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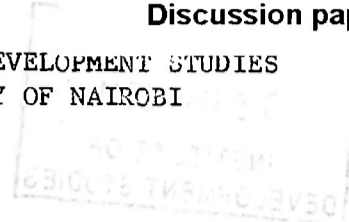
Discussion Paper No. 115

THE DETERMINATION OF INDIVIDUAL
HOURLY EARNINGS IN URBAN KENYA

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The Determination of Individual Hourly Earnings in Urban Kenya - G. Johnson

The purpose of this paper is to investigate the factors which account for differences among individuals in hourly earnings in the major urban center in Kenya. There are two principal reasons for conducting such an investigation. First, there is an emerging consensus among econom[ists] that the general level of wages in the modern sector of the "typical" lesser developed country is too high to permit the efficient allocation of resources. Specifically, (a) high wages promote urban-rural imbalance, thus causing high rates of migration to cities even in the face of serious urban unemployment and/or unemployment;[1] (b) rapid rates of increase of real wages in t[he] modern sector has lowered the rate of growth of employment relative to output, [th]us exacerbating the unemployment problem,[2] and (c) high wages in the modern sector reduce domestic resources available for capital accum[ul]ation, both public and private, and hence lower the rate of economic growth below its potential maximum. Knowledge of the determinants of the structure of wages is essential to understanding why t[he] general lev[el] is too high, which is in turn necessary for the formulation of a workable incomes policy.

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1 - See J.R. Harris and M.P. Todaro, "Migration, Unemployment, and Development: A Two Sector Analysis," American Economic Review, March 1970, pp. 126-42.

2 - See, for example, L.G. Reynolds, "Wages and Employment in a Labor-Surplus Economy," American Economic Review, March 1965, pp. 19-39 and J.R. Harris and M.P. Todaro, "Wages, Industrial Employment, and Labour Productivity," East African Economic Review, June 1969, pp. 29-46.

Second, questions concerning the distribution of income are interesting
in any society, and they are especially interesting in societies in which
per capita income is very low. What are the income advantages of the
educated, of union members, of government employees? To what extent are
females discriminated against in the labor market? Answers to such
questions are important in their own right as well as providing insights
into the operation of the aggregate labor market.

It is quite difficult to attack these questions without reliable
microeconomic data (i.e., data which provide the joint distribution of
income, sex, education, union membership status, etc. across individuals),
but such data are quite rare in lesser developed countries. This paper,
however, is able to exploit such a data set, that from the Household Survey
of the Nairobi Urban Study. Although it was primarily concerned with
specific urban problems such as housing, shopping patterns, and the like,
this survey contained a battery of questions on basic socio-economic
information. [3] The paper is divided into four sections: In Section I a
model of individual wage differences is set out; in Section II the model
is tested on the survey data; in Section III some further tests on special
hypotheses are reported, and in Section IV various implications of the results
concerning labor market behavior in lesser developed countries are
discussed.

I. The Earnings Function

In the absence of institutional impediments to full employment
the wage rate paid each worker will depend upon (a) his personal product-

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ivity and (b) the nonpecuniary attributes of his particular job. In
most countries the actual earnings of an individual will be influenced (c)
by the type of employment activity in which he is engaged, unionized,
government, nonunion private, or self employment, reflecting monopoly
powers and/or non-maximizing behavior on the part of some employers.
Finally, in many societies there is (d) labor market discrimination
against certain subgroups in the society, and the resultant earnings
advantages or disadvantages (of being female, a Negro in the United
States, a Catholic in Northern Ireland, from a particular tribe in an
African country, etc.) must be accounted for in the earnings function.
We now examine each of these sets of factors in detail. [4]

(a) Personal Productivity

An individual's personal productivity or stock c_ human capital
can be represented by (i) his formal education, (ii) post-for... training,
both on and off the job, and (iii) innate ability. Most micr...conomic data,
including those used in this study, do not contain (ii), and economists
are not really sure what (iii) is. To a certain extent, however, the
increment to the stock of human capital du to experience and other
forms of post-formal training can be represented by an individual's
position in the life cycle. In general, the earnings of a particular in-
dividual relative to all other individuals in the work force, holding
other factors constant, first rise at an increasing rate with age after
he obtains his first job, then rise at a declining rate, reach a maximum
somewhere between age 45 and 55, and decline thereafter. This is usually
attributed to the incidence of post-formal training, high at early and

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4 - For an extensive discussion of the methods used to explain earnings
    levels, see Giora Hanoch, Personal Earnings and Investment in Schooling,
    Unpublished Ph.D. dissertation, University of Chicago, 1965.

low at later ages. [5]

The effect of education on the earnings potential of an individual can in principle be manipulated to obtain a rate of return to various increments of schooling, either a private or a social rate. [6] However, there are two problems associated with inferring a rate of return from cross-sectional data on earnings in the typical lesser developed country. First, if there is substantial unemployment over the range of education under consideration, the probability of obtaining employment within various periods of time must be included in the calculation of the private rate of return, and the social rate of return to educating a redundant person is negative. [7] Second, with increasing supplies of educated labor in most lesser developed countries it is very likely that the kinds of positions filled by individuals with a certain level of education a generation (or even a few years) ago are now being filled by persons with much more education. This would imply that the observed age-income profile would overstate the effect of age on potential earnings, for to some extent it represents this "seniority effect" instead of human capital accumulation after completion of formal education. ... of the

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5 - See J. Mincer, "On the Job Training: Costs, Returns, and Some Implications," _Journal of Political Economy_, Supplement, October 1962, pp. 50-79 and Yoram Ben Porath, "The Production of Human Capital and the Life Cycle of Earnings," _Journal of Political Economy_, August 1967, pp. 352-65.

