CSAE Working Paper WPS/1993-03

Wages and Unemployment in Urban Côte d'Ivoire

John Hoddinott

WPS/93.3

Lady Margaret Hall
Oxford

and

CSAE

My thanks to seminar participants at LSE, McGill, Nottingham and Oxford, and especially Andrew Oswald for stimulating comments on earlier versions of this paper. The data are drawn from the World Bank's Living Standards Survey for Côte d'Ivoire and I acknowledge with thanks the provision of this data set to CSAE. Errors are mine.

Harris-Todaro or Shapiro-Stiglitz? Wage Determination in Urban Côte d'Ivoire

Abstract

Two sector development models, such as Harris-Todaro (1970), assume a positive relationship between urban wages and unemployment. This paper claims that this orthodoxy is wrong. Drawing on data from Côte d'Ivoire, it argues that urban wages are depressed by higher levels of unemployment. Further, urban labour markets in this west African country behave in a fashion remarkably similar to the United States, Britain, Canada and other Developed Countries. Altering the model specification or level of aggregation does not qualitatively alter this finding. These results are consistent with the model of wage determination developed by Shapiro and Stiglitz (1984) and Blanchflower and Oswald (1992).

1. Introduction

The two sector model of Harris and Todaro (1970) assumes a positive relationship between urban wages and urban unemployment. Given a positive differential between urban and rural wages, individuals move from rural to urban areas until urban unemployment rises to equate expected urban wages (the wage multiplied by the probability of finding work, expressed as 1 - rate of urban unemployment) with rural wages. If the wage differential increases, say as a result of higher urban wages, "... it is easy to show that an increase in this differential will have a positive impact both on the short-run rate of growth of unemployment and on the long-run equilibrium rate" (Blomqvist, 1978, p.9). Further theoretical work has refined the model in many ways - for example, by more carefully specifying job search by migrants (Fields, 1975), by dropping the assumption that urban wages are set exogenously (Stiglitz, 1974, Calvo, 1978) or by introducing the informal sector (Cole and Sanders, 1985)[1]. However, the positive relationship between wages and unemployment has remained unchanged and unchallenged.

This paper advances two arguments. First, this orthodoxy regarding the urban wage-unemployment relationship is wrong. Drawing on data from Côte d'Ivoire, it argues that urban wages are depressed by higher levels of unemployment. Second, urban labour markets in this west African country behave in a fashion remarkably similar to the United States, Britain, Canada and other Developed Countries.

The paper is organised into three sections. It begins by extending a model, based on work by Shapiro and Stiglitz (1984) and Blanchflower and Oswald (1992) that predicts a negative wage-unemployment relationship where a zero-migration equilibrium holds. The model is specified, estimated, and the robustness of the results checked. Controlling for a number of potentially serious econometric problems, most notably unobserved location specific effects, it finds strong evidence of a negative relationship between wages and unemployment. Further, the wage-unemployment elasticity, -0.13, is very close to that reported for most Developed Countries. There is no evidence of a positive relationship between these variables.

[1] Further variants are reviewed in Rosenzweig (1988).

2. Theory

In the original Todaro (1969) model, an individual is indifferent between migrating and not-migrating when expected utility is the same in both places. Let $\alpha(U)$ be the probability of being employed (itself a function of urban unemployment), and w_u, w_r be urban and rural wage rates respectively, where $w_u > w_r$. Omitting migration costs and assuming that discount rates are unchanged by location of residence, these expected utilities (EU) can be written as :[2]

$$EU\ (urban) = \int [\ \alpha(U) \cdot w_u\ ]\ d(t)$$

and

$$EU\ (rural) = \int w_r\ d(t)$$

In their extension to the Todaro model, Harris and Todaro (1970) note that migration occurs until $\alpha(U) \cdot w_u$ is equal to w_r. There is a positive relationship between urban wages and urban unemployment. This acts as a compensating differential to produce a zero migration equilibrium.

The Harris-Todaro result appears sensible. Thus, a necessary first step is to explain how a negative relationship between wages and unemployment could exist. The approach used here is Blanchflower and Oswald's (1992) adaptation of a model originally developed by Shapiro and Stiglitz (1984), further modified to suit the particular conditions of labour markets in urban Côte d'Ivoire. In addition to predicting the negative wage-unemployment relationship, this model is attractive for two reasons. First, it allows for the possibility that workers migrate between regions. Second, it signals the presence of several potentially serious econometric problems.

In a Shapiro-Stiglitz type model, risk-neutral workers derive utility from wages and disutility from effort. Such workers can maximise their utility by working for a firm, but not providing any effort, provided there is no risk of being caught 'shirking'. Firms recognise that their employees have an incentive to behave in this way, but are unable to monitor effort by individual workers. Hence, they need some mechanism of ensuring that

[2] Replacing wages with income, as in the original Todaro model, does not alter this equilibrium condition.

workers do not 'shirk'. Shapiro and Stiglitz suggest that firms can resolve this problem by paying workers a wage above the market clearing wage, with the proviso that a worker is fired if caught shirking. This implies a negative relationship between workers' wages and unemployment. The feature that discourages workers from shirking is the cost of being caught and subsequently fired. If unemployment is low, this cost can only remain credible if wages are correspondingly higher. Alternatively, if unemployment is high, firms can pay a lower wage, secure in the knowledge that difficulties in finding work should they be made redundant, is sufficient to 'discipline' workers. This relationship - the 'no shirking condition' or NSC - is shown in Figure 1.

*** Figure 1 here ***

In the Shapiro-Stiglitz model, a number of factors will cause the NSC curve to shift - for example, higher unemployment benefits shift the NSC curve upwards. This occurs because higher unemployment benefits reduce the costs associated with being fired for shirking, and employers can offset this effect only by paying a higher wage. Unemployment insurance schemes are comparatively rare in Developing Countries. However, the idea that differing access to non-wage income sources will shift the NSC curve is helpful here. In the Côte d'Ivoire, sources of non-wage income include running one's own business (as a trader, as the operator of a food stall or as a shoe-shine person) or relying on transfers from family or extended family members. An individual's ability to gain access to these sources will vary by location. For example, opportunities for self-employment, or perhaps for being supported by a relative, might be greater in a large city such as Abidjan, than in a smaller town such as Katiola.[3] This would imply that, holding unemployment and all other factors constant, wages should be higher in Abidjan than in Katiola. Figure 2 shows the NSC curves for Abidjan and Katiola consistent with this hypothesis.

*** Figure 2 here ***

[3] Newman (1987, p. 3) notes that in Abidjan, "a relatively high percentage" of unemployed men reside with other relatives.

This model explains why a negative relationship between wages and unemployment might exist; and, holding unemployment constant, why wages might be higher in some Ivorian cities than in others. However, it cannot be considered an equilibrium model for a country like Côte d'Ivoire. For a given rate of unemployment, one might expect that all workers would migrate to the locality with the highest wages. In the Harris-Todaro framework, the positive wage-unemployment relationship acts as a compensating differential to produce a zero migration condition. Drawing on work by Blanchflower and Oswald (1992), this feature is now incorporated into the model.

Assume an individual can choose, between periods, to live in one of two urban localities. (These results can be extended to an arbitrary number of rural and urban locations without affecting the generality of the results). They cannot migrate within a given time period. These centres are distinct labour markets, and each differs in some non-pecuniary, time invariant manner. For example, some Ivorians might prefer to live in Yamoussoukro, where a large Roman Catholic Basilica has recently been constructed, rather than the more cosmopolitan city of Abidjan. More generally, it might be the case that some towns are more pleasant, or desirable, places to live than others. For a given level of outside employment opportunities and unemployment, some workers will be willing to trade-off lower wages for access to these non-pecuniary benefits.[4] To state this more formally, let w1 and w2 be wages in towns 1 and 2 respectively, e be effort, $\alpha(U)$ the probability of being employed (itself a function of the rate of unemployment), b1 and b2 be levels of non-wage income, and g(s) and h(s) be density functions of labour demand shocks, s. In town 2, there is some non-pecuniary benefit, Φ, that is available to individuals regardless of their employment status. Accordingly, expected utility in towns 1 and 2 is:

$$\text{EU (town 1)} = \int \{(w1 - e)\alpha(U) + b1[(1 - \alpha(U)]\}\, g(s)\, ds$$
$$\text{EU (town 2)} = \int \{(w2 - e + \Phi)\alpha(U) + (b2 + \Phi)[(1 - \alpha(U)]\}\, h(s)\, ds$$

A zero-migration equilibrium requires that both towns offer the same level of expected utility. If b1 = b2, and the distribution of demand shocks is identical in the two towns, this

[4] This should not be confused with the 'bright city lights' hypothesis, popular in the 1960s and early 1970s but lacking empirical foundation (Todaro, 1976). This view claimed that non-pecuniary attractions motivated individuals to move from rural to urban areas. The assumption used here is different. Non-pecuniary benefits obtainable in some cities offset poorer wage/unemployment prospects.

can only occur if the wage/unemployment patterns differ. In this scenario, both towns share a common wage curve, but town 2 lies on a point south-west of town 1. Town 1 will have a higher expected wage - the intrinsically less attractive town must be characterised by better wage and unemployment conditions if it is to retain its workers. Alternatively, setting b1 > b2 implies that the two towns have separate wage curves (as in Figure 2). If unemployment is the same in both towns, zero-migration equilibrium requires that a higher wage in town 1 offset the non-pecuniary benefit available in town 2. (Conversely, if wages are the same in both towns, unemployment must be higher in town 2.) More generally, allowing non-wage income to vary between the towns requires the distribution of demand shocks to differ. Specifically, the more attractive town 2 must be characterised by a more unfavourable distribution of shocks. Blanchflower and Oswald (1992, pp. 5-9) provide formal proofs of these propositions.

