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This paper contains preliminary findings from research work still in progress and should not be quoted without prior approval of the authors.

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An Investigation of The Labor Market Earnings of Panamanian Males: Evaluating Sources of Inequality*

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Abstract

This paper presents empirical evidence on the determinants of labor market earnings and inequality for males in Panama. Using newly available microdata from the U.N. sponsored Socioeconomic Survey of Panama conducted in 1983, we estimate earnings equations using the measurement framework developed by Mincer (1974) and widely used in studies of the determinants of earnings.[1] We compare our estimates for Panama with those for other countries at various stages of economic development. The primary focus of this paper is to examine empirical evidence on two aspects of inequality in less developed economies, namely labor market segmentation and social stratification. While we present several tets of the segmentation hypothesis, including several of the dual labor market hypothesis, we discuss the inherent problems of interpreting such tests. We also present evidence on the importance of family background in the determination of earnings and educational attainment for Panamanian males and compare it with that for the U.S.

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1. Introduction

This paper presents empirical evidence on the determinants of labor market earnings and inequality for males in Panama. Using newly available microdata from the U.N. sponsored Socioeconomic Survey of Panama conducted in 1983, we estimate earnings equations using the measurement framework developed by Mincer (1974) and widely used in studies of the determinants of earnings.[1] We compare our estimates for Panama with those for other countries at various stages of economic development.

The primary focus of this paper is to examine empirical evidence on two aspects of inequality in less developed economies, namely labor market segmentation and social stratification. It is widely believed that in Latin American countries family origin plays a much stronger role in determining educational and labor market outcomes than it does in more advanced economies such as the U.S. The most frequently offered explanations for this phenomena stress greater state support for education and greater opportunities for job mobility and training in a more advanced economies. It is also widely believed that markets are segmented with the poor confined to a labor market distinct from that engaged in by the middle class. As noted by Cain (1976), it is difficult to test such theories, in part because they are poorly formulated statistical hypotheses and in part because critical data on mobility between sectors do not exist.

The plan of this paper is as follows. We first discuss Mincer's earnings equation and related models for the determination of earnings. We briefly survey the relevant published literature on empirical earnings functions with an eye toward producing an empirical benchmark against which we can measure our

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1. See Psacharopoulos (1981) for a valuable survey of numerous country studies of income distribution based on the Mincer model.

results for Panama. Next we describe our estimates for the country as a whole and compare these estimates with similar specifications for data from other countries.

We next consider evidence on the extent of labor market segmentation in Panama. First, we compare earnings regressions for the country as a whole with those for separate regions of the country. In a small country the size of Panama, it is plausible that there would be no geographical segmentation; estimated earnings equations for regions would be expected to be similar. Evidence to the contrary would indicate the importance of separate markets within the country and hence a form of segmentation. A second version of the segmentation hypothesis, which we also test, suggests that poor people are in a different market than others. This type of segmentation hypothesis is sometimes called the dual labor market hypothesis. As noted by Cain (1976) and reemphasized by us below, testing this hypothesis raises delicate econometric problems.

The "obvious" way to test this hypothesis splits the population into two groups: the poor and the rest. If the earnings functions differ for these two groups, it would appear that they are in separate markets. Such a procedure has been advocated and pursued in the literature. (See Cain (1976), for a survey of these papers.) There are, however, three problems with this approach. First, by selecting samples on the basis of the dependent variable (earnings), sample selection bias can be induced in the estimates causing the poor to look different from the rest. Second, even if there were two distinct earnings equations, biased estimates and tests result if the wrong definition of poverty is used. By picking the wrong cut off point for income for defining the poverty population, it is possible to produce estimates of earnings functions for two erroneously labeled sectors which are biased toward similarity. Third, if the true functional form of the earnings function is not known (as it usually is not) and is, in fact, misspecified, evidence showing separate regressions for each group, after correcting for selection bias, may simply indicate misspecification of the functional form of the earnings equation. These questions are discussed and some tests are proposed and implemented.

Finally, we consider evidence on the social stratification hypothesis. We first examine the importance of family background variables in determining labor market earnings. We discuss some ambiguity that arises in interpreting such evidence. Another aspect of stratification is the transfer of educational status across generations. We fit intergenerational mobility models for education and compare our findings with evidence from other countries. We find considerably greater evidence of stratification for Panama than for the U.S.

2. Models of Labor Earnings and Their Estimation

A variety of models of labor earnings have been advanced in the literature. The two most prominent are the Mincer (1958,1974) - Becker (1964) human capital model and the hedonic model developed by Tinbergen (1951,1956) and popularized by Rosen (1974) and Sattinger (1980). Although the economic interpretation placed on earnings equations differs in these two models, they are empirically indistinguishable in a single cross section of data of the type at our disposal.