6 - The rate of return to the Eth year of schooling is that r which satisfies

$$\sum_{t=1}^{T} \{W(E,t)-W(E-1,t)\}(1+r)^{-t} - C_E - W(E-1,0) = 0,$$

where C_E is the cost of that year of schooling (to the individual for the private return, to the society for the social return) and T is the number of years the individual has remaining in the labor force. If the difference in earnings remains constant with age at ΔW, then the rate of return is roughly equal to $(\Delta W/W_o)/(1+C_E/W_o)$, where $W_o \equiv W(E-1,0)$.

7 - For a thorough analysis of these issues see G. Fields, "Private and Social Returns to Education in Labour Surplus Economies," Discussion Paper No. 104, Institute for Development Studies, Nairobi, April 1971.

There are, of course, other aspects of an individual's stock
of human capital. First, it would be very useful to have some measure
of the quality of an individual's education. This can be partially
represented by an index of how good the schooling system the individual
attended was, say by expenditure per pupil. Related to this is the
quality of education at home, which would be related to the education
or occupation of the individual's parents.[8] In most developing countries -
certainly most African countries, however, workers' parents rarely had
any formal education at all, so this variable would probably not show
up as significant until the next generation of workers. Second, the
rapid growth of urban areas i. ... ... in most
underdeveloped countries and the relatively recent emergence of the modern
sector implies that a large fraction of the urban work force grew up
in rural areas and migrated to cities at some point. Presumably the
general skills necessary for successful participation in the modern
sector will be greater the longer the individual has lived in the urban
area, so it should be useful to include a measure of the length of time
the individual has lived in the urban area in the explanation of wage
differences.

(b) <u>Nonpecuniary Advantages</u>

In principle one would like to include a set of nonpecuniary
attributes associated with each individual's job in the explanation of
wage differences. These would include the cleanliness of the work place,
an index of the required degree of physical exertion, the social status of
the occupation, and the like. Any variable which increases the overall

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8 - Each of these variables, expenditure on schooling and father's education,
was found to be quite significant in the explanation of earnings for
a recent national probability sample in the U.S. See G. Johnson
and F. Stafford, "Social Returns to Quantity and Quality of Schooling,"
University of Michigan working paper, December 1970.

attractiveness of the of the job would reduce the wage which the
employer would have to pay in order to attract a work force of the
desired quantity and quality. In practice, however, it is rather difficult
to sort out those variables which should be included in the list, and
no attempt is made to include any such variables in this study. A major
source of difficulty in this respect is the likelihood that individuals
have different tastes for each particular nonpecuniary attribute - some
people do not mind a high degree of physical exertion while others do.
But this would imply that individuals would avoid the types of jobs
for which they have especial aversions, and this in turn suggests that
nonpecuniary attributes may not be terribly important in the determination
of wages.

(c) Type of Employment Activity

If the general level of wages in a particular country is too high
to permit full employment in the modern sector of the typical lesser
developed country, we would like to know why. To set up the problem for
testing we will distinguish between three sets of hypotheses concerning
the reason for the high wage level: (1) unionism, (2) government as employer,
and (3) legal and social minimum wages. [9]

(1) Unionism. If a significant fraction of the work force is
organized by trade unions, the union movement is to a significant extent
interested in the short run economic welfare of its members, and the

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9 - Very useful summaries of alternative approaches to wage determination
in lesser developed countries are contained in E.J. Berg, "Wage Structure
in Less Developed Countries," in A.D. Smith, ed., Wage Policy Issues
in Economics Development. London, 1969 and L.G. Reynolds, "Relative
Earnings and Manpower Allocation in Developing Countries," Pakistan
Development Review, Spring 1969, pp. 14-34.

government permits relatively free collective bargaining between
unions and managements, it is very likely that the wage rate in
unionized industries will be driven up above that prevailing in
nonunionized industries, and the union wage level will obviously be
greater than the market clearing wage in the modern sector. Whether
this is sufficient to generate unemployment in the Harris-Todaro sense
depends on the effect of the high union wage on the nonunion wage level.
If employers of nonunion labor do not perceive that they are threat-
ened by unionization of their workers and are not otherwise forced or
motivated to pay a higher wage than is justified by market conditions,
the wage in nonunion industries of the modern sector will fall below
the agricultural wage (after adjustment has been made for differences
in the cost of living), [10] and full employment, with a "distorted"
wage structure, will still prevail after a period of adjustment. On
the other hand, there are some reasons for supposing that the level of
the union wage may influence the nonunion wage <u>directly.</u> One of
these is the "threat effect" hypothesis. [11] As the union/nonunion wage
differential increases, the probability that a majority of the workers

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10 - Ignoring differences in living costs, nonpecuniary attributes, and
     hours of work, labor market equilibrium will be established when
     $W_u Q_u + W_n (1-Q_u) = W_a$, where W_u, W_n, and W_a are the wage levels for
     union, nonunion, and agricultural workers, respectively, and Q_u is
     an index of the probability, appropriately discounted, of obtaining
     employment in the unionized sector. If W_u is set greater than then W_n,
     it then follows that the equilibrium wage in the nonunion sector
     will be less than the wage in agriculture, so long as $Q_u > 0$. Q_u will
     depend positively on the rate of growth of total employment
     and the rate of labor turnover in unionized industries as well as
     the relative size of the unionized branch of the modern sector. For
     an exposition of this approach see my "The Structure of Rural-Urban
     Migration Models," <u>East African Economic Review</u>, forthcoming June
     1971.

11 - See S. Rosen, "Trade Union Power, Threat Effects and the Extent of
     Organization," <u>Review of Economic Studies</u>, April 1969, pp. 185-96.

in the typical nonunion firm will be motivated to change their status will also increase. A profit maximizing employer will therefore attempt to keep his wage offer in line with the union wage, less but not too much so. This implies, of course, that the wage level in the nonunion branch of the modern sector will not fall to that level which would equate the demand for and supply of labor in the modern sector.