There is a further feature of the model worth noting. Let the demand for labour be given by $w = s \cdot F'(L)$, where $F'(L)$ is the marginal product of labour and s represents location specific exogenous shocks. The NSC curve can be regarded as a labour supply curve traced out by changes in s. Suppose the locality specific labour demand curves lie relatively close together, reflecting an assumption of quantitatively small demand shocks, as in Figure 3.

*** Figure 3 here ***

The locus of points obtained from the intersection of the labour demand and NSC curves shows a positive relationship between wages and unemployment, as in the Harris-Todaro model. However, it is the differing availability of nonwage income (generating the family of NSC curves) that generates this upwardly sloping wage curve, not a positive relationship between wages and unemployment *per se*. This suggests that failing to control for locality specific effects will lead to upwardly biased parameter estimates.

3. Data and Model Specification

The data are drawn from the 1985, 1986 and 1987 rounds of the Côte d'Ivoire Living Standards Survey.[5] This multi-purpose, cluster-based survey of 1600 households contains particularly good information on earnings, employment status, unemployment and search behaviour while unemployed. The sample was constructed as a rolling panel, with half the households replaced in each round. Attention is restricted to the 20 urban areas surveyed in each round. (Examining the wage-unemployment relationship in rural areas is unlikely to be of interest as reported unemployment in rural areas is virtually zero (Newman, 1987).)

The estimated model is based on a pooled sample of all males residing in urban clusters, not attending school and aged between 14 and 60 in the 1985, 1986 and 1987 rounds. Only 44.8% of these individuals are engaged in wage employment. As those working in wage employment may be a non-random group, the two-stage approach of Heckman (1979) and Lee (1983) is used to correct for sample selection bias in the wage equation. A logit is estimated with the dependent variable equalling one if the individual was employed in wage employment, zero otherwise. A Mincerian wage equation is then estimated, correcting for sample selection bias via the inclusion of the inverse Mill's ratio. This employment equation is a function of individuals' age, education, location, headship and marital status, nationality, parental background and survey round.

The following considerations motivate the inclusion of these regressors. The likelihood of individuals obtaining wage employment should rise with age, but older people may begin to leave employment. Hence, both age and its square are included. Schooling, and possession of educational qualifications may be used by employers as screening devices. Locational differences in non-wage employment opportunities are captured by dummy variables indicating residence at the time of the survey. An individual's marital status and position within the household may affect his reservation wages and this justifies the inclusion of these variables. Parental background, whether either parent worked in the technical, professional or government sector, may influence ability to obtain wage employment either directly (parents help their children find jobs) or indirectly - through transfer of human capital in the form of knowledge of job search techniques. Nationality is included because

[5] Ainsworth and Muñoz (1986) provide a description of the survey.

non-Ivorians (the majority of whom are economic migrants) may have lower reservation wages, though Appleton, Collier and Horsnell (1990) report that these individuals may also have poorer access to information regarding jobs.[6] Finally, a dummy variable indicating whether this data was obtained from the individual himself or from another member of the household is included to control for erroneous reporting of this information. Year dummies are added to pick up aggregate influences that change over the three years of the survey.

Conditional on being engaged in wage employment, earnings are a function of individual characteristics, location, occupation, year of observation, rates of unemployment, and the inverse Mill's ratio. A quadratic for age has not been included as Appleton, Collier and Horsnell (1990) found that it had no statistically significant effect on earnings (adding this term does not alter the results reported here).[7] A dummy variable equalling one if related to some one in the same firm is included to test for the presence of nepotism effects. Job specific human capital that is passed from one generation to the next is captured by a dummy variable equalling one if the individual is doing the same work as a parent once did.

Individuals in the sample reported hourly, daily, weekly and monthly earnings. These have been standardised as hourly earnings, based on data on hours worked per day and days worked per week. Earnings include direct payment as well as bonuses, commissions, tips, and benefits in kind such as housing, food, clothing, and transport. The mean level of hourly earnings is CFA 1007.

A summary of these variables, together with their means and standard deviations, is given in Table 1.

*** Table 1 here ***

This specification raises two issues. The model presented here claims that wages are a function of local levels of unemployment. It could be argued that the causality runs the

---

[6] "In the wake of sans-travail demonstrations, non-Ivorians are generally hired only when the Office de la Main d'Oeuvre is unable to provide Ivorian staff of the type requested, and non-Ivorian Africans are reluctant to enter the labor exchange offices." Appleton, Collier and Horsnell (1990, p. 13).

[7] van der Gaag and Vijverberg (1988, 1989) use job specific work experience in their wage equations. However, this variable may be correlated with unobserved worker ability. For example, low ability workers may move, or be fired, more frequently and hence build up less experience (Beggs and Chapman, 1988). Since this unobserved characteristic will lead to biased parameter estimates, age is used instead.

other way - that unemployment is a function of local wage rates. One way of resolving this would be to find a variable that affects unemployment but not wages and use instrumental variables estimation. There are no such plausible instruments in this data set, save a measure of lagged unemployment and it could be regarded as a legitimate regressor in its own right. Using it as an instrument would merely replace the problem of simultaneity with an arbitrary identification restriction. Accordingly, two wage equations are estimated - one using current unemployment and the other lagged unemployment. As the effect of this simultaneity is to bias upwards estimated coefficients of unemployment on wages, there should be a less negative relationship when using the current rate of unemployment.

The second issue is the measurement of unemployment. In many Developing Countries, the relatively high number of self-employed individuals, seasonality aspects of some types of employment, and the likely presence of underemployment, make it difficult to compute unemployment rates (Newman, 1987).[8] For this reason, the construction of these variables is detailed below.

The initial sample consists of males, resident in urban areas, not attending school and aged between 14 and 60. The following individuals are subsequently excluded: those not working and who are waiting for the farm season; those not working, not looking for work and who do not want to work; those not working and not looking because there is no work; and those not working and not looking for unspecified reasons. Men are defined as being employed (EMPLOYED) if they: reported working in the last seven days; reported holding jobs but not working because they were on holiday; reported holding jobs but not working because they were ill; or reported holding jobs but not working because they were waiting to start work.

Men are defined as being unemployed (UNEMPLOYED) if they: are not working but sought work in the last 7 days; or are not working, not looking for work but are waiting to hear from an employer. Next, let PART = EMPLOYED + UNEMPLOYED and define the current rate of unemployment as UNEMPLOYED / PART. This is calculated for each urban locality. Individuals in the survey were also questioned about their labour market activities in the last 12 months, including whether they had searched for work during periods when they were without paid employment. Define the number of men who fell into this

[8] Sen (1975), Standing (1978) and Squire (1981) discuss these issues in detail.

category as UNEMPY. The non-current, or lagged rate of unemployment is UNEMPY / PART.

4. Results

The theory discussed in section 2 can be summarised by three hypotheses:

Hypothesis 1: Higher rates of unemployment exert downward pressure on wages. (The wage-unemployment relationship assumed to exist in the Harris-Todaro framework does not hold.)

Hypothesis 2: Parameter estimates for the current measure of unemployment will be biased upwards. The lagged measure of unemployment should generate a more negative wage curve.

Hypothesis 3: Failing to control for unobserved location-specific effects (for example via dummy variables or random or fixed effects estimation) will upwardly bias the estimated coefficients on unemployment.