The simple schooling model of Mincer (1958) writes:

$$\ell ny = \alpha_0 + \alpha_1 s + u \tag{1}$$

where ℓn is natural logarithm, y is earnings and s is schooling, and u is an error term for the model representing unobserved determinants of income. In one version of Mincer's model, in which everyone is alike in untrained earning capacity and opportunities, α_1 can be interpreted as the market rate of interest. More generally, α_1 can be interpreted as an average rate of return to schooling with α_0 as the logarithm of the base earnings of an individual with no schooling. This second interpretation is based on a tautology that income equals initial endowment plus the average rate of return to investment multiplied by the volume of the investment.

In later work by Mincer (1974) and Becker and Chiswick (1966), this specification is augmented to include the effect of investment after formal schooling. In this specification the log of earnings is written as

$$\ell ny = \beta_0 + \beta_1 t + \beta_2 t^2 + u \qquad (2)$$

where t and t^2 are, respectively, post school labor market experience and experience squared and u is an unobserved error term. This basic equation can be and has been embellished to include hours of work, regional dummy variables and other variables. (see Chiswick (1974) or Mincer (1974)). Model (2) is the basic specification for earnings adopted in this study.

An alternative interpretation of (1) and (2) is as an "hedonic equation." Tinbergen (1956) derives log linear equations (1) and (2) from models in which heterogenous firms value productive attributes such as schooling and work experience and heterogenous workers supply themselves to the market. An implicit market for skills sorts workers and firms. The slope coefficients of (1) and (2) reveal the percentage change in price paid for extra units of the associated attribute. Tinbergen (1951) provides an excellent intuitive description of the process of equilibration in hedonic markets.

The precise economic interpretation placed on estimates of equations (1) and (2) is of little concern to us here. Under either interpretation, these equations give equilibrium income relationships of the effects of changes in inputs on log income. Because it is more familiar we use the language of Mincer's framework, if only to facilitate the comparison of our empirical results with those reported by others.

Following the traditions of a well established empirical literature, we estimate equations (1) and (2) and variants of these equations by ordinary least squares. Research by Griliches (1979) using data from the U.S. indicates that more sophisticated econometric methods that attempt to control for the endogeneity of schooling (i.e., that the the unobservables in earnings equations may influence schooling decisions) and for ability bias (a spurious relationship between income and schooling that may only be a consequence of the fact that people with greater market ability also get more schooling) do not alter the estimates of earnings and wage equations. Although it remains to be established that this is the case for Panamanian data, we use the conventional methodology if only to enhance the comparability of our estimates with those obtained for other countries.

3. Estimates of the Schooling Model (Eq.(1))

Table 1 reports estimates of the means and variances of log earnings and schooling, and parameters of earnings equation (1) for Panamanian males age 25-64 in 1983 (see the bottom two rows of the table). To put these numbers in context, we report estimates of the same parameters for the U.S. as a whole, for the U.S. broken down into regional and racial groups, for Puerto Rico as a whole (1959) and urban Puerto Rico (1959), for a sample of urban Mexicans (1963), and for non-farm Canada (1961). All except the Panamian estimates are taken from Chiswick (1974).[2]

The estimates separate into two groups: those for the more economically developed countries and regions (Canada and the U.S.) and those for less developed regions (urban Mexico, Panama as a whole, Panama City and its

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2. The numbers reported in Table 1 represent <u>all</u> of the evidence on the schooling model reported by Chiswick (1974).

TABLE 1
ESTIMATES OF THE SIMPLE SCHOOLING MODEL (Eq.(1)) FOR DIFFERENT COUNTRIES

Country/Region/Date	Source in Chiswick	Std.Dev. of Earnings ℓn	Std.Dev. of Schooling (s)	Mean of ℓn y	Mean Schooling	α_0 (Standard error in parens)	α_1	Goodness of fit (R^2)	Variance of U
US/Non-South/ White Males Age 25-64, 1959	p.50	.65	3.36	8.67	10.78	7.87 (.26)	.06 (.02)	.11	.38
US/South/ White Males Age 26-65, 1959	p.50	.74	3.90	8.43	9.96	7.51 (.23)	.08 (.02)	.20	.44
US/Non-South/ All Males Age 25-64, 1959	p.50	.65	3.41	8.54	10.67	7.85 (.23)	.06 (.02)	.11	.38
US/South/ All Males Age 25-64/1959	p.50	.76	4.03	8.32	9.42	7.38 (.20)	.09 (.02)	.22	.45
US/Total/ Males 25-64/1959	p.84	.70	3.66	8.45	10.31	7.66 (.22)	.08 (.02)	.15	.41
US/Whites/Total	p.84	.68	3.53	8.51	10.57	7.74 (.25)	.07 (.02)	.13	.40
Canada/NonFarm Males 25-64/1961	p.84	.68	3.38	8.27	8.70	7.59 (.14)	.08 (.01)	.15	.39

Table 1 (continued)