(2) Government as Employer. In most lesser developed countries a fairly large fraction of wage earners are government employees, and it is quite possible that the government arbitrarily sets a wage level for its employees which is higher than is dictated by market conditions. Civil servants compose an articulate and potentially troublesome minority from the point of view of the incumbent government, and it is not difficult to imagine that the government will try to "bribe" them into submission and cooperation. In addition, decisions concerning government salary levels may be made by the bureaucrats themselves, which would be unlikely to result in systematic biases on the low side of the market wage.

(3) Legal and Social Minumum Wages. To the extent that the government enforces its code of statutory minimum wage levels, a floor may be established on nonunion wage levels, a floor may be established on nonunion wage levels which will have the effect of attracting too many people to urban areas. There may be other reasons why the nonunion wage level does not adjust to a very low level. First, the individual productivity of workers may depend on either the real wage the employer pays (through its effect on the worker's health and nutrition) or the wage the employer offers relative to offers by other firms (because of "morale" effects). By either version of the efficiency wage hypothesis the firm may find it profitable to increase its wage offer to a point

beyond that at which it can just fill all its positions. In fact, the profit maximizing wage is determined by setting the elasticity of labour efficiently with respect to the wage equal to unity. By the health-productivity variant of the model variant of the model, firms are likely to establish minimum real wages which are independent of the wage level prevailing in the union or government sectors. By the morale effect variant the wage in the nonunion branch of the modern sector should be geared to that prevailing in union and government employm nt, which is roughly the same as is predicted by the threat effect model.

Second, decision makers in firms may derive utility from paying wages which are high in either a relative or an absolute sense, which implies that they are willing to sacrifice some of their profits in order to pay higher wages. This beha... ur would most likely apply to firms which are owned and managed by foreigners, for foreigners may not want to be known as exploiters of local labour. If firms have the same (well behaved) trade of between porfits and wages, it can be shown that firms in which the production process is more capital intensive will be more likely to pay high wages than more labor intensive firms (because the cost of high wages is lower for the former). This paternalism factor makes much the same suggestion as the efficiency model, namely that the wage level in the nonunion branch of the modern sector may not fall to its market clearing level.

Another possibility concerns the impact of potential labor mobility on the desired wage level of the typical firm. In most underdeveloped economics the bulk of the labor force has very strong ties with rural areas, and very often an individual will quit a good job in the modern

sector in order to go back to his home area for a year or two.

In order to counter this problem and minimize total labor costs (wages plus training costs) firms may offer very high wage rates compared to rural wages, and this can result in substantial urban unemployment even though there are no institutional imperfections such as unions.[12] To the extent that this phenomenon is important in the modern sector, it also complicates the interpretation of union/nonunion wage differentials, for the costs of labor turnover may be different for union and nonunion firms.

The Murky Sector. Even if a migrant cannot find employment in either the high or relatively high branches of the modernsector, there is still a large class of opportunities for small-scale self employment in the urban area. Much of this activity in the "murky" sector requires no capital and is not subject to any barriers to entry, so one would expect the forces of competition to work here.[13] To the extent that a new urban in-migrant has some chance of eventually obtaining employment in the modern sector, the returns to the labor of petty capitalists should be less than the equivalent in agriculture. On the other hand, if there is only a very small chance that an individual can crack into the modern sector, returns to the urban self employed and to agricultural labor (after adjusting, of course, for differences in labor quality) should be about the same.

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12 - J. Stiglitz is exploring some of the implications of this model in a paper in progress.

13 - Various theoretical implications of the existence of a murky are explored in D. Mazumdar, "The Theory of Urban Unemployment in Less Developed Countries." Makerere University working paper, 1970.

Testable Implications. By including the type of employment activity of the individual as an explanatory variable it is possible to estimate the relative pecuniary advantages accruing to those working in a unionized private industry or for the government relative to each other and those who work in private employment in the modern sector. It is also possible to estimate the returns to the self employed relative to other groups. The results of such an excercise will provide some insight into the validity of the various hypotheses concerning the structure of wages we have set out. For example, if government workers receive more than union workers in private industry - holding qualifications constant - the government as employer hypothesis would be supported, the unionism hypothesis refuted.

A convenient method for performing tests of this sort is to set up the regression model in the form

$$\log W = a_1 U + a_2 G + a_3 U \times G + a_4 S + \ldots,$$

where W is the wage rate the individual receives, U a dummy variable which is one if the individual is a union member and zero if he is not, G is a dummy variable reflecting government employment, S a dummy variable reflecting self employment status, and where, of course, all other variables influencing wages are included. The interaction term, $U \times G$, would be included to allow for the possibility that unions influence the wages of government workers to a different extent that those who are employed in private industries. The coefficient a_1 represents the logarithm of the difference between the wages of union and nonunion workers in private employment. Hence $W_u / W_n = e^{a_1}$, and the proportionate wage advantage due to union membership status is

$$(W_u - W_n)/W_n = e^{a_1} - 1.$$

The wage of government workers relative to unionized workers in private industries is $e^{a_2 - a_1}$, of the self employed relative to nonunion workers in private industries e^{a_4}, and so forth.

To test the set of hypotheses which predict that there is a floor to the wage rate in nonunion industries in the modern sector, one would see if a_4, the coefficient on self employment status, is significantly less than zero. If $a_4 = 0$, i.e. $W_n = W_s$, it is then fairly clear that there are no barriers to the nonunion private wage level falling to its competitive level. This test, however, is open to the "alibi" that self employment yields a nonpecuniary advantage to individuals because of the associated independence from externally imposed hours, pace of work, and the like. This argument would also imply a negative value of a_4.