4.1 Pooled results from the 1985 - 1987 surveys

We begin by briefly reviewing results for the logit that examines the likelihood that an individual is engaged in wage employment. (These are outlined in Appendix Table 1.) The quadratic relationship between age and wage employment is highly significant. The likelihood of participation increases with the number of completed grades. Being head of a household or being married also raises the likelihood of being employed in the wage sector. Non-Ivorians are less likely to have wage jobs. The one surprising finding is the negative coefficients on primary and secondary school certificates. Disaggregating the sample by age reveals that this result is only statistically significant for individuals aged less than 30. It is possible that these variables are capturing unobserved household characteristics. Holders of these certificates tend to come from better off families (Appleton, Collier and Horsnell, 1990) and it may be the case that such families can support their children while they engage in job search activities. Udall and Sinclair (1982) describe this as a 'luxury unemployment'

hypothesis. They present evidence from a number of Developing Countries consistent with this argument.

Table 2 examines the determinants of earnings. Columns (1) and (2) are OLS estimates using current and lagged rates of unemployment respectively. The coefficient for current unemployment is negative but not statistically significant. The wage-unemployment elasticity, evaluated at the mean, is -0.056. However, recall that coefficients on current rates of unemployment will be biased upwards, that is they should be greater (or less negative) than those for lagged unemployment. This is the case, as column (2) shows. The coefficient for lagged unemployment is more negative and is statistically significant at any reasonable confidence level. The wage-unemployment elasticity, evaluated at the mean, is -0.126. A doubly of unemployment generates about a 13% reduction in wages. This figure is remarkably similar to the -0.1 estimate that Blanchflower and Oswald (1993) suggest holds in the United States, Britain, Canada, Austria, Germany, Holland, Italy, Norway and Switzerland. Christofides and Oswald (1992) and Groot et. al. (1992) present additional, comparable evidence for Canada and Holland respectively.

*** Table 2 here ***

The Heckman generalised tobit results are presented in columns (3) and (4) of Table 2. The key result to note here is that the coefficients for current and lagged unemployment are nearly identical to those reported in the first two columns, with the wage-unemployment elasticities being -0.054 and -0.127 respectively.[9] The coefficients on the remaining explanatory variables remain largely unaffected by controlling for selectivity. Earnings increase with age and number of completed grades. Wages are lower in towns located in the East and West regions of the country. Occupation also affects earnings. However, the coefficients for headship and marital status are no longer statistically significant when

[9] This approach requires the imposition of an identification condition - at least one variable must appear in the first stage probit or logit that does not appear in the second stage least squares equation (Maddala, 1986, pp. 229-230). The choice of identifying variables will affect the estimated parameters of the logit, and hence the calculation of the inverse Mill's ratio. In turn, this will lead to changes in the estimated parameters for regressors in the second stage equation. The identification restrictions were varied and the model re-estimated. These produced comparable results, which are available from the author on request.

selectivity is taken into account. The standard errors for nationality and possession of a primary school certificate also increase.[10]

Next, recall that the theory indicated that for a given level of labour demand, failing to control for location specific characteristics might confuse the availability of non-wage employment (which would suggest a positive wage-unemployment relationship) with the no shirking condition (which suggests a negative relationship). If this assumption is correct, inclusion of location specific dummy variables should lower the coefficients for unemployment. As columns (5) and (6) demonstrate, this is precisely what is observed - the coefficients on both current and lagged unemployment are biased upwards when the location dummies are excluded. This is particularly striking for current unemployment, where the coefficient turns from being positive (and significant) when the location dummies are not included, to being negative when location is controlled for.

These results concur with the predictions made in section 2. There are two additional results worth noting. The estimated wage equation includes a number of dummy variables denoting different occupations. It could be argued that these are choice variables. As such, their inclusion generates biased parameter estimates. As column (7) indicates, dropping these variables does not qualitatively affect the results presented here - though the point elasticity (-0.149) is slightly higher when the occupation dummies are excluded. Second, unemployment has been entered as a linear variable. To determine whether the negative relationship is robust to nonlinear functional forms, a quadratic term was included, and the results of this are reported in column (8). The linear term remains significant, though the quadratic is not. The wage-unemployment elasticity, evaluated at the mean, is -0.158, similar to that reported for the linear case.

In Table 2, the urban labour market is treated as a single sector. Yet, there are good reasons for disaggregating these results by employment in the public and private sector. It is possible that some public sector wages are set centrally, and this will weaken any relationship between wages and unemployment. Secondly, the threat of dismissal may be less credible in the public sector. Not only may it be more difficult to monitor effort, but

---

[10] The results for possession of a primary school certificate differ markedly from those reported by van der Gaag and Vijverberg (1988, 1989). They find no evidence that this variable affects earnings in the Côte d'Ivoire. The divergence of results appears to be driven by differences in the samples used. Their results pertain solely to the 1985 round. When the data used here is also restricted to that year, primary school certificates have no impact on earnings. However, they appear to have a negative effect in subsequent years, particularly in the 1987 round.

the greater degree of unionisation may make it harder to sack indolent workers. This suggests a fourth hypothesis:

Hypothesis 4: Local rates of unemployment should exert a more powerful effect on private sector wages.

*** Table 3 here ***

This possibility is explored in three ways. In the first two columns of Table 3, OLS estimation is used to examine separately the determinants of wages conditional on being employed in the private sector or public sector. There are two notable results. First, unemployment exerts a more powerful effect on private sector pay than it does on wages in the public sector. The wage-unemployment elasticities are -0.171 and -0.105 respectively. Moreover, this effect is more precisely measured in the private sector. In fact, the hypothesis that unemployment has no effect on wages in the public sector is not rejected at the 5% significance level, though it can be if lower probability levels are used. Second, the location dummy variables have no impact on earnings in the public sector, but they do influence earnings in the private sector. Specifically, the coefficients for Eastern Region and Western Region towns are negative and significant in the private sector wage equation. This is consistent with the hypothesis that public sector wages are less influenced by local factors.

The OLS estimates ignore the potential selectivity of individuals engaged in wage employment. To take this into account, a multinomial logit model was estimated, with individuals allocated to one of three categories: employed in wage employment; employed in the private sector; and employed in the public sector. (The results of the multinomial logit are reported in Appendix Table 2). The inverse Mill's ratio was calculated and included as an additional regressor in separate private and public sector wage equations. Columns (3) and (4) of Table 3 report these results. Both the parameter estimates and the t statistics for unemployment are nearly identical to those reported in the OLS estimates. The wage-unemployment elasticities are also very similar, being -0.169 for the private sector and -0.100 for the public sector.

A second feature of the OLS estimates is that they assume that the error terms in the private and public sector wage equations are uncorrelated. An endogenous switching model was also estimated to account for this possibility (Robinson and Tomes, 1984, van der Gaag

and Vijverberg, 1988). As columns (5) and (6) of Table 3 show, lagged unemployment has a negative and significant effect on private sector wages, though the wage-unemployment elasticity is somewhat lower at -0.046. Unemployment has no statistically significant impact on wages in the public sector. It should be noted that the sample was restricted to individuals engaged in wage employment. Further, it was necessary to impose strong, and somewhat arbitrary, identification conditions in order to obtain convergence and the results are sensitive to these. Specifically: years of education and location were dropped from the reduced form switching probit equation (results from this are reported in Appendix Table 3); education credentials and nationality were dropped from the public sector wage equation; and education credentials and a number of personal characteristics were dropped from the private sector wage equation.

Table 4 shows abridged results of the OLS, generalized tobit and endogenous switching models where a quadratic term for lagged unemployment has been added.[11] In every case, unemployment exerts a more powerful effect on private sector wages than on earnings in the public sector, and this effect is always more precisely estimated in the former. The wage-unemployment elasticities are similar, though slightly higher, than those reported for the linear case.

*** Table 4 here ***

Finally, recall that the Shapiro-Stiglitz framework used here is based on the notion that firms would fire workers caught shirking. This threat is likely to be less credible for workers with large amounts of firm specific human capital. Firing such workers is costly to the firm because of the need to both recruit and train a new worker. Conversely, newer, or younger workers are less costly to fire, because less has been invested in them. This possibility suggests a fifth hypothesis:

Hypothesis 5: Local rates of unemployment should exert a more powerful effect on workers with less firm specific human capital.

To test this hypothesis, the sample is divided into two groups - men aged over and under 30 years of age. It is assumed that younger men have had fewer opportunities to

[11] Full results are available from the author.

accumulate firm specific human capital. Accordingly, unemployment should have a more powerful effect on their wages. Table 5 shows exactly this effect for both linear and quadratic specifications.

