly proxied by potential measures, are refined by using an actual measure of experience. Regan and Oaxaca (2006) show that using potential versus actual experience in earnings models is best viewed as a model misspecification problem rather than in a classical errors-in-variable framework. By using an actual measure of experience, this is also the approach we follow, except that we do not use a predicted value of actual experience but an observed value. Instrumental variable techniques are the traditional approach taken to correct classical measurement error. Then, as emphasized by Regan and Oaxaca (2006), instrumenting potential experience would not solve the model specification problem.

However, in the labor economics literature, it has been argued that, because women have to allocate their nonleisure time between market activities and household activities associated with child rearing, the experience accumulated

---

14 Conversely, one can argue that analyses that omit occupation and industry may underestimate the importance of background and choice-based characteristics on labor market outcomes (Altonji and Blank 1999). In this article, we still chose to rely on earnings functions that do not include industry and occupation dummies.
15 Although job training might be the result of individual choices, and hence be correlated with individual ability, 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 discrimination component of the gender wage gap.
16 See Sandell and Shapiro (1980), Gronau (1988), Wright and Ermisch (1991), Korenman and Neumark (1992, 1994), Dustmann and Meghir (2005), and Dustmann and Rochina-Barrachina (2007).
by a married women is then a function of the wages earned and is highly correlated with the wage women command in the market. Using actual experience may then add an endogeneity issue that would not be so acute with the use of potential experience. One econometric approach to endogeneity of actual experience is the use of instrumental variable techniques (Mincer and Polachek 1974; Altonji and Shakotko 1987; Wright and Ermisch 1991; Choudhury 1993). An alternative approach is followed by Gronau (1988), who determines earnings and experience in a simultaneous equations framework. Using administrative data, Dustmann and Meghir (2005) identify the return to actual experience by restricting their sample to workers displaced due to firm closure, thus assuming that firm closure is exogenous conditional on their observables and that displaced workers are a random sample of the workforce. In this study, because we lack plausible instruments and use limited survey data (still rare for Africa), we restrain the analysis to ordinary least squares (OLS) estimates only.17

From the biographical survey, one can also compute the years of seniority in the current job as well as unemployment and inactivity for each individual. Adding nonworking time in earnings functions would notably allow for the possibility that human capital appreciates and depreciates at different rates (Mincer and Ofek 1982). However, possibly like actual experience, all these labor force attachment variables are arguably the results of individual choices, and we lack reliable instruments to identify their effects.18 We then decide to rely on total actual experience only.

Concerns also 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. The often-recommended estimation strategy for sample selec-

17 We still investigated potential endogeneity issues of education and actual experience variables using IV regressions, but we do not report the results. In selecting instruments, we followed related work of Sandell and Shapiro (1980), Wright and Ermisch (1991), and Korenman and Neumark (1992) and used family background information (father’s occupation at the worker’s age of 15 and the spouse’s education, ethnicity, and religion). The exogeneity tests could never reject the null hypothesis of exogeneity of the different sets of potentially endogenous regressors. However, we do not emphasize these findings given that using family background as instruments is problematic if there is intergenerational transmission of ability and positive sorting in the marriage market.

18 In particular, whether wages actually rise with job seniority remains one important controversy in the labor economics literature. For instance, in contrast to Abraham and Farber (1987), Altonji and Shakotko (1987), and Topel (1991), Altonji and Williams (2005) find that OLS is subject to a large upward bias and should not be used to estimate the return to job seniority.
tion related to paid-work participation is the use of Heckman’s two-step procedure. To tackle the second issue, one generally uses a generalization of the former method (Lee 1983) when the first-stage selection equation takes several modalities (not working; enter the public sector, the formal private sector, or the informal sector). Beyond the fact that these parametric methods impose assumptions about the joint distribution of the errors terms of the equations of interest,19 they are also data-demanding, as they need identifying variables, that is, variables affecting selection into the labor force (paid-work participation or sector choice) but not labor market outcomes (earnings). Given these methodological difficulties (especially the debate over the appropriate exclusion restrictions), we opt in this study for results from pooled OLS earnings functions across sectors.20