(d) Discrimination

In most societies females are at a disadvantage in the labor market relative to males, in part because most employers are males. If this is so, females will receive lower wages than males, other factors held constant. For the typical African country the other major possibility for discrimination is on ethnic grounds, i.e. by tribe. To test for any such possibilities the regression model can include one-zero dummy variables for sex and tribal affiliation, say

$$\log W = b_1 F + b_2 T_1 + b_3 T_2 + \dots,$$

where F indicates female, T_1 membership in a particular tribe and T_2 membership in another, and where again, the other variables are also included in the regression. The estimated wage of females relative is

to males is e^{b_1}, of tribe 1 relative to tribe 2 $e^{b_2-b_3}$. There are
other possible interpretations of these coefficients besides pure
labor market discrimination. A significantly negative value of b_1,
for example, is also consistent with the hypothesis that females
are simply not as/productive as males even when educational and other
qualifications are identical. In order for labor market discrimination
to take place, all employers must derive utility from employing one
group over another - in this case they must be willing to sacrifice
some of their profits in order to employ males instead of females,
members of one tribe rather than another. If there is a fairly large
class of employers who do not have such tastes and desire only to
maximize profits, a negative value of b_1 would not represent labor
market discrimination, for in the absence of quality differences among
groups in the work force the forces of competition would drive relative
wages to equality.

There is another type of discrimination in the labor market, that
due to discrimination by employees rather than employers. [14] This
seems most relevant in the African case, for members of one tribe are
somewhat reluctant in many instances to work with members of another
tribe. Employers, on the other hand, may not really care if an employee
is from one tribe or another. If the tribes are mixed in a particular
workplace, however, productivity may fall because of friction or poor
communication. The employer therefore hires only members of a single
tribe. Marginal firms will hire members of that tribe with the lowest
wage rate, and this would tend to equalize wages by tribe.

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14 - For the original analysis of the economic implications of various
types of discrimination see G.S. Becker, The Economics of Dis-
crimination, Chicago, 1957.

II. Empirical Results

    In the Spring of 1971 an intensive household survey of Africans
in Nairobi was conducted by the Institute for Development Studies
under the auspices of the Nairobi City Council. The sample was confined
to low and middle income areas of the city, which does not create much
of a bias because most residents of high income areas are Asians and
Europeans. The survey instrument contained a battery of questions on
basic socio-economic invariables/ which provided sufficient information to estimate
an earnings function of the sort discussed in Section I. The sample used
in this paper consists of all respondents who received some wage income
in Nairobi during 1970, and the dependent variable is the logarithm of
of the wage rate (measured in Cents Kenya) per hour of work for the
respondent's modal work activity in 1970. [15] The principal reason that
we chose to explain wage rather than income differences among individuals
is that a large part of the sample worked less than full time, and income
earned per month is of course very sensitive to this. The wage rate,
on the other hand, is a measure of an individual's earning capacity or
stock of human capital. It would be very interesting for a country like
Kenya to explain differences in incomes for a year for the entire
adult population, for this would provide information on the determinants
of unemployment and underemployment as well as wages. This, however,
would require a national probability sample, for a large fraction of
individuals who desire employment in the modern sector are forced to
spend much of their time in rural areas. [16]

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15 - Wage incomes are adjusted to include direct allowances, but no
    attempt was made to adjust for the value of free housing in the
    cases in which it was provided.

16 - For a more thorough discussion of this view of labor market behavior
    see my "Wages, Employment, and Income Distribution in Kenya," Insti-
    tute for Development Studies, 1971.

The specification of the earnings function is

$$\log W = \alpha E' + \beta_1 A + \beta_2 A^2 + \beta_3 ARR + \beta_4 U + \beta_5 G + \beta_6 U \times G$$
$$+ \beta_7 S + \beta_8 F + \gamma TRB + \beta_0 + \varepsilon,$$

where

> E': Vector of educational dummy variables
> A: Age of respondent
> ARR: Age arrived in Nairobi
> U: Union member
> G: Government employee
> S: Self employed
> F: Female
> TRB: Vector of tribal dummy variables.

The level of educational attainment is entered in categoric rather than metric form to allow for the possibility that the effect of eduvation on wages may not be "smooth." The principal cutoff points in Kenya are seven (primary) and eleven (secondary) years of schooling, and one might expect the marginal effect of a year of schooling on earnings potential to be much greater for, say, the seventh year than for the fifth or sixth. The coefficients on age and age squared, β_1 and β_2, should be positive and negative, respectively, reflecting the earlier discussion of human capital accumulation over the life cycl   The coefficient on ARR should be negative, for it is the negative of the annual increment to an individual's stock of human capital due to residing in Nairobi. Expectations concerning the signs and values of β_4, β_5, β_6, and β_7, the coefficients on the type of employment activity variables, were discussed fairly thoroughly in the previous section, as was the interpretation of the coefficient on F. Four tribes, Kikuyu, Kamba, Luo, and Luhya, were selected for inclusion in the regression equation, for they together represent 93 per cent of the sample The coefficient on each hould be interpreted as the proportionate deviation

Table 1.

Determinants of Hourly Earnings

in Urban Kenya, 1970 [a]

Variable	(1) Education Categoric	(2) Education Metric
Educ. 1-3	.155 (.058)	–
" 4-6	.317 (.050)	–
" 7	.550 (.054)	–
" 8-10	1.013 (.066)	–
" 11	1.536 (.078)	–
" 12+	1.818 (.208)	–
E	–	.010 (.014)
E^2	–	.011 (.001)
A	.083 (.009)	.086 (.009)
A^2	-.00079 (.00011)	-.00080 (.00011)
ARR	-.013 (.002)	-.013 (.002)
U	.274 (.041)	.265 (.041)
G	.165 (.053)	.153 (.053)
U×G	-.178 (.071)	-.164 (.070)
S	-.717 (.064)	-.725 (.063)
F	-.238 (.054)	-.208 (.054)
KIK	-.112 (.065)	-.091 (.065)
KAM	-.036 (.071)	-.001 (.073)
LUO	.008 (.073)	.024 (.073)
LUH	.112 (.076)	.133 (.076)
Const.	2.83 (.185)	2.75 (.184)
R^2	.490	.491

a - Estimated standard errors of regression coefficients in parentheses
   beside estimated coefficients.

of the earnings of the particular tribe from those of "others" (minor
Kenya tribes and a scattering of individuals from Tanzania, Uganda, Ethiopia,
the Congo, and Sudan), other things equal.