*** Table 5 here ***

4.2 Results from panel estimates

The results presented thus far suggest that higher unemployment is associated with lower wages in urban Côte d'Ivoire. This effect is more marked in the private sector, amongst younger men, and when the simultaneity of these variables is taken into account. This section provides further evidence by examining the relationship between unemployment and wages at the urban locality level.

One rationale for this approach is due to Moulton (1987, 1990). To this point, the dependent variable, and the majority of the independent variables, were measured at the individual level. Unemployment was measured at the locality level. Moulton (1990, p. 334) has noted that, "It is reasonable to expect that units sharing an observable characteristic, such as industry or location, also share unobservable characteristics that would lead the regression disturbances to be correlated." This correlation causes the estimated standard errors to be biased downwards, and, consequently, misleadingly high levels of significance are obtained. By estimating the model using locality means instead of individual observations, the level of aggregation is the same for both dependent and all independent variables, thus eliminating the downward bias on the standard errors.

Secondly, recall that it is possible to impute, erroneously, a positive relationship between wages and unemployment by confusing changes in wages brought about by better non-wage opportunities with those associated with the wage-unemployment relationship. By pooling the urban mean data over three years, it is possible to use fixed and random effects estimation. Assuming that non-wage employment opportunities are time invariant, the differencing inherent in this procedure will eliminate their effect. Thus, estimation using means provides a second check on the results of section 4.1.

The dependent variable is the locality mean of the log of hourly earnings in the private sector. As only Abidjan, Bouake and 11 other urban areas contain individuals

working in the private sector in at least two rounds of the survey, there are just 35 observations in the panel. The need to conserve degrees of freedom restricts the number of regressors that can be included. In addition to the mean level of current and lagged unemployment, mean years of education and age were included; these being retained because they consistently had a powerful effect on earnings in the cross section results.[12] A linear version is not reported here. Though the lagged unemployment variable is correctly signed with a wage-unemployment elasticity of -0.078, the t statistic is only -1.29, low compared to conventional significance levels.

*** Table 6 here ***

There are several features to note in Table 6. As in the individual-level results, parameter estimates for current unemployment are biased upwards and are measured with large standard errors relative to the lagged unemployment variables. Second, controlling for these unobserved effects causes the coefficient on unemployment to fall, a result also implied by the theory and consistent with the results reported in section 4.1. In the case of lagged unemployment, both likelihood ratio and Lagrange multiplier tests reject ordinary least squares in favour a fixed effects model (which controls for both unobserved locality and period effects). The choice of random or fixed effects was examined using a Hausman (1978) specification test. The null hypothesis that unobserved effects are treated as random disturbances is not rejected. However, both fixed and random effects estimation give similar wage-unemployment elasticities, -0.241 and -0.200 respectively. These are very similar to the elasticities reported in Table 4 for the private sector using individual level data and a quadratic specification.

5. Concluding Notes

Since the publication of Todaro (1969) and Harris and Todaro (1970), economists studying Developing Countries have taken as given a positive relationship between urban wages and

[12] Note that the rolling nature of the panel generates means for education and age that differ across survey years.

unemployment. This paper argues that this orthodoxy is wrong. Drawing on data from Côte d'Ivoire, it shows that urban wages are depressed by higher levels of unemployment. Further, the wage-unemployment elasticity is remarkably similar to that recently reported for the United States, Britain, Canada and other Developed Countries. A doubling of unemployment in urban Côte d'Ivoire causes wages to fall by about 13%. This result is consistent with the Shapiro-Stiglitz model of wage determination.

A potential caveat to these findings is the size of the sample and the quality of the data. The data set employed here is considerably smaller than those used in studies of wage curves in Developed Countries. For example, whereas Blanchflower and Oswald's (1993) examination of wages and unemployment in the United States is based on a sample of approximately 1.7 million individuals, the locality level estimates rely on only 35 data points. However, set against this caveat are three considerations. First, to the extent that it is possible to check, the Côte d'Ivoire Living Standards Survey appears to be of particularly good quality (Deaton, 1993). Second, the smallness of sample size and the potential for measurement error should jointly conspire to make it more difficult, not less, to obtain well measured parameter estimates.

Third, and most importantly, the empirical results conform to virtually all predictions made in the theoretical and specification sections of this paper. Coefficients for current rates of unemployment were assumed to be biased upwards. This was found when using both individual and mean level data. Controlling for simultaneity bias, unemployment reduces wages and this effect is statistically significant. It was argued that failing to control for unobserved, location specific effects will upwardly bias the parameter estimates. This is the case both in the pooled individual level observations and in the cluster mean estimates. Disaggregating by sector and by age showed that unemployment exerted a more powerful effect on private sector wages and on younger workers. Both results conform to *a priori* expectations. The locality level estimates control for unobserved effects and also address the aggregation issue. These also supported the finding of a negative relationship between wages and unemployment. The results are robust to changes in model specification and estimation.

Harris-Todaro type models, the cornerstone of much theorising on economic development, posit a positive relationship between urban wages and unemployment. The results presented here show virtually no support for this claim. At least in Côte d'Ivoire, there exists a negative relationship between these variables.

References

Ainsworth, M. and J. Muñoz (1986) "The Côte d'Ivoire Living Standards Survey" LSMS Working paper No. 26, World Bank, Washington D.C.

Appleton, S., P. Collier and P. Horsnell (1990) "Gender, Education, and Employment in Côte d'Ivoire" SDA Working Paper No. 8, World Bank, Washington D.C.

Beggs, J. and B. Chapman (1988) "Labor Turnover Bias in Estimating Wages" *Review of Economics and Statistics*, vol. 70, pp. 117-123.

Blanchflower, D. and A. Oswald (1992) "International Wage Curves", mimeo, LSE.

Blanchflower, D. and A. Oswald (1993) "The Wage Curve", unpublished manuscript, LSE.

Blomqvist, A. (1978) "Urban Job Creation and Unemployment in LDCs: Todaro vs. Harris and Todaro" *Journal of Development Economics*, vol 5, pp. 3-18.

Calvo, G.A. (1978) "Urban Development and Wage Determination in LDCs: Trade Unions in the Harris-Todaro Model" *International Economic Review*, vol. 19, pp. 65-81.

Cole, W. and R. Sanders (1985) "Internal Migration and Urbanization in the Third World" *American Economic Review*, vol. 75, pp. 481-494.

Christofides, L. and A. Oswald (1992) "Real Wage Determination and Rent Sharing in Collective Bargaining Agreements" *Quarterly Journal of Economics*, vol. 107, pp. 985-1002.

Deaton, A. (1993) "Data and Econometric Tools for Development Analysis" Research Program in Development Studies Discussion Paper No. 172, Center of International Studies, Woodrow Wilson School, Princeton University.

Fields, G.S. (1975) "Rural-Urban Migration, Urban Unemployment and Underemployment, and Job Search Activities in LDCs" *Journal of Development Economics*, vol. 2, pp. 165-187.

Groot, W., E. Mekkelholt and H. Oosterbeek (1992) "Further Evidence on the Wage Curve" *Economics Letters*, vol. 38, pp. 355-359.

Harris, J. and M. Todaro (1970) "Migration, Unemployment and Development: A Two -Sector Analysis" *American Economic Review*, vol. 60, pp. 126-142.

Hausman, J. (1978) "Specification Tests in Econometrics" *Econometrica*, vol. 46, pp. 1251-1271.

Heckman, J. (1979) "Sample Selection Bias as a Specification Error" *Econometrica*, vol. 47, pp. 153-161.

Lee, L.F. (1983) "Generalized Econometric Models with Selectivity" *Econometrica*, vol. 51, pp. 507-512.

Maddala, G.S. (1986) *Limited Dependent and Qualitative Variables in Econometrics* (Cambridge University Press: Cambridge).

Moulton, B. (1987) "Diagnostics for Group Effects in Regression Analysis" *Journal of Business and Economic Statistics*, vol. 5, pp. 275-282.

Moulton, B. (1990) "An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units" *Review of Economics and Statistics*, vol. 72, pp. 334-338.

Newman, J. (1987) "Labor Market Activity in Côte d'Ivoire and Peru" LSMS Working paper No. 36, World Bank, Washington D.C.

Robinson, C. and N. Tomes (1984) "Union Wage Differentials in the Public and Private Sector: A Simultaneous Equations Specification" *Journal of Labor Economics*, vol. 2, pp. 106-127.

Rosenzweig, M. (1988) "Labor Markets in Low-Income Countries" in *Handbook of Development Economics* vol. I, ed. by H. Chenery and T.N. Srinivasan (North Holland: Amsterdam).