B. Gender Wage Decomposition Techniques
Oaxaca and Neumark’s Traditional Decompositions
The most common approach to identifying sources of gender wage gaps is the Oaxaca-Blinder decomposition. Two separate standard Mincerian log wage equations are estimated for males and females. The Oaxaca decomposition is

$$\ln w_m - \ln w_f = \beta_x (\bar{x}_m - \bar{x}_f) + (\beta_m - \beta) \bar{x}_f,$$

where and are the means of the natural logs of males’ and females’ wages, respectively; and are vectors containing the respective means of the independent variables for males and females; and and are the estimated coefficients. The first term on the right-hand side captures the wage differential due to different characteristics of males and females. The second term is the wage 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 nondiscriminatory 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 nondiscriminatory wage structure. Therefore, the issue is how to determine the wage structure that would prevail in the absence of discrimination. This choice poses the

19 See the discussion in Bourguignon, Fournier, and Gurgand (2007).
20 In previous versions of this article, we reported corrected estimates using additional information from the biographical and employment surveys as a source of identification for the selection equations: household variables such as marriage prior to first employment from the biographical data, spouse’s religion, respondent’s status toward household head, and the household’s dependency ratio and number of domestics. Note that, in general, these selectivity-corrected estimations never affected the qualitative aspect of the results presented all along this study.
well-known index number problem given that we could use either the male or the female wage structure as the nondiscriminatory 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. First, Oaxaca (1973) proposes either the current male wage structure as \( \beta^* \) or the current female wage structure, suggesting that the result would bracket the “true” nondiscriminatory wage structure. Reimers (1983) implements a methodology that is equivalent to assigning identical weights to men and women. Cotton (1988) argues that the nondiscriminatory structure should approach the structure that holds for the larger group and use as a weighting structure the fraction of males in the sample. Neumark (1988) proposes a general decomposition of the gender wage differential, such as

\[
\ln w_m - \ln w_f = \beta^* (\bar{x}_m - \bar{x}_f) + [(\beta_m - \beta^*) \bar{x}_m + (\beta^* - \beta_f) \bar{x}_f].
\] (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, that is, \( \beta^* = \beta_m \), or if it is assumed that \( \beta^* = \beta_f \). Neumark shows that \( \beta^* \) can be estimated using the weighted average of the wage structures of males and females, and he advocates using the pooled sample to estimate \( \beta^* \). The first term is the gender wage gap attributable to differences in characteristics. The second and the third terms capture the difference between the actual and pooled returns for men and women, respectively.

While Neumark’s decomposition is attractive, it is not immune from common criticisms of decomposition methods in general, namely, the omission or inadequate measures of variables that affect productivity. Also, without evidence that employers care only about the proportion of each type of labor employed, it is not clear that the pooled coefficient is a good estimator of the nondiscriminatory wage structure (Appleton et al. 1999). In addition, like other conventional decomposition methods, Neumark’s decomposition fails to account for differences in sectoral structures between gender groups. We then make use of an additional decomposition technique developed by Appleton et al. (1999) that takes explicitly into account this sectoral structure.

The approach of Appleton et al. (1999) is similar to Neumark’s and decomposes the gender wage gap into three components. Hence, it does not suffer from the index number problem encountered by previous authors who attempted to account for differences in occupational choices (Brown, Moon, and Zoloth 1980). The authors assume a sectoral structure that would prevail in an absence of gender differences in the impact of characteristics on sectoral choice. A multinominal logit model is used to specify the selection process of
TABLE 2
OLS EARNINGS FUNCTIONS FOR MALES AND FEMALES

|                      | Males                  | Females                |
|----------------------|------------------------|------------------------|
|                      | Potential Experience   | Actual Experience      | Potential Experience | Actual Experience |
| Years of completed   | 0.0817****             | 0.0817****             | 0.1402***             | 0.1266***         |
| schooling            | (11.59)                | (11.96)                | (15.81)               | (16.01)           |
| Potential years of   | 0.0094***              | 0.0179***              |                       |                   |
| labor market         | (3.37)                 | (5.77)                 |                       |                   |
| experience           |                        |                        |                       |                   |
| Actual years of      | 0.0110***              | 0.0155***              |                       |                   |
| labor market         | (3.91)                 | (5.72)                 |                       |                   |
| experience           |                        |                        |                       |                   |
| Constant             | -0.1145                | -0.1191                | -1.2863***            | -0.9904***        |
|                      | (.76)                  | (.82)                  | (-7.49)               | (-6.85)           |
| N                    | 1,051                  | 1,051                  | 823                   | 823               |
| R²                   | 0.3915                 | 0.3938                 | 0.4780                | 0.4776            |

Note. Dependent variable is log hourly earnings. Absolute values of t-statistics are in parentheses. N = observations. Other covariates introduced in the earnings models include the father’s years of education, two dummies for religion and ethnicity (Catholic, Merina), a dummy for being married at the time of the survey, a dummy for having received formal training in the current job, a dummy for the presence of union in the current job, and the number of hours worked per week.