The initial results for a sample of 1254 individuals are presented
in Table 1, and the tightness of the fit indeed confirms the notion
that the wage structure in urban Kenya can be explained by a set of
socio-economic variables. The results are best interpreted one set of
variables at a time.

Education

The single most important variable explaining the logarithm of
an individual's hourly earning is his level of educational attainment
(the simple correlation coefficient between $\log W$ and E, measured in years,
is .427). Two regressions are presented in Table 1, (1) which enters
education in categoric form and (2) which enters education in metric
form with a quadratic. There is little to choose between the alternative
forms, for the categoric case appears to be well represented by the
second degree polynomial in E. When education is entered in both
categoric and metric forms, a regression which is not reported, all
of the coefficients associated with education become insignificant due
to multicolinearity, which one would expect from (1) and (2). The
coefficients on the other variables are little affected by the way
education is entered into the regression.

We will first discuss the categoric results, equation (1), for
the coefficients, which represent logarithmic deviations of the particular
educational category from a zero level of formal educational attainment
are more easily interpreted. The results indicate an increasing marginal

proportionate effect of education on wages as the educational level is increased.[18] Table 2 presents the percentage earnings advantage due to moving from a particular educational category to each higher one.[19] (The category 12+ was excluded from this table because of the paucity of observations in this range.) The underscored figures are the percentage increases due to moving to the next highest category. Taking the midpoint of each category (2 for 1-3, etc.), the average percentage increment due to a year of schooling are 8.5 for 0 to 2, 6 for 2 to 5, 13.5 for 5 to 7, 29.5 for 7 to 9, and 34.0 for 9 to 11. As pointed out in fn. 6, this is a rough measure of the conventional rate of return to schooling when out-of-pocket (or out-of-treasury, for the social rate) costs are ignored. It should be pointed out that if the conventional rate

Table 2.

Estimated Percentage Increases in Potential
Hourly Earnings Due to Moving from Lower
to Higher Degrees of Educational Attainment

	TO				
	2	5	7	9	11
	$\underline{17}$	38	73	175	366	0
		$\underline{18}$	49	136	297	2	F
			$\underline{27}$	101	287	5	R
				$\underline{59}$	169	7	O
					$\underline{68}$	9	M

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18 - Increasing returns to education, at least through secondary school, are not uncommon for underdeveloped countries. See, for example, Martin Carnoy, "Earnings and Schooling in Mexico," Economic Development and Cultural Change, July 1967, pp. 408-19.

19 - For eample, the estimated value of $\log W_{11} - \log W_0 = 1.54$, so $W_{11}/W_0 = e^{1.54} = 4.66$. The percentage increment due to moving from 0 to 11 years of schooling is then $100 \times (4.66 - 1) = 366$.

of return to schooling had any especial significance in Kenya it
would be incumbent upon us to work out more sophisticated estimates
of the structure of returns. This would involve obtaing figures for
private and social costs at various levels of E and equating present
values by iteration. However, as was noted earlier, the probability
of obtaining a job in the modern sector versus either a position in
agriculture or unemployment, as well as estimates of the effect of
education on productivity in agriculture, are neccesary to calculate
meaningful estimates. The figures in Table 2 are thus interesting
from the point of view of the distribution of income rather than educational
policy.

Increasing marginal returns to schooling are . also indicated
by equation (2). The estimated effect of education on wages is given
by $\partial(\log W)/\partial E = .010 + .022E$. The t test for the hypothesis that
the second derivative of log W with respect to E is positive is simply
twice the coefficient on E^2 divided by its standard error, which yields
a t value in excess of 20. In discussion of the results on the other
determinants of wages in this section, the estimates from equation (2)
will be used.

The enormous wage advantage accruing to ...ployed persons with some
secondary schooling helps to explain the serious unemploymer problem
Kenya is currently facing with secondary school leavers. [20] On the one
hand, the huge wage advantage of secondary over primary school graduates,
169 per cent, means that it is well worth the student's time to finish
his studies even if there is a very good chance that he will not obtain
the kind of job for which he is qualified. Similarly, since education is

20 - On this problem see P. Kinyanjui, "The Education, .raining and Unemploy-
ment of Kenya Secondary School Leavers," I.D.S. working paper, May 1971.

the prinicipal route to success in the society, there is also strong
pressure on the government by the citizenry to increase the capacity
of the school system. On the other hand, the high wage differential
will lower the expansion (in absolute terms) of the number of new jobs
in the economy suitable for school leavers. An employer will require
a secondary over a primary school graduate only if the efficiency of
the former is at least 161 per cent greater than the latter's. In a
capital-poor country like Kenya, there cannot be expected to be many such
positions. Thus, unless the wage differential between educational
categories can be reduced, the problem of unemployed school leavers
is likely to get worse. [21]

Age and Age Arrived in Nairobi

The coefficients on age and age squared are each quite significant,
having the expected positive and negative signs, respectively, and the
coefficient on the age at which the individual arrived in Nairobi is also
significant in the expected negative direction. For a person who arrived
in Nairobi at a certain age, the effect on the potential wage rate is
given by $\partial(\log W)/\partial A$ = .073 - .00160A, for the coefficient on ARR must
be added to the coefficient on A in order to give the total effect of age.
This implies that wage rates reach a maximum in cross-sectional terms at
about age 46. The predicted difference in the logarithm of the wage rate
of a worker 46 years old and one 22 years old is .446, which means that the
older makes about 56 per cent more than the younger worker. This is very

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[21] - It is a very interesting question whether the existence of large
unemployment rates for school leavers will reduce the demand for
education in the future. It is also interesting to speculate why
unemployed school leavers do not return to agriculture, at least
during peak periods of farming activity, as those with less schooling
do. One possibility, which was suggested by my colleague L.D. Smith,
is that unemployed secondary school leavers are in debt to their
families or other persons in the villages and cannot yet admit failure.

similar to the equivalent differential for the United States. [22]

The coefficient on ARR implies that for each year a worker has resided in Nairobi his potential wage increases by 1.3 per cent. This result probably reflects two factors. First, to some extent the coefficient picks up the "acculturation" effect discussed in Section I, which was the a priori justification for including the variable in the regression in the first place (and for including the question in the survey instrument). Second, and perhaps more important, the length of time an individual has been in Nairobi represents the number of years the individual has been able to search for the best jobs available to him, and, hence, in a probabilistic sense it is a measure of his sucess. Furthermore, in line with the discussion of the probable effects of education in Section I, increased supplies of educated labor have caused employers to increase hiring standards of jobs with given attributes, which makes it increasingly difficult for successive series of new entrants into the labor force to obtain high-paying positions given their qualifications.