Sen, A. (1975) *Employment, Technology, and Development* (Clarendon Press: Oxford).

Shapiro, C. and J. Stiglitz (1984) "Equilibrium Unemployment as a Worker Discipline Device" *American Economic Review*, vol. 74, pp. 433-444.

Squire, L. (1981) *Employment Policy in Developing Countries: A Survey of Issues and Evidence* (Oxford University Press: New York).

Standing, G. (1978) *Labour Force Participation and Development* (International Labour Office: Geneva).

Stiglitz, J. (1974) "Alternative Theories of Wage Determination and Unemployment in LDCs: The Labor Turnover Model" *Quarterly Journal of Economics*, vol. 88, pp 194-227.

Todaro, M. (1969) "A Model of Labor Migration and Urban Unemployment in Less Developed Countries" *American Economic Review*, vol. 59, pp. 138-148.

Todaro, M. (1976) *Internal Migration in Developing Countries* (International Labour Office: Geneva).

Udall, A. and S. Sinclair (1982) "The 'Luxury Unemployment' Hypothesis: A Review of Recent Evidence" *World Development*, vol. 10, pp. 49-62.

van der Gaag, J. and W. Vijverberg (1988) "A Switching Regression Model for Wage Determinants in the Public and Private Sectors of a Developing Country" *Review of Economics and Statistics*, vol. 70, pp. 244-252.

van der Gaag, J. and W. Vijverberg (1989) "Wage Determinants in Côte d'Ivoire: Experience, Credentials and Human Capital" *Economic Development and Cultural Change*, vol. 37, pp. 371-382.

White, H. (1980) "A Heteroskedasticity-Consistent Covariance Matrix and a Direct Test for Heteroskedasticity" *Econometrica*, vol. 48, pp. 721-746.

Table 1: Variable Means and Standard Deviations

All Observations

Variable	Definition	Mean	Std.Dev
age	age	29.675	10.390
age squared	age squared	988.49	707.23
primary school certificate	=1 if passed primary school leaving exam	0.51966	0.49973
secondary school certificate	=1 if passed secondary school leaving exam	0.16011	0.36680
baccalaureate or higher degree	=1 if holds baccalaureate or higher degree	0.06413	0.24506
number of completed grades	number of completed grades	8.4719	4.0430
head of household	=1 if household head	0.46723	0.49904
married	=1 if married	0.45506	0.49809
non-Ivorian	=1 if a non-Ivorian	0.12781	0.33396
parental occupation	=1 if father or mother employed in technical, professional or public sector	0.12921	0.35452
Abidjan or Bouake	=1 if lives in Abidjan or Bouake	0.62453	0.48436
Eastern Region town	=1 if lives in town in East Region	0.18633	0.38946
Western Region town	=1 if lives in town in West Region	0.11798	0.32266
1986	=1 if drawn from 1986 survey	0.34457	0.47534
1987	=1 if drawn from 1987 survey	0.32772	0.46949
answers questions	=1 if answers questions	0.18539	0.38871

Table 1 - continued

Wage Earners Only

Variable	Definition	Mean	Std.Dev
age	age	34.195	8.3542
primary school certificate	=1 if passed primary school leaving exam	0.47450	0.49965
secondary school certificate	=1 if passed secondary school leaving exam	0.19098	0.39331
baccalaureate or higher degree	=1 if holds baccalaureate or higher degree	0.08897	0.28487
number of completed grades	number of completed grades	9.7722	4.3146
head of household	=1 if household head	0.80071	0.39770
married	=1 if married	0.74880	0.43396
non-Ivorian	=1 if a non-Ivorian	0.10795	0.31050
parents did same occupation	=1 if parent did same occupation	0.02847	0.16641
related to person in same firm	=1 if related to some one in same enterprise	0.02728	0.16301
service worker	=1 if employed as painter, housemaid, laundrer, cook taxi/bus driver or truck driver	0.05931	0.23635
skilled worker or craftsman	=1 if employed as foreman, electrician, nurse, machine operator, sailor, or draftsman	0.07236	0.25924
teacher or principal	=1 if employed as teacher (primary, secondary or university) or principal	0.11032	0.31347
white collar professional	=1 if employed as doctor, pharmacist, lawyer, architect, pilot/stewardess, administrator, accountant, or engineer	0.11507	0.31929
other technical or professional	=1 if employed as other technical or professional	0.16607	0.37237
Abidjan or Bouake	=1 if lives in Abidjan or Bouake	0.66548	0.47210
Eastern Region town	=1 if lives in town in East Region	0.16489	0.37130
Western Region town	=1 if lives in town in West Region	0.10795	0.31050
1986	=1 if drawn from 1986 survey	0.33689	0.47293
1987	=1 if drawn from 1987 survey	0.35824	0.47977
answers questions	=1 if answers questions	0.11507	0.31929
locality current unemployment rate		0.14847	0.10342
locality lagged unemployment rate		0.15904	0.11294

Table 2: Determinants of Urban Wages

	OLS		Generalized Tobit	
	(1)	(2)	(3)	(4)
Unemployment				
current rate of unemployment	-0.3753	-	-0.3665	-
	(-1.018)		(-0.998)	
lagged rate of unemployment	-	-0.7936	-	-0.7984
		(2.872)		(-2.929)
Personal Characteristics				
age	0.0402	0.0401	0.0450	0.0451
	(10.208)	(10.282)	(8.016)	(8.079)
primary school certificate	-0.2027	-0.2005	-0.1454	-0.1415
	(-2.924)	(-2.901)	(-1.709)	(-1.668)
secondary " "	-0.0547	-0.0546	-0.0502	-0.0500
	(-0.494)	(-0.494)	(-0.453)	(-0.451)
baccalaureate or higher degree	0.3522	0.3544	0.3441	0.3461
	(2.182)	(2.220)	(2.096)	(2.113)
number of completed grades	0.0991	0.0996	0.0939	0.0943
	(4.309)	(4.333)	(4.198)	(4.215)
head of household	0.4601	0.4567	0.1733	0.1616
	(4.961)	(4.963)	(0.773)	(0.725)
married	0.2065	0.2041	0.1261	0.1213
	(2.667)	(2.635)	(1.341)	(1.288)
non-Ivorian	-0.3415	-0.3318	-0.2494	-0.2370
	(-3.225)	(-3.128)	(-1.902)	(-1.808)
parents did same occupation	0.1470	0.1321	0.1403	0.1252
	(0.923)	(0.834)	(0.896)	(0.805)
related to person in same firm	-0.0522	-0.0387	-0.0238	-0.0094
	(-0.386)	(-0.276)	(-0.176)	(-0.068)
Occupation				
service worker	-0.1589	-0.1606	-0.1756	-0.1776
	(-1.302)	(-1.327)	(-1.419)	(-1.445)
skilled worker or craftsman	0.0410	0.0377	0.0414	0.0381
	(0.397)	(0.373)	(0.398)	(0.374)
teacher or principal	0.5557	0.5474	0.5541	0.5457
	(4.954)	(4.909)	(4.910)	(4.862)
white collar professional	0.3465	0.3221	0.3421	0.3174
	(3.257)	(3.005)	(3.177)	(2.925)
other technical or professional	0.1537	0.1403	0.1456	0.1332
	(1.966)	(1.788)	(1.846)	(1.672)
Location				
Abidjan or Bouake	0.1103	0.0669	0.0855	0.0429
	(0.996)	(0.730)	(0.766)	(0.462)
Eastern Region town	-0.2798	-0.4051	-0.2807	-0.4063
	(-2.516)	(-3.341)	(-2.543)	(-3.371)
Western Region Town	-0.3162	-0.3915	-0.3414	-0.4179
	(-2.602)	(-3.120)	(-2.780)	(-3.289)
Year				
1986	0.1052	0.1405	0.1116	0.1470
	(1.478)	(1.953)	(1.573)	(2.051)
1987	-0.1654	-0.0872	-0.1664	-0.0884
	(-2.385)	(-1.257)	(-2.410)	(-1.280)
Answers questions	-0.0156	0.0013	0.0084	0.0261
	(-0.161)	(0.013)	(0.083)	(0.259)
Constant	3.5316	3.6239	3.8277	3.9293
	(12.557)	(12.936)	(13.093)	(13.413)
Inverse Mill's Ratio	-	-	-0.2539	-0.2611
			(-1.335)	(-1.380)
Adj R2	0.558	0.561	0.559	0.562
F statistic	49.339	49.989	47.374	48.013
Sample Size	843	843	843	843
Wage-unemployment elasticity evaluated at the mean	-0.056	-0.126	-0.054	-0.127