** Significant at the 1% level.

an individual into the different sectors. Then, by estimating pooled and separate multinominal logit models for men and women, it is possible to derive the average probability for male and female workers in the different sectors. The full sectoral decomposition then includes seven terms. The first three terms are similar to Neumark’s decompositions of within-sector wage 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.

IV. Econometric Results

A. Potential versus Actual Experience in Earnings Functions

Table 2 reports regression estimates of the human capital determinants of log hourly earnings for males and females using potential experience (cols. 1 and 3)
and actual experience (cols. 2 and 4) alternatively. Regressions introducing actual experience in lieu of potential experience shed light on gender-specific effects. From models 2 and 4, when actual experience is accounted for, the return to experience diminishes for women (from 1.79% to 1.55%) while it increases for men (from 0.94% to 1.10%). This gives support to the possibility of an overestimation of the return to women’s experience with the use of potential measures, since accounting for interrupted work spells via actual measures has in fact the effect of decreasing the market value of their experience.

We are also interested in the coefficient on the schooling variable. With regard to measurement error, there is in general no reason to suppose that the differential effect of work experience affects estimates of male and female schooling differently. Nonetheless, in the case of experience, as we showed in Sections I and II, the female measure is likely to be subject to relatively large conceptual measurement error. Accordingly, the female experience coefficient may be affected by an upward or downward bias. If there is a correlation between schooling and work experience (which is negative here), a relatively large bias in the female experience coefficient could in turn give rise to a relatively large bias in the female schooling coefficient (Dougherty 2003). Columns 3 and 4 highlight that the marginal return to experience is overestimated for females. In addition, the female estimated coefficient on education is affected by the use of a more precise labor force attachment variable: the return to education diminishes from 14.02% to 12.66% for women, but it remains remarkably stable for men. As a consequence, by introducing actual experience, we reestimate the return to female schooling that may frequently be biased when proxy measures of experience are used in Mincer-type earnings regressions. Moreover, since potential experience is subject to greater measurement error for females, the generated bias in the schooling coefficients appears to be greater for women, thereby inducing an overestimation of the differential in the male-female schooling coefficients. However, the correction applied here remains relatively small and is not able to erase the difference between the marginal returns to male and female schooling (8.17% vs. 12.6%, respectively).

Note that more flexible polynomial specifications for experience and education have been tried but cannot be accurately estimated with these data. We tested alternative measures of actual experience using tenure in the current job and a variable taking into account the time accumulated while working in the same profession, irrespective of the workplace, firm, or employer. The results are not reported as we lack valid instruments to identify their effects accurately. Let us just note that the OLS estimates report that, at the mean point of tenure, the marginal return to job seniority is greater for women than for men. As for the “profession” variable, we found that the gap between the returns to specific experience across gender was reduced.
Finally, given the large amount of time spent out of the labor force for women (on average 10 years vs. 5 years for men), being able to account for the time spent in and out of the labor market in earnings functions seems to be a step toward refining the returns to human capital variables across the sexes. Even if the differences in returns with or without actual experience are relatively small, they may affect the portion of the gender earnings gap component that is not explained by gender differences in observed characteristics.

B. Earnings Decompositions

Table 3 provides an overview of the gender earnings decompositions using the alternative decomposition techniques described in Section III.B and the two different specifications of the earnings functions. The results confirm that a greater portion of the gender gap can be explained using actual rather than potential experience. Depending on the decomposition techniques used, the explained component ranges from 10.3% to 21.8% in the conventional model and from 22.2% to 37.2% using actual in lieu of potential experience. This variation is quite considerable. Neumark’s decomposition clearly always produces the highest share of the explained component (37.2% with actual experience).