Type of Employment

The results on U, G, U×G, and S indicate that the type of employment activity in which the individual is engaged is an important determinant of his earning capacity. Each of the coefficients on these variables should be interpreted as the logarithmic deviation of the wage for that type

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22 - The estimated wage of a 46 year old worker relative to that of a 22 year old worker was estimated to be 1.73 in the U.S. from the regression equation in Johnson and Stafford, op. cit., which is somewhat higher than the estimate from equation (2). However, when the effect of age is is estimated separately for the employed and the self-employed, as is done in Section IIIm the estimated age 46/age 22 differential becomes 1.74, which is virtually identical with the U.S. result.

Table 3.

Estimated Differences of Logarithm
of Wages for Workers in Alternative
Types of Employment

ADVANTAGE OF:

Nonunion Private	Nonunion Government	Union Government	Union Private		
.725 (.063)	.878 (.074)	.979 (.068)	.990 (.082)	Self	
	.153 (.053)	.254 (.050)	.265 (.041)	Nonun. Priv.	O
		.101 (.050)	.112 (.054)	Nonun. Govt.	V E R
			.011 (.047)	Union Govt.	

of activity from that of nonunion workers in private industries, the excluded category, after other things are taken into account. The estimated advantage of each group over each other and the associated standard error are shown in Table 3, [23] and each of these differences except that between unionists in public and private employment is significantly different from zero at conventionally acceptable confidence levels.

Table 4 presents indeces of estimated hourly earnings by type of employment activity in relation to nonunion employees in private industries and the percentage of the sample in each category. These

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23 - Since $\log W = \beta_4 U + \beta_5 G + \beta_6 U \times G + \ldots$, the estimated wage advantage of, say, unionists in the private sector over nonunion government workers is $\hat{\beta}_4 - \hat{\beta}_5$, and its estimated standard error is
$\{V(\hat{\beta}_4) + V(\hat{\beta}_5) - 2COV(\hat{\beta}_4, \hat{\beta}_5)\}^{\frac{1}{2}}$.

Table 4.

Indeces of Estimated Hourly
by Type of Employment.

Employment Type	Index	% of Sample
Private Nonunion	100	25.1
" Union	130	39.0
Government Nonunion	116	9.7
" Union	129	16.7
Self Employed	48	9.5

results demonstrate that there is a large union/nonunion wage differential

in Kenya, a wage advantage of 30 per cent in private industries and 11

per cent in government employment. It is interesting to note that estimates

of the union wage advantage. for private industries from similar data

sets range from 28 to 34 per cent,[24] and these are within a single standard

error of the estimate for Kenya. Nonunion workers in government earn 16

per cent more than their counterparts in private industries. Now all this

suggests that both the unionism and government-as-employer hypotheses

concerning the high wage level in the modern sector are relevant for Kenya,

with the former perhaps being more important.

At the same time, wages of nonunion workers in private industries

are more than twice the hourly earnings of the self employed, which is

consistent with the different wage models which predict a floor to the

wages received by nonunion employees - threat effects, legal minimum wages,

productivity effects, and paternalistic wage setting. It is, unfortunately,

not possible with this data set to test between these, for they each

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24 - See L.W. Weiss, "Concentration and Labor Earnings," American Economic
Review, March 1966, pp. 96-117; F.P. Stafford, "Concentration and
Labor Earnings: Comment," American Economic Review, March 1968, pp.
174-81; and G.E. Johnson and K.C. Youmans, "Union Relative Wage Effects
by Age and Education," Industrial and Labor Relations Review, January
1971, pp. 171-79.

predict the same thing, i.e. $W_n > W_s$. It is also rather difficult

to test the prediction that the wage level for the self employed will

be no greater than the wage level in agriculture, for, although there

are no official statistics, the cost of living is much greater in Nairobi

than in the countryside. The predicted hourly earnings of a typical

(i.e., the mean values of the other variables: A = 33, E = 5, ARR = 20,

and from the "other" tribal classification) male in self employment is

46 cents (K), and the customary wage in agriculture is about 38 cents. [25]

Real wages are then equal if the urban cost of living is 21 per cent greater

than the rural cost of living, and it is generally believed that 21 per

cent understates the difference. [26] Thus, although we can make no claims

for the precision of the supportive statistics, it appears that the self

employed do not earn much more than individuals in agriculture.

Discrimination

Females in Nairobi earn 19 per cent less than males (males earn

22 per cent more), observable qualifications held constant. To what

extent this is due to discrimination and to what extent it is due to lower

productivity on the part of females is an open question. In the United States

25 - For comparative purposes, the predicted wage of this mean individual
in private nonunion employment is 97 cents and 126 cents in private
union employment. In 1970 100 cents (K) = $.14 (US) = 5.8 p (UK).