Table 2 - continued

	Generalized Tobit			
	No location controls		No occupation controls	Quadratic Included
	(5)	(6)	(7)	(8)
Unemployment				
current rate of unemployment	0.6226	-	-	-
	(2.238)			
lagged rate of unemployment	-	0.1832	-0.9379	-1.3457
		(0.787)	(-3.463)	(-1.895)
lagged rate squared	-	-	-	1.1036
				(1.014)
Personal Characteristics				
age	0.0458	0.0469	0.0466	0.0451
	(8.186)	(8.335)	(8.346)	(8.073)
primary school certificate	-0.1392	-0.1391	-0.1553	-0.1385
	(-1.642)	(-1.628)	(-1.761)	(-1.630)
secondary " "	-0.0826	-0.0856	-0.0423	-0.0498
	(-0.741)	(-0.767)	(-0.371)	(-0.450)
baccalaureate or higher degree	0.3712	0.3844	0.3767	0.3467
	(2.180)	(2.245)	(2.155)	(2.119)
number of completed grades	0.0970	0.0977	0.1122	0.0943
	(4.174)	(4.160)	(4.941)	(4.229)
head of household	0.0973	0.0683	0.1970	0.1734
	(0.443)	(0.311)	(0.868)	(0.774)
married	0.0911	0.0752	0.1053	0.1198
	(0.971)	(0.804)	(1.087)	(1.270)
non-Ivorian	-0.2112	-0.1979	-0.2267	-0.2343
	(-1.595)	(-1.485)	(-1.666)	(-1.790)
parents did same occupation	0.0897	0.0849	0.1354	0.1160
	(0.575)	(0.550)	(0.777)	(0.748)
related to person in same firm	0.0191	0.0093	0.0171	-0.0243
	(0.150)	(0.073)	(0.124)	(-0.173)
Occupation				
service worker	-0.1684	-0.1467	-	-0.1736
	(-1.336)	(-1.151)		(-1.416)
skilled worker or craftsman	0.0617	0.0722	-	0.0346
	(0.568)	(0.661)		(0.339)
teacher or principal	0.5131	0.5037	-	0.5476
	(4.569)	(4.462)		(4.865)
white collar professional	0.3381	0.3485	-	0.3180
	(3.038)	(3.044)		(2.938)
other technical or professional	0.1424	0.1729	-	0.1367
	(1.756)	(2.122)		(1.717)
Location				
Abidjan or Bouake	-	-	0.0466	0.1064
			(0.490)	(0.843)
Eastern Region town	-	-	-0.3703	-0.3918
			(-3.028)	(-3.278)
Western Region Town	-	-	-0.3949	-0.3885
			(-3.081)	(-2.961)
Year				
1986	0.1291	0.1096	0.0928	0.1438
	(1.789)	(1.489)	(1.359)	(2.021)
1987	-0.1207	-0.1781	-0.0773	-0.0924
	(-1.790)	(-2.510)	(-1.074)	(-1.344)
Answers questions	0.0229	0.0214	0.0399	0.0221
	(0.225)	(0.207)	(0.396)	(0.219)
Constant	3.7005	3.7824	3.8178	3.9166
	(12.885)	(13.084)	(12.779)	(13.417)
Inverse Mill's Ratio	-0.3211	-0.3393	-0.2567	-0.2541
	(-1.729)	(-1.808)	(-1.360)	(-1.339)
Adj R2	0.546	0.544	0.543	0.562
F statistic	51.664	51.181	56.481	46.035
Sample Size	843	843	843	843
Wage-unemployment elasticity evaluated at the mean	0.092	0.029	-0.149	-0.158

Table 2 - continued

Notes:
(1) t statistics are in parentheses.
(2) standard errors are corrected for heteroscedasticity using the method outlined by White (1980).
(3) omitted dummy variable categories are no education diploma, living in northern region town, 1985, employed in other occupations.

Table 3: Determinants of Private and Public Earnings

	OLS		Generalized Tobit		Endogenous Switching	
	Private (1)	Public (2)	Private (3)	Public (4)	Private (5)	Public (6)
Unemployment						
lagged rate of unemployment	-0.9513	-0.7767	-0.9393	-0.7774	-0.2899	-0.7853
	(2.501)	(-1.860)	(-2.440)	(-1.863)	(-1.723)	(-1.288)
Personal Characteristics						
Age	0.0470	0.0328	0.0425	0.0328	0.0422	0.0299
	(8.273)	(5.325)	(3.898)	(6.245)	(6.674)	(3.841)
primary school certificate	-0.0882	-0.3244	-0.1172	-0.3184	-	-
	(-1.108)	(-2.997)	(-1.139)	(-2.935)		
secondary " "	-0.1838	0.1401	-0.1981	0.1348	-	-
	(-1.159)	(1.058)	(-1.304)	(1.104)		
baccalaureate or higher degree	0.7248	0.1192	0.6431	0.1010	-	-
	(2.936)	(0.787)	(2.700)	(0.668)		
number of completed grades	0.0820	0.1192	0.0773	0.1085	0.1058	0.1305
	(2.855)	(7.959)	(2.204)	(3.833)	(17.496)	(10.929)
head of household	0.4710	0.1715	0.5682	0.0541	-	-0.1505
	(4.162)	(1.182)	(2.560)	(0.196)		(-0.675)
married	0.1870	0.1409	0.2543	0.1401	-	0.1683
	(1.802)	(1.297)	(1.555)	(1.291)		(1.277)
non-Ivorian	-0.3090	-0.3765	-0.3164	-0.3095	-	-
	(-2.669)	(-1.969)	(-2.646)	(-1.299)		
parents did same occupation	0.2240	0.0472	0.2345	0.0563	-	0.4341
	(1.330)	(0.187)	(1.386)	(0.224)		(2.266)
related to person in same firm	-0.0848	-0.0316	-0.1021	-0.0288	-	-0.0694
	(-0.422)	(-0.146)	(-0.492)	(-0.136)		(-0.269)
Occupation						
service worker	-0.2149	-0.2678	-0.2098	-0.2802	-	-
	(-1.583)	(-0.935)	(-1.548)	(-0.992)		
skilled worker or craftsman	-0.0901	0.1573	-0.0933	0.1587	-	-
	(-0.625)	(1.422)	(-0.655)	(1.437)		
teacher or principal	0.0976	0.5227	0.0873	0.5226	-	-
	(0.471)	(4.627)	(0.431)	(4.626)		
white collar professional	0.6244	-0.0169	0.6173	-0.0157	-	-
	(4.212)	(-0.140)	(4.385)	(-0.129)		
other technical or professional	0.2212	-0.0763	0.2225	-0.0788	-	-
	(2.253)	(-0.668)	(2.251)	(-0.693)		
Location						
Abidjan or Bouake	0.0415	0.0283	0.1057	0.0777	0.1508	-0.0098
	(0.334)	(0.217)	(0.587)	(0.475)	(1.010)	(-0.052)
Eastern Region town	-0.7305	-0.2307	-0.7457	-0.2482	0.2905	-0.1625
	(-4.153)	(-1.390)	(-4.046)	(-1.413)	(2.041)	(-0.888)
Western Region Town	-0.6046	-0.2365	-0.5961	-0.2456	0.2786	-0.2203
	(-3.094)	(-1.538)	(-3.032)	(-1.588)	(0.823)	(-1.141)
Year						
1986	0.1519	0.1479	0.1480	0.1518	-0.0696	0.0546
	(1.602)	(1.370)	(1.550)	(1.402)	(-0.306)	(0.458)
1987	-0.0673	-0.0243	-0.0692	-0.0294	0.2796	-0.0085
	(-0.718)	(-0.250)	(-0.733)	(-0.304)	(2.238)	(-0.073)
Answers questions	-0.0145	0.0408	-0.0174	0.0646	-	-
	(-0.120)	(0.295)	(-0.143)	(0.446)		
Constant	3.5479	4.0183	3.3636	4.4133	2.7961	4.7910
	(10.616)	(14.837)	(10.631)	(4.959)	(14.704)	(10.703)
Inverse Mill's Ratio	-	-	0.2253	-0.1430		
			(0.498)	(-0.466)		
Sigma	-	-	-	-	0.8271	0.9757
					(15.880)	(23.793)
Rho	-	-	-	-	-0.6711	0.8096
					(-6.011)	(17.699)
Adj R2	0.566	0.489	0.566	0.487	-	-
F statistic	30.809	15.729	29.468	15.013	-	-
Sample size	503	340	530	340	530	340
wage-unemployment elasticity evaluated at the mean	-0.171	-0.105	-0.169	-0.100	-0.046	-0.125

Table 3 - continued

Notes:
(1) t statistics are in parentheses.
(2) standard errors in columns (1) - (4) are corrected for heteroscedasticity using the method outlined by White (1980).
(3) omitted dummy variable categories are no education diploma, living in northern region town, 1985, employed in other occupations.
(4) Rho is correlation between the error term in the wage equation and the error term in the switching equation.