24 According to Oaxaca’s decomposition, differences in actual experience across genders account for about 9% of the gap while potential experience explains only 3%.
These findings are novel for Madagascar, and more generally for Africa, but similar to findings in developed countries. Thus, the share of the gap attributable to differences in experience between men and women appears to be severely underestimated when potential instead of actual experience is used. This may be explained as follows. First, as stated earlier, men and women differ little in the mean characteristics of potential experience, but they differ significantly in actual experience. Second, although potential and actual experiences are highly correlated (0.78), an additional year of actual experience gives different returns than a year of potential experience. So, when the actual measure is used, both the difference in means and the difference in returns produce a greater explained component than when the potential variable is introduced.

Educational differences continue to explain much more of the gender gap than labor force attachment differences (in Oaxaca’s decomposition with actual experience, 19% vs. 9%). Interestingly enough, once actual experience is accounted for, the fraction of the gender gap explained by education remains quite stable. This is at odds with some findings in developed countries where, in absence of actual experience, Antecol and Bedard (2004) have shown that educational differences appear to absorb some of the systematic differences in labor force attachment. This would suggest that, in the absence of actual experience measures, education is not able to absorb the variations in actual experience since the latter are not necessarily correlated with educational attainment.

Of course, these pooled decompositions mask sector-specific differences in the calculated gender earnings gap, for instance, if we consider separately the public, private formal, and private informal sectors. Average earnings actually differ greatly across sectors and sexes. This explains why separate decompositions by sector induce significant variations in the decompositions across the three sectors (results not reported). First, in the public sector, average earnings are higher for women than for men. In this sector, the gender gap is therefore in favor of females. In fact, women employees have more favorable characteristics than their male counterparts. On the contrary, the gender earnings gap is in favor of males in the private formal sector and, more importantly, in the informal sector.28

25 For example, those of Wright and Ermisch (1991), O’Neill and Polachek (1993), and Myck and Paull (2004) for the United Kingdom and the United States and those of Meurs and Ponthieux (2000) for France.

26 These patterns are drawn from wage gaps across ethnic minorities and race.

27 Similarly, Glewwe (1990) found no wage discrimination against women in the public sector in Ghana.

28 From Neumark’s decomposition in these sectors, 40% and 49%, respectively, of the gender gap is explained by differences in observed endowments (in favor of males) while workers’ characteristics explain less of the gender gap in the public sector (26%).
ECONOMIC DEVELOPMENT AND CULTURAL CHANGE

TABLE 4
FULL DECOMPOSITIONS OF THE GENDER EARNINGS GAP

| Earnings Functions with | Potential Experience | Actual Experience |
|------------------------|----------------------|-------------------|
|                        | Decomposition       | %                 | Decomposition | %               |
| Raw gender earnings gap| .417                | 100               | .417          | 100             |
| Earnings differences due to within-sector differences attributable to: |                      |                   |                |
| Characteristics        | .105                | 25.1              | .161          | 38.5            |
| Deviation in male returns | .103               | 24.7              | .078          | 18.9            |
| Deviation in female returns | .111               | 26.6              | .079          | 19.0            |
| Subtotal               | .319                | 76.3              | .319          | 76.4            |
| Earnings differences due to between-sectoral location attributable to: |                      |                   |                |
| Characteristics        | .057                | 13.8              | .057          | 13.8            |
| Deviation in effect of characteristics on male sectoral location | .011               | 2.7               | .011          | 2.7             |
| Deviation in effect of characteristics on female sectoral location | .030               | 7.1               | .030          | 7.1             |
| Subtotal               | .098                | 23.6              | .098          | 23.6            |

**Note.** These are sectoral earnings functions including human capital variables and demographics (not reported).

The problem is that separate decompositions by sector ignore sectoral composition differences of men and women. The full decomposition developed by Appleton et al. (1999), taking into account the location of males and females in the three sectors, is reported in table 4. Again, we present two versions of the decomposition, with potential experience and with actual experience.

The first three terms address the earnings differences due to within-sector dissimilarities in characteristics and returns and are weighted sums of the Neumark's decomposition. In line with the traditional decomposition results, the within-sector differences in characteristics explain much of the raw gender earnings gap. With potential experience, the explained share of the raw gap amounts to 25.1%, whereas it increases to 38.5% with the use of actual experience. Using a more precise labor force attachment variable has then the effect of diminishing the share of the gap attributable to within-sector deviations in returns across gender (from about 25% to 19%). The within-sector deviations in returns are found to be positive. The same picture emerges from Appleton et al. (1999)'s full decompositions on Ethiopia and Uganda, which also report positive signs on the deviation components, that is, favorable deviation of males’ returns as compared to the pooled earnings structure.