26 - There are many problems in performing urban-rural wage comparisons,
some of which I have gone into in my "Wages, Employment, ..." op.
cit.. The major ones of these include the seasonality of work
activity in agriculture, nonpecuniary differences with respect to
location and different types of work, and the fact that a fairly
substantial portion of the typical urban income recipient's earnings
are remitted to his home area. W.E. Whitelaw
in the estimation of a "remittances function" with the data set
employed in the present study.

the wage disadvantage of females is between 25 and 30 per cent, depending on age and education. This is to a large extent explained by the fact that females generally drop out of the labor force (or are expected to do so) in order to raise families during the period of maximum human capital formation. This type of labor supply behavior is not so common in Kenya. An additional source of earnings differentials between females and males concerns the differential incidence of the various types of employment. For this sample, 35.3 per cent of females were union members as compared with 58.3 per cent of males, and 26.6 per cent of females were self employed as compared with 6.8 per cent of males. (The incidence of U and U×G was essentially the same for the sexes.) Now the regression equation accounted for the influences of union membership and self employment status on wages, and it is interesting to find out how much additional "discrimination" can be accounted for by these two differences. One rather crude way is to multiply the difference between the proportions of the sexes in each category times the appropriate estimated effect of that category on wages from equation (2). (It is rough because it is not possible to calculate standard errors of the total earnings differential estimated in this fashion.) This implies that because of the institution of unionism the difference between the logarithm of female and male wages is changed by $.265 \times (.353 - .583) = - .061$. Similarly, the greater incidence of self employment changes the estimated value of $\log W_f - \log W_m$ by $- .725 \times (.266 - .068) = - .144$. These effects together just about equal the direct effect of F on log W, and adding these to to the direct coefficient implies that the earnings disadvantage of females relative to males is about 40 per cent.

With respect to the tribal dummies it is most interesting to look at differences among the four major tribes, for these represent 93 per cent

of the total sample. The estimated logarithmic differences in wages
by tribe - after other differences are taken into account - are shown
in Table 5. The most interesting result is that Kikuyus, the largest
tribe in Kenya and the politically dominant one, earn significantly
less than each of the other three.

There are two principle alternative (although not mutually
exclusive) explanations of this. First, Kikuyus may be discriminated
against by employers, for employers, who are generally Asians

Table 5.

Estimated Differences in Logarithm
of Wages by Major Tribe

ADVANTAGE OF:

KAM	LUO	LUH		
.090	.115	.224	KIK	O
(.045)	(.047)	(.052)		V
	.025	.134	KAM	E
	(.054)	(.058)		R
		.109	LUO	
		(.061)		

and Europeans and who may resent Kikuyus for their role in the independence
movement of the 1950's. Another variant of this approach is based
on the fact that a large number of the major firms in Nairobi were
formed or expanded significantly during the 1950's, a time in which
the movement of Kikuyus into Nairobi was restricted by the colonial
authorities. These high wage firms were thus staffed by members of
other tribes, and, because members of particular tribes prefer to work
with their "own people" (the employee discrimination model), Kikuyus
have on average tended to be excluded from the better jobs.

Second, the Kikuyu areas in Kenya are slightly closer and are
quite a bit more accessible to Nairobi than the Kamba areas, and they
are much more so than the Luo and Luhya areas, which are in the Western
part of Kenya. Since practically all the respondents have retained their
rural ties, [27] this would imply that the reservation price for prolonged
residence in Nairobi would be lower for Kikuyus than for Kambas than
for the Luo or Luhya. In other words, a Luo who was not fortunate enough
to obtain a good job in Nairobi within a certain period of time would
be more likely to go back to his home area than would a Kikuyu, for the
disutility of being in Nairobi is greater for the former than the latter.
Consistent with this interpretation is the fact that the ratio of the
fraction of the Nairobi population which is Kikuyu to the equivalent
fraction for the nation is 1.78, whereas it is 1.34 for Kambas and 1.08
and 1.17 for Luos and Luhyas, respectively. [28] It should be stressed,
however, that this economic interpretation of tribal differentials does
not rule out a discrimination explanation at the same time; the two
are not mutually exclusive.

III. Effect of Human Capital Variables on the Returns to the Self Employed

A rather important social question in Kenya and most other
LDC's concerns what to do with the educated unemployed. If large numbers
of primary and secondary school leavers cannot find employment in the
modern sector of the economy, they will be forced to move into agriculture
or urban self employment. This suggests a question: to what extent
does education increase the earnings capacity of individuals outside

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27 - Rural ties are retained in the sense that individuals own or expect
to inherit land in their home areas, wives are left in the home
area, and the urban worker remits a portion of his income to the
rural area for support of his family.

28 - Republic of Kenya, Census of Population, 1969, vol. I.

the modern sector?

The IDSUS data are obviously of no help in attacking the returns to education in the agricultural sector question, [29] but it can be employed to answer the question for petty capitalists in urban areas. By adding interaction terms between the human capital variables and the dummy variable for self employment status to the other variables in equation (2), that is

$$\log W = \alpha_1 E + \alpha_2 E^2 + \alpha_1' E \times S + \alpha_2' E^2 \times S + \beta_1 A + \beta_2 A^2 + \beta_1' A \times S$$
$$+ \beta_2' A^2 \times S + \beta_3 ARR + \beta_3' ARR \times S + \ldots,$$

one can test whether the human capital variables, individually and in concert, influence the earnings of the self employed differently from the way they influence the earnings of those individuals employed by business firms and the government. The results of such a test are shown in Table 6. (The coefficients on the other variables are little changed by the introduction of the interaction terms and are thus not reported.) For comparative purposes the corresponding results from equation (2) are also shown. The null hypothesis that the effect of the human capital variables on the earnings of the two groups, the self employed and employees, is the same is decisively refuted (F = 7.79), which is to say that the increase in the variance explained is worth the loss of five degrees of freedom.

The estimated effect of education on the earnings of the self employed is $\hat\alpha_1 + \hat\alpha_1' + 2(\hat\alpha_2 + \hat\alpha_2')E = .020 + .002E$, which is less than

29.- For a very interesting attempt to estimate the effect of schooling on earnings in the agricultural sector of an LDC see Alberto Valdes E., "Wages and Schooling of Agricultural Workers in Chile," Economic Development and Cultural Change, January 1971, pp. 313-29.

Table 6.