Table 4: Wage-Unemployment Elasticities for Private and Public Sector with Quadratic

	OLS		Generalized Tobit		Endogenous Switching	
	Private	Public	Private	Public	Private	Public
	(1)	(2)	(3)	(4)	(5)	(6)
lagged rate of unemployment	-1.8801	-1.2758	-1.9087	-1.2456	-0.5649	-0.8084
	(-1.962)	(-1.203)	(-1.974)	(-1.172)	(-2.394)	(-0.507)
lagged rate squared	1.7521	1.0606	1.8304	0.9952	-0.4576	0.0473
	(1.202)	(0.691)	(1.226)	(0.646)	(-1.809)	(0.009)
wage-unemployment elasticity evaluated at the mean	-0.225	-0.129	-0.225	-0.127	-0.113	-0.126
Adj R2	0.566	0.488	0.566	0.486	-	-
F statistic	29.515	15.032	28.292	14.370	-	-

Notes:
(1) All other regressors used in Table 3 were used in these estimates.
(2) Estimation as per Table 3.

Table 5: Wage Determinants by Age of Worker

	Generalized Tobit			
	Males aged less than 31		Males aged 31 or older	
	(1)	(2)	(3)	(4)
Unemployment				
lagged rate of unemployment	-1.9854	-4.2245	-0.1812	0.0374
	(-3.419)	(-2.898)	(-0.714)	(0.058)
lagged rate squared	-	4.4635	-	-0.4444
		(2.017)		(-0.444)
Personal Characteristics				
age	0.0535	0.0568	0.0030	0.0030
	(2.416)	(2.602)	(0.200)	(0.205)
primary school certificate	-0.0622	-0.0599	-0.3026	-0.3037
	(-0.346)	(-0.341)	(-2.432)	(-2.442)
secondary " "	-0.0675	-0.0490	-0.0695	-0.0688
	(-0.401)	(-0.291)	(-0.524)	(-0.518)
baccalaureate or higher degree	0.3834	0.4072	0.2901	0.2904
	(1.638)	(1.733)	(1.717)	(1.718)
number of completed grades	0.1111	0.1068	0.1005	0.1004
	(5.315)	(5.039)	(5.986)	(5.978)
head of household	-0.6359	-0.5737	1.1933	1.1858
	(-1.142)	(-1.052)	(2.958)	(2.913)
married	-0.0210	-0.0410	0.2986	0.2977
	(-0.134)	(-0.261)	(2.327)	(2.319)
non-Ivorian	0.0804	0.0861	-0.5837	-0.5841
	(0.278)	(0.302)	(-3.050)	(-3.051)
parents did same occupation	0.2422	0.1650	-0.0681	-0.0667
	(1.314)	(0.956)	(-0.297)	(-0.291)
related to person in same firm	-0.0609	-0.1295	0.4860	0.4892
	(-0.319)	(-0.677)	(2.768)	(2.804)
Occupation				
service worker	0.0580	0.0664	-0.3750	-0.3768
	(0.203)	(0.240)	(-2.804)	(-2.817)
skilled worker or craftsman	0.2356	0.2423	-0.0564	-0.0544
	(1.244)	(1.270)	(-0.492)	(-0.473)
teacher or principal	0.6280	0.6489	0.5024	0.5020
	(3.113)	(3.219)	(4.391)	(4.389)
white collar professional	0.2524	0.2651	0.3288	0.3288
	(1.363)	(1.450)	(2.978)	(2.975)
other technical or professional	0.0568	0.0768	0.1323	0.1308
	(0.446)	(0.601)	(1.371)	(1.351)
Location				
Abidjan or Bouake	-0.1783	0.0941	0.1659	0.1412
	(-0.974)	(0.403)	(1.444)	(0.965)
Eastern Region town	-0.7067	-0.6229	-0.3472	-0.3517
	(-2.950)	(-2.729)	(-2.823)	(-2.819)
Western Region Town	-0.8123	-0.6851	-0.2128	-0.2244
	(-2.972)	(-2.546)	(-1.645)	(-1.609)
Year				
1986	0.4753	0.4603	-0.0728	-0.0713
	(3.567)	(3.552)	(-0.880)	(-0.861)
1987	0.1763	0.1530	-0.2258	-0.2246
	(1.337)	(1.187)	(-2.928)	(-2.900)
Answers questions	0.1843	0.1866	-0.1363	-0.1328
	(1.302)	(1.339)	(-0.975)	(-0.942)
Constant	4.7591	4.6387	3.9771	3.9845
	(4.035)	(3.995)	(11.146)	(11.151)
Inverse Mill's Ratio	-0.9349	-0.8981	0.8841	0.8792
	(-1.872)	(-1.830)	(2.161)	(2.139)
Adj R2	0.550	0.555	0.471	0.470
F statistic	16.248	15.897	22.429	21.462
Sample Size	288	288	555	555
Wage-unemployment elasticity evaluated at the mean	-0.319	-0.448	-0.029	-0.016

Table 5 - continued

Notes:
(1) t statistics are in parentheses.
(2) standard errors are corrected for heteroscedasticity using the method outlined by White (1980).
(3) omitted dummy variable categories are no education diploma, living in northern region town, 1985, employed in other occupations.

Table 6: Locality Level Wage Determinants

using current unemployment

	OLS	Fixed Effects	Random Effects	Variable Means
	(1)	(2)	(3)	
Unemployment				
Current unemployment	1.3871	-2.7285	-1.0207	0.0864
	(0.639)	(-1.080)	(-0.497)	
Current unemployment squared	-4.5981	4.7596	1.5665	0.0215
	(-0.808)	(0.769)	(0.305)	
Locality characteristics				
mean age	0.1028	0.1319	0.1135	31.569
	(5.188)	(5.132)	(5.590)	
mean number of completed grades	0.2266	0.1291	0.1708	8.661
	(6.049)	(3.361)	(5.068)	
Constant	0.3418	0.4199	0.5831	
	(0.516)	(0.554)	(0.910)	
Likelihood ratio test		58.215		
Lagrange multiplier test		3.216		
Hausman test			6.767	
Adjusted R2	0.698	0.843	0.705	
Sample Size	35	35	35	
Wage-unemployment elasticity evaluated at the mean	0.051	-0.165	-0.065	

using lagged unemployment

	OLS	Fixed Effects	Random Effects	Variable Means
	(1)	(2)	(3)	
Unemployment				
Lagged unemployment	-1.4946	-3.0436	-2.4365	0.1142
	(-1.004)	(-2.282)	(-1.997)	
Lagged unemployment squared	1.4800	4.0746	2.9932	0.0358
	(0.599)	(1.963)	(1.545)	
Locality characteristics				
mean age	0.1010	0.1211	0.1121	31.569
	(5.524)	(6.633)	(6.910)	
mean number of completed grades	0.2099	0.0997	0.1435	8.661
	(5.930)	(2.663)	(4.410)	
Constant	0.6805	1.0855	0.9807	
	(1.067)	(1.755)	(1.712)	
Likelihood ratio test		53.475		
Lagrange multiplier test		6.665		
Hausman test			7.005	
Adjusted R2	0.707	0.873	0.708	
Sample Size	35	35	35	
Wage-unemployment elasticity evaluated at the mean	-0.132	-0.241	-0.200	

Notes:
(1) Fixed and random effects control for both locality and period effects.

Appendix Table 1: Determinants of Participation in Wage Employment

	Logit
Personal Characteristics	
age	0.1833
	(5.296)
age squared	-0.0031
	(-6.548)
primary school certificate	-0.4456
	(-3.914)
secondary school certificate	-0.0679
	(-0.354)
baccalaureate or higher degree	0.0167
	(0.062)
number of completed grades	0.0356
	(1.949)
head of household	1.7698
	(9.783)
married	0.4509
	(2.603)
non-Ivorian	-0.7051
	(-4.479)
parental occupation	0.0818
	(0.555)
Location	
Abidjan or Bouake	0.2378
	(1.138)
Eastern Region town	0.0182
	(0.079)
Western Region town	0.2897
	(1.178)
Year	
1986	-0.0886
	(-0.711)
1987	0.0084
	(0.066)
answers questions	-0.1246
	(-0.906)
Constant	-3.8077
	(-6.704)
Log-Likelihood	-1167.289
Chi-Squared (16)	603.431
Sample size	2136

Notes:
(1) t statistics are in parentheses.
(2) dependent variable =1 if works for wages.