The last three terms of the full decomposition tell us the share of the gender gap that may be attributed to gender differences in proportions of workers in each sector. The positive sum of these three terms implies that the differences...
in sectoral locations are more favorable to men than to women. The gender earnings gap would have been 23.6% smaller if men and women had been equally distributed across the three sectors. This might be because fewer women than men are located in the higher-paying public sector, where the gender earnings gap is in favor of women. Female paid-work participants are found less often in the public sector than their male counterparts (respectively, 35% vs. 64%), while they are almost equally distributed in the lower-paying informal sector (49% vs. 51%). Hence, the weak representation of women in the higher-paying public sector appears to contribute toward keeping the gender pay gap greater than it otherwise would be.

V. Conclusion
This study of Madagascar represents the first attempt to shed light on the determination of the gender earnings gap while using detailed information from biographical and labor force surveys. This unique matched data set enables us to reassess the returns to human capital across gender, notably by introducing an actual measure of individuals’ labor force attachment. We then propose different decompositions of the gender earnings gap that take into account our new measure of workers’ professional experience.

The results show that using actual experience in lieu of potential experience in earnings functions leads us to reassess the returns to human capital, especially for women. This is because the Mincer proxy for work experience shows little difference across gender (22.6 and 24 years for men and women, respectively), while the difference in average actual experience provides a different story (20.5 and 17.1 years, respectively). We evidence an overestimation of women’s returns to education and experience with the use of proxy measure for work experience in earnings functions. Hence, accounting for interrupted work spells via actual measures of experience has the effect of decreasing the market value of women’s education and labor force attachment. However, the correction applied is not able to erase the significant difference between the marginal returns to male and female schooling (more than 4 percentage points in favor of women). The resulting incentive to invest in schooling for women may partly explain why Madagascar has become one of the few African countries to have achieved equal access to schooling between boys and girls, at least at low levels of the education system (World Bank 2001).

The various traditional earnings decompositions we perform show that dif-

29 Note that considering a more restrictive definition of paid-work participation (more hours worked per week) has the effect of widening the share of the gender gap explained by differences in sectoral locations, the latter becoming even more favorable to men than to women.
ferences in average actual experience across sexes lead to markedly different estimates of the fraction of the gender earnings gap that is explained by experience. We also provide evidence that, in absence of precise labor force attachment measure, education is not able to absorb the variations in actual experience since the latter are not necessarily correlated with educational attainment. This is an additional argument to support the need for more precise labor force participation measures in developing countries.

However, traditional decomposition methods fail to account for differences in sectoral structures between gender groups. We then utilize Appleton et al. (1999)’s decomposition technique, which incorporates the impact of sectoral location to examine the gender earnings disparities within each sector. It highlights that the differences in sectoral locations are more favorable to men than to women. The gender earnings gap would have been about one-quarter smaller if men and women had been equally distributed across the three sectors. Hence, the weak representation of women in the higher-paying public sector appears to contribute toward keeping the gender pay gap greater than it otherwise would be. Public sector downsizing (the partial freeze on public sector recruitment from the mid-1980s in Madagascar) has then worsened women’s economic position as more women have moved away from the state sector to the private sector.