Effects of Introducing
Interaction between Human
Capital Variables and Self
Employment Status

Variable	Interactive Model		Equation (2)
	Coefficient on Variable	Coefficient on Interaction Term	
E	.021 (.015)	-.001 (.006)	.010 (.014)
E^2	.011 (.001)	-.010 (.007)	.011 (.001)
A	.096 (.009)	-.074 (.029)	.086 (.009)
A^2	-.00093 (.00014)	.00095 (.00034)	-.00080 (.00011)
ARR	-.010 (.002)	-.030 (.007)	-.013 (.002)
S	1.47 (.56)	-	-.725 (.063)
R^2	.507		.491

Table 7.

Estimated Derivative of log W with Respect
to E for Employees, Self Employed, and Difference

E	Employees	Self Employed	Difference
1	.043 (.028)	.013 (.043)	.030 (.045)
4	.109 (.026)	.019 (.022)	.090 (.024)
7	.175 (.026)	.025) (.058)	.150 (.060)
11	.263 (.030)	.033 (.118)	.230 (.120)

the estimated effect for employees. $\hat{\alpha}_1 + 2\hat{\alpha}_2 E = .021 + .022E$, for all

values of E. The estimated influence of E on the logarithm of the wage

rate and the associated estimated standard errors for employees, the

self employed, and the differential effect of education on the two

groups for selected values of E is shown in Table 7. The most interesting

result is that whereas the estimate of $\partial(\log W)/\partial E$ is significantly

greater than zero for $E > 2$ for employees it is not so for any value

of E for the self employed. The estimated difference in the effect

of education on the earnings of the two groups is significant for $E > 3$.

The interaction results also suggest that there is no relation

between wages and age for the self employed. The derivative of log W

with respect to A is $-.018 + .00004A$ for the self employed, which is

negative for all relevant values of A, but its standard error is always

at least as great as its value. For employees, on the other hand, the

estimated value of $\partial(\log W)/\partial A$ is significantly positive for $A < 43$ and

significantly negative for $A > 50$. (W is highest in a relative sense

at $A = 46$.) The effect of the age arrived in Nairobi variable, however,

is significantly greater for the self employed than for employees. This

most likely represents a selection effect. Individuals who are successful

petty capitalists - for whatever the reason - will tend to stay in this

occupation. Those who are less successful will search harder for

a job or return to their home areas to work in agriculture.

IV. Summary and Conclusions

    The principal empirical findings of this study of wages in Kenya's modern sector can be summarized as follows:

(1) There is an increasing marginal proportionate effect of education on potential earnings of individuals from 0 through 11 years of schooling. The estimated derivative of the logarithm of the wage with respect to education increases from .010 at E = 0 to .252 at E = 11. This is very difficult to justify economically since there is a surplus of educated labor in Kenya.

(2) The effect of age on earnings in Kenya is quite similar to that in developed countries. Relative wages rise with age until age 46 and fall thereafter. The age at which the individual migrated to Nairobi also has a negative effect on earnings, which probably mainly reflects the combination of seniority systems and increasing supplies of would-be entrants to the modern sector.

(3) Union wages are estimated to be 30 per cent greater than nonunion wages in private industries and 11 per cent greater in government employment, other things held constant. For nonunion workers government employment increases wages by 16 per cent. The results appear to be most consistent with the view that unionism is the principal cause of high wages in the modern sector of Kenya.

(4) At the same time, the nonunion wage level in private industries is more than twice the hourly returns for the self employed, which suggests in turn that even the nonunion labor market is in disequilibrium with respect to the rural wage level.

(5) The earnings of females in Nairobi are on average 1. er cent lower than those of males, other observable factors held constant. Females, however, tend to work in nonunion occupations and to be self employed

to a greater extent than males, both of which factors exacerbate the earnings disadvantage of females, and upon adding the effect of these to the differental, the wage disadvantage of females rises to forty per cent.

(6) Earnings of members of the largest tribe in Kenya, the Kikuyu, are significantly less than any of the other three major tribes, which is consistent with an interpretation of the existence of one or another discriminatory practices against them. This result, however, is also consistent with simple migration theory, for the home areas of the Kikuyu are closest to Nairobi of any of the tribes.

(7) The effect of the human capital variables, age and education, is systematically different for the self employed and employees. This suggest that petty capitalism is an alternative to the modern sector only for the relatively uneducated.

In conclusion, it seems appropriate to stress the usefulness of the periodic gathering of data sets comparable to this one for different countries. If such a data set had been available for Kenya in, say, 1965, we would have been able to evaluate the trends in the returns to education, the relat on between earnings and age, advantages to union membership, and so forth. This would have permitted the testing of a wider range of hypotheses than was possible with this single cross-section. For example, with data for two time periods one could answer the question of whether the government wage level leads or lags the private industry union wage level. Another set of questions which could be attacked concerns the changes in educational qualifications for entry into the better jobs in the modern sector. We would also like to point out that future surveys could profitably obtain certain types of information which were not included in the IDSUS survey. First, it is important to obtain

as much information on the background of the individual as possible,
the occupation of the father, the size of the community in which the
individual, grew up, the number of older and younger brothers and
sisters, and so forth. The importance of particular indicators of
background varies among countries, of course, and the selection of
the "optimal" set requires knowledge of both the techniques of eco-
nomic analysis and the culture of the particular country, but inclusion
of such variables would aid the estimation of the effect of variables
like those included in this study. Second, recent developments in
human capital theory have stressed the importance of post-formal training
in the accumulation of individual human capital. This is probably
even more important in LDC's than in developed economies. Accordingly,
future surveys should attempt to find out as much as possible about
on-the-job training, occupational history, and formal technical training
of individuals.

It would be very interesting to contrast the results of similar
studies to this one for a number of different countries (and, where
appropriate, different urban areas within specific countries). This would
permit the analysis of the effects of various institutional differences -
with respect to the stage of economic development, type of economic
and political organization, racial and ethnic homogeneity, and other
cultural delineations - among countries on labor market behavior and the
personal distribution of income.