Appendix Table 2: Multinomial Logit for Employment in the Private and Public Sector

	Private Sector	Public Sector
Personal Characteristics		
age	0.1544	0.3380
	(4.203)	(4.944)
age squared	-0.0028	-0.0046
	(-5.594)	(-5.155)
primary school certificate	-0.4448	-0.2913
	(-3.697)	(-1.550)
secondary school certificate	-0.1329	-0.2913
	(-0.626)	(-1.550)
baccalaureate or higher degree	-0.5352	0.1256
	(-1.539)	(0.353)
number of completed grades	-0.0098	0.1728
	(-0.565)	(6.534)
head of household	1.4562	2.5086
	(7.445)	(8.564)
married	0.6233	0.1095
	(3.278)	(0.442)
non-Ivorian	-0.4315	-1.3979
	(-2.654)	(-4.980)
parental occupation	0.2053	-0.0659
	(1.305)	(-0.313)
Location		
Abidjan or Bouake	0.4555	-0.4448
	(1.999)	(-1.485)
Eastern Region town	-0.1512	0.3197
	(-0.586)	(0.992)
Western Region town	0.1885	0.3943
	(0.693)	(1.135)
Year		
1986	-0.0916	-0.1197
	(-0.685)	(-0.629)
1987	-0.0089	0.0289
	(-0.065)	(0.154)
answers questions	-0.0428	-0.2815
	(-0.297)	(-1.105)
Constant	-3.2016	-9.7029
	(-5.333)	(-8.087)
Log-Likelihood	-1636.149	
Chi-Squared (32)	603.431	
Sample size	2136	

Notes:
(1) t statistics are in parentheses.

Appendix Table 3: Probit Regression for Endogenous Switching Model

	Probit
Personal Characteristics	
age	0.1215
	(2.832)
age squared	-0.0015
	(-2.737)
primary school certificate	-0.2863
	(-2.937)
secondary school certificate	0.1455
	(1.119)
baccalaureate or higher degree	0.9906
	(5.714)
number of completed grades	-
head of household	0.7953
	(4.769)
married	-0.1431
	(-0.910)
non-Ivorian	-0.7173
	(-5.042)
parental occupation	0.0047
	(0.047)
Location	
Abidjan or Bouake	-
Eastern Region town	-
Western Region town	-
Year	
1986	0.0410
	(0.388)
1987	-0.0740
	(-0.731)
answers questions	-
Constant	-2.9964
	(-3.988)
Log-Likelihood	-1455.357
Sample size	843

Notes:
(1) t statistics are in parentheses.
(2) sample restricted to individuals engaged in wage employment.

Figure 1

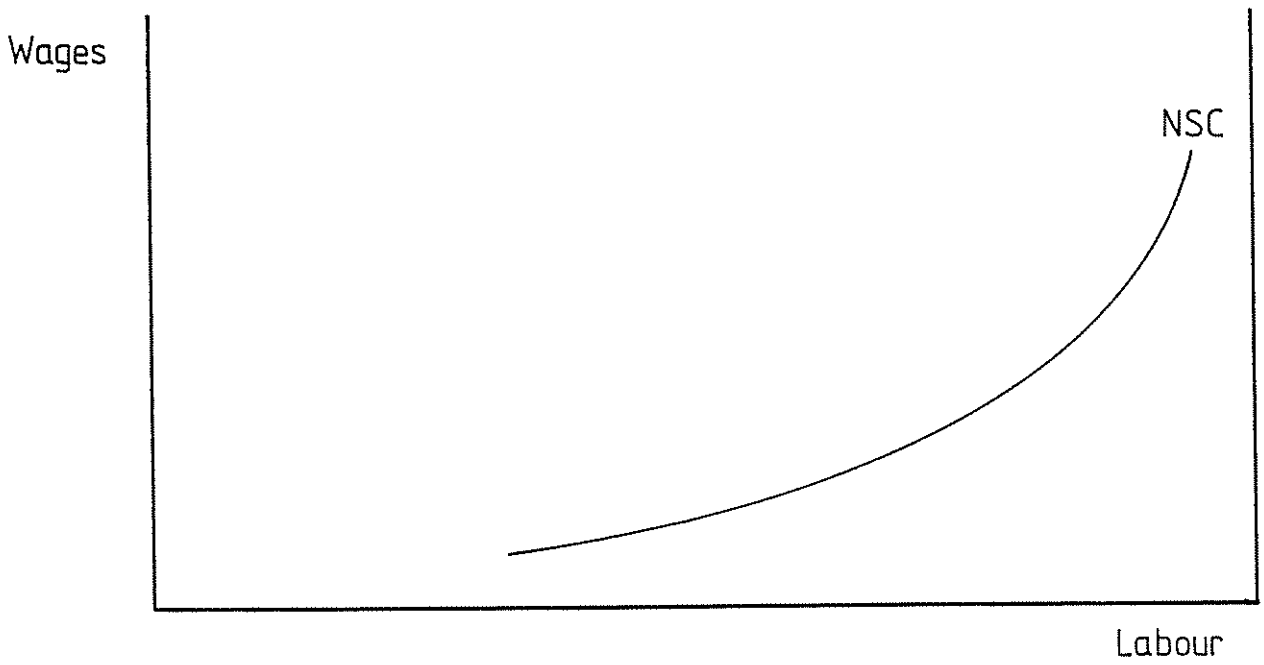

Figure 2

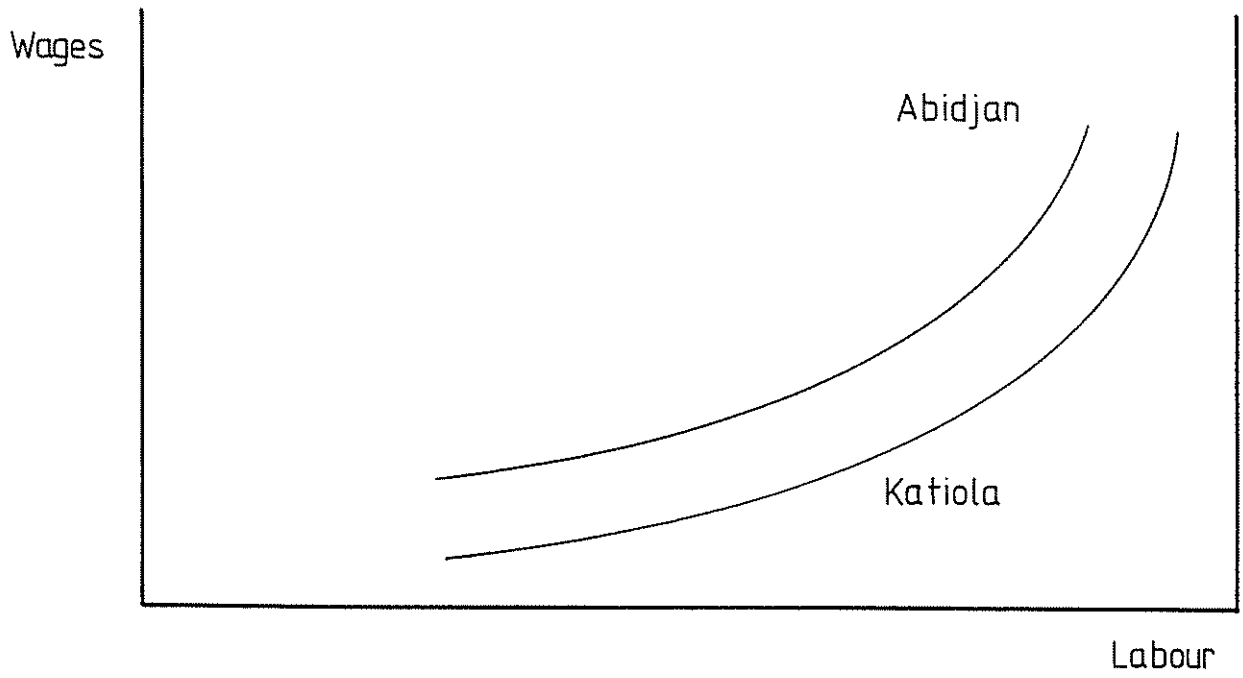

Figure 3