References
Abraham, Katharine G., and Henry S. Farber. 1987. “Job Duration, Seniority, and Earnings.” American Economic Review 77, no. 3:278–97.
Adair, Linda S., David K. Guilkey, Eilene Z. Bigsaw, and Socorro Gultiano. 2002. “Effect of Childbearing on Filipino Women’s Work Hours.” Journal of Population Economics 15, no. 4:625–45.
Agesa, Richard U. 1999. “The Urban Gender Wage Gap in an African Country: Findings from Kenya.” Canadian Journal of Development Studies 20, no. 1:59–76.
Altonji, Joseph G., and Rebecca M. Blank. 1999. “Race and Gender in the Labor Market.” In Handbook of Labor Economics, ed. Orley C. Ashenfelter and David Card, vol. 3C, 3143–58. Amsterdam: Elsevier.
Altonji, Joseph G., and Robert A. Shakotko. 1987. “Do Wages Rise with Job Seniority?” Review of Economic Studies 54, no. 3:437–39.
Altonji, Joseph G., and Nicolas Williams. 2005. “Do Wages Rise with Job Seniority? A Reassessment.” Industrial and Labor Relations Review 58, no. 3:370–97.
Antecol, Heather, and Kelly Bedard. 2004. “The Racial Wage Gap: The Importance of Labor Force Attachment Differences across Black, Mexican, and White Men.” Journal of Human Resources 34, no. 2:564–83.
Antoine, Philippe, Philippe Boquier, Thierry Maimiri, and Nicolas Razafindratsima. 2004. “Collection of Biographical Data in Antananarivo: The Biomad98 Survey.” Interstat 28 (April): 83–99.
Antoine, Philippe, Philippe Bocquier, Nicolas Razafindratsima, and François Roubaud. 2000. *Biographies de trois générations dans l’agglomération d’Antananarivo* [Biographies of three generations in the Antananarivo Conurbation]. CEPED, Collection documents et manuels no. 11. Paris: CEPED.

Appleton, Simon, John Hoddinott, and Pramila Krishnan. 1999. “The Gender Wage Gap in Three African Countries.” *Economic Development and Cultural Change* 47, no. 2:289–312.

Armitage, Jane, and Richard Sabot. 1991. “Discrimination in East African’s Urban Labor Market.” In *Unfair Advantage: Labor Market Discrimination in Developing Countries*, ed. Nancy Birdsall and Richard Sabot. Washington, DC: World Bank.

Bennell, Paul. 1996. “Rates of Return to Education: Does the Conventional Pattern Prevail in Sub-Saharan Africa?” *World Development* 24, no. 1:183–99.

Blau, Francine, and Lawrence Kahn. 2000. “Gender Differences in Pay.” *Journal of Economic Perspectives* 14, no. 4:75–99.

Blinder, Alan S. 1973. “Wage Discrimination: Reduced Form and Structural Estimates.” *Journal of Human Resources* 8, no. 4:436–55.

Bourguignon, François, Martin Fournier, and Marc Gurgand. 2007. “Selection Bias Correction Based on the Multinomial Logit Model: Monte-Carlo Comparisons.” *Journal of Economic Surveys* 21, no. 1:174–205.

Brown, Randall S., Marilyn Moon, and Barbara S. Zoloth. 1980. “Incorporating Occupational Attainment in Studies of Male-Female Earnings Differentials.” *Journal of Human Resources* 15, no. 1:3–28.

Choudhury, Sharmila. 1993. “Reassessing the Male-Female Wage Differential: A Fixed Effect Approach.” *Southern Economic Journal* 60, no. 2:327–40.

Cling, Jean-Pierre, Mireille Razafindrakoto, and François Roubaud. 2005. “Export Processing Zones in Madagascar: A Success Story under Threat?” *World Development* 33, no. 5:785–803.

Cohen, Barney, and William J. House. 1993. “Women’s Urban Labour Market Status in Developing Countries: How Well Do They Fare in Khartoum, Sudan?” *Journal of Development Studies* 29, no. 3:461–83.

Cotton, J. 1988. “On the Decomposition of Wage Differentials.” *Review of Economics and Statistics* 70, no. 2:236–43.

Courgeau, Daniel, and Eva Lelièvre. 1992. *Event History Analysis in Demography*. Oxford: Clarendon.

Dougherty, Christopher. 2003. “Why Is the Rate of Return to Schooling Higher for Women than for Men?” Centre for Economic Performance Discussion Paper, no. 581 (August), London School of Economics and Political Science.

Dustmann, Christian, and Costas Meghir. 2005. “Wages, Experience and Seniority.” *Review of Economic Studies* 72, no. 1:77–108.

Dustmann, Christian, and María Engracia Rochina-Barrachina. 2007. “Selection Correction in Panel Data Models: An Application to the Estimation of Females’ Wage Equations.” *Econometrics Journal* 10, no. 2:263–93.

Glewwe, Paul. 1990. “Schooling, Skills and the Return to Education: An Econometric Exploration Using Data from Ghana.” *Living Standards Measurement Working Paper*, no. 76, World Bank, Washington, DC.

Glick, Peter, John-Brice Randrianasolo, and François Roubaud. 2003. “The Urban
Labor Market in Madagascar through Growth and Crisis, 1993–2002.” Working Paper no. 175, Cornell Food and Nutrition Policy Program, Cornell University.

Glick, Peter, and David E. Sahn. 1997. “Gender and Education Impacts on Employment and Earnings in West Africa: Evidence from Guinea.” Economic Development and Cultural Change 45, no. 4:793–823.

GRAB (Groupe de réflexion sur l’approche biographique). 1999. Biographie d’enquêtes: Bilan de 14 collectes biographiques [Survey’s biography: Assessment of 14 biographical surveys]. Collection Méthodes et Savoirs. Paris: PUF/Diffusion.

Gronau, Reuben. 1988. “Sex-Related Wage Differentials and Women’s Interrupted Labor Careers: The Chicken or the Egg?” Journal of Labor Economics 6, no. 3:277–301.

Isemonger, Alan G., and Neil Roberts. 1999. “Post-entry Gender Discrimination in the South African Labour Market.” Journal for Studies in Economics and Econometrics 23, no. 2:1–25.

Kim, Moon-Kak, and Solomon Polachek. 1994. “Panel Estimates of Male-Female Earnings Functions.” Journal of Human Resources 29, no. 2:406–28.

Korenman, Sanders, and David Neumark. 1992. “Marriage, Motherhood, and Wages.” Journal of Human Resources 27, no. 2:233–55.

———. 1994. “Sources of Bias in Women’s Wage Equations.” Journal of Human Resources 29, no. 2:379–405.

Lee, Lung-Fei. 1983. “Generalized Econometric Models with Selectivity.” Econometrica 51, no. 2:507–12.

Light, Audrey, and Manuelita Ureta. 1995. “Early Career Work Experience and Gender Wage Differentials.” Journal of Labor Economics 13, no. 1:121–54.

MADIO. 1998. L’emploi, le chômage et les conditions d’activité dans l’agglomération d’Antananarivo, enquête 1-2-3: Premiers résultats de la phase 1 [Biographical trajectories in the Antananarivo Conurbation: Job, family, and dwellings: First results of the Biomad98 Survey]. Madagascar: INSTAT.

———. 1999. Trajectoires biographiques dans l’agglomération d’Antananarivo: Emploi, famille, logement: Premiers résultats de l’enquête Biomad98 [First results of the Biomad98 Survey]. Madagascar: INSTAT.

Meurs, Dominique, and Sophie Ponthieux. 2000. “Une mesure de la discrimination dans l’écart de salaire entre hommes et femmes” [A measure of discrimination in the wage gap between men and women]. Économie et Statistiques nos. 337–38: 135–58.

Milne, William, and Monica Neitzert. 1994. “Kenya.” In Labor Markets in an Era of Adjustment: Issues Papers. EDI Development Studies, vol. 2, ed. Susan Horton, Ravi Kanbur, and Dipak Mazumdar, 405–57. Washington, DC: World Bank.

Mincer, Jacob. 1974/1993. Schooling, Experience, and Earnings. New York: Gregg Revivals.

Mincer, Jacob, and Boyan Jovanovic. 1981. “Labor Mobility and Wages.” In Studies in Labor Markets, ed. Sherwin Rosen, 21–64. Chicago: University of Chicago Press.

Mincer, Jacob, and Haim Ofeh. 1982. “Interrupted Work Careers: Depreciation and Restoration of Human Capital.” Journal of Human Resources 17, no. 1:3–24.

Mincer, Jacob, and Solomon Polachek. 1974. “Family Investments in Human Capital: Earnings of Women.” Journal of Political Economy 82, no. 2:S76–S108.

Myck, Michal, and Gillian Paull. 2004. “The Role of Employment Experience in
Explaining the Gender Wage Gap.” Institute for Fiscal Studies Working Paper no. W04/16 (July), Institute for Fiscal Studies, London.

Neumark, David. 1988. “Employers’ Discriminatory Behavior and the Estimation of Wage Discrimination.” *Journal of Human Resources* 23, no. 3:279–95.

Nicita, Alessandro, and Susan Razzaz. 2003. “Who Benefits and How Much? How Gender Affects Welfare Impacts of a Booming Textile Industry.” World Bank Policy Research Working Paper, no. 3029 (April), World Bank, Washington, DC.

Nordman, Christophe J., and François-Charles Wolff. 2009a. “Islands through the Glass Ceiling? Evidence of Gender Wage Gaps in Madagascar and Mauritius.” In *Labor Markets and Economic Development*, ed. Ravi Kanbur and Jan Svejnar, chap. 25. Studies in Development Economics. New York: Routledge.

———. 2009b. “Is There a Glass Ceiling in Morocco? Evidence from Matched Worker-Firm Data.” *Journal of African Economies* (forthcoming).

Oaxaca, Ronald. 1973. “Male-Female Wage Differentials in Urban Labor Markets.” *International Economic Review* 14, no. 3:693–709.

O’Neill, June, and Solomon Polachek. 1993. “Why the Gender Gap in Wages Narrowed in the 1980s.” *Journal of Labor Economics* 11, no. 1:205–28.

Poulain, Michel, Benoît Riandey, and Jean-Marie Firdion. 1992. “Data from a Life History Survey and from the Belgian Population Register: A Comparison.” *Population: An English Selection* 4:77–96.

Rakotomanana, Faly, Eric Ramilison, and François Roubaud. 2003. “The Creation of an Annual Employment Survey in Madagascar: An Example for Sub-Saharan Africa.” *InterStat* 27 (September): 35–57.

Rakotomanana, Faly, and François Roubaud. 1998. “Statistical Measurement of the Informal Sector in Madagascar: Experience from the 1-2-3 Surveys.” Proceedings of the Joint IASS/IAOSS Conference Statistics for Economic and Social Development, Aguascalientes, Mexico.

Razafindrakoto, Mireille, and François Roubaud. 1999. “La dynamique du marché du travail dans l’agglomération d’Antananarivo entre 1995 et 1999: La croissance économique profite-t-elle aux ménages?” [*Labor market’s dynamics in the Antananarivo Conurbation between 1995 and 1999: Does economic growth benefit the households?*]. *Économie de Madagascar* 4:103–37.

———. 2003. “Two Original Poverty Monitoring Tools: The 1-2-3 Surveys and the Rural Observatories.” In *New International Poverty Reduction Strategies*, ed. Jean-Pierre Cling, Mireille Razafindrakoto, and François Roubaud, 313–39. London: Routledge.

Regan, Tracy L., and Ronald L. Oaxaca. 2006. “Work Experience as a Source of Specification Error in Earnings Models: Implications for Gender Wage Decompositions.” IZA Discussion Papers no. 1920, Institute for the Study of Labor, Bonn.

Reimers, Cordelia W. 1983. “Labour Market Discrimination against Hispanic and Black Men.” *Review of Economics and Statistics* 65, no. 4:570–79.

Roubaud, François. 2000. *Le projet MADIO à Madagascar: L’information statistique au service du débat démocratique sur la politique économique* [The MADIO Project in Madagascar: Statistical information on economic policies to fuel the democratic debate]. Stateco no. 95/96/97, INSEE, France.
Sandell, Steven H., and David Shapiro. 1980. “Work Expectations, Human Capital Accumulation, and the Wages of Young Women.” *Journal of Human Resources* 15, no. 3:335–53.

Siphambe, Happy Kufigwa, and Malebogo Thokweng-Bakwena. 2001. “The Wage Gap between Men and Women in Botswana’s Formal Labour Market.” *Journal of African Economies* 10, no. 2:127–42.

Stanley, T. D., and Stephen B. Jarrell. 1998. “Gender Wage Discrimination Bias? A Meta-regression Analysis.” *Journal of Human Resources* 33, no. 4:947–73.

Topel, Robert. 1991. “Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority.” *Journal of Political Economy* 99, no. 1:145–76.

Weichselbaumer, Doris, and Rudolf Winter-Ebmer. 2005. “A Meta-analysis of the International Gender Wage Gap.” *Journal of Economic Surveys* 19, no. 3:479–511.

World Bank. 2001. *Education and Training in Madagascar: Towards a Policy Agenda for Economic Growth and Poverty Reduction*, vol. 2, *Main Report*. Report no. 22389-MAG (June). Washington, DC: World Bank, Africa Region, Human Development IV.

Wright, Robert E., and John F. Ermisch. 1991. “Gender Discrimination in the British Labour Market: a Reassessment.” *Economic Journal* 406, no. 101:508–22.