Puerto Rico*,** (1959)(Income for Males over Age 25)	p.86	1.19**	4.75	6.86	6.17	5.98 (.15)	.14 (.02)	.32*	.97
Urban Puerto Rico*,** (Income for Males over Age 25)	p.86	1.14**	5.01	7.31	7.95	6.29 (.16)	13 (.02)	.31	.89
Mexico/Urban** Males All Ages (1963)	p.85	.89	3.98	6.94	6.57	(not reported)	.14 (.002)	.42	.46
Mexico/Urban/Males Older than 25 (1963)	p.85	.79	4.26	7.25	6.79	(not reported)	.14 (.003)	.56	.27
Panama/Total Country (1983) Males 25-64	--	1.393	4.74	7.673	7.666	6.365 (.033)	.17 (.004)	.337	1.286
Panama City & Environs (Province of Panama incl. Canal Zone)****	--	.982	4.58	8.299	9.696	7.225 (.040)	.11 (.005)	.226	.708

*Based on Grouped Data.
**Note that estimates are for income and not earnings.
***Chiswick notes that there were few small children in the sample
****The estimates are basically unaffected when observations for people living in the Canal Zone in Panama province are excluded.

environs, and Puerto Rico.) Rates of return to schooling (values of α_1), variability in earnings (measured by the standard deviation of log earnings) and variability in schooling levels (standard deviation of schooling) tend to be higher in less developed regions as do goodness of fits for the equation (R^2). The same pattern is found comparing the results for Panama as a whole with the results for more urban (and developed) Panama City. Estimated rates of return to schooling are higher in Panama as a whole (.17) than in Panama City and environs (.11). The estimates reported in Table 1 clearly place Panama and Panama City squarely in the distribution of less developed countries in which the impact of schooling on earnings tends to be high.

4. Estimates of the Rate of Return to Schooling

Mincer (1974) has presented powerful theoretical and empirical reasons for augmenting the schooling model of equation (1) to include post school work experience or age. (Experience is proxied as age minus schooling.) For this reason, earnings function (2) has been widely used to generate estimates of the impact of a unit change of schooling on log earnings. Below, we report detailed estimates of models based on equation (2) as well as more elaborate specifications.

Before turning to a detailed discussion of such estimates, it is helpful to present our estimate of the rate of return to schooling based on equation (2) and compare it with estimates from other countries derived from the same methodology. We are aided in this task by the compilation of estimates of earnings function for males in Psacharopoulos (1981). Table 2 presents his results. Our estimate of the rate of return in Panama obtained from equation

(2) is 12.56%.[3] This estimate is below the average for all Latin American countries reported in Table 2. However, it is important to note that our estimate is for 1983 whereas the estimates for the other Latin American countries are based on data as remote in time as 1963. With continuing economic development, it is plausible that the 1983 rates of return for Mexico, Brazil and Columbia would be lower than the figures reported for the countries in Table 2. The estimated rate of return for Panama places it somewhere between the intermediate country and less developed category rates of return as computed by Psacharopoulos.

5. Estimates of Earnings Functions for the Country as a Whole and for Disaggregated Regions

We now turn to the results of an extensive empirical investigation of earnings functions for Panamanian non-farm males age 25-64. The analysis was conducted for individuals who report positive earnings in the survey year. More than 95% of the surveyed individual males had nonzero earnings so sample selection bias arising from deleting observations should not be a problem. Earnings consist of income from ordinary employment, including self employment income. Table 3 defines the variables used in these regressions and as well as those utilized in the analyses presented in this paper.

Table 4 records estimates for the country as a whole with parameters of a

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3. This estimate is the partial derivative of ℓn earnings with respect to a change in education holding experience (= age minus schooling) and experience squared constant. The estimating equation used to secure the estimate regresses ℓn earning on education, age and age squared. Under different specifications (including regional dummy variables, variables measuring whether the worker has taken technical training, and family background variables) the estimated rate of return varies from .128 to .0781. The number reported in the table presents the estimate obtained in using the same regression specification as is used to produce the other numbers in the table.

Table 2
The Percent Increment in Earnings Associated with One Extra Year of Schooling

Country	Year	Rate of Return in percent: ($\partial \ell ny/\partial s \times 100$)	Source*
Africa:			
Ethiopia	1972	8.0	Hoeer (1974)
Kenya	1970	16.4	Johnson (1972)
Morocco	1970	15.8	Psacharopoulos (1977a)
Asia:			
Malaysia	1978	22.8	Lee (1980)
Singapore	1974	8.0	Fong (1976)
S. Vietnam	1964	16.8	Stroup & Hargrove (1969)
Thailand	1971	10.4	Chiswick (1976)
Taiwan	1972	6.0	Cannicott (1972)
Latin America:			
Brazil	1970	19.2	Psacharopoulos (1980a)
Chile	1980	9.6	Psacharopoulos (1985)
Costa Rica	1974	15.0	Psacharopoulos (1985)
Colombia	1973	20.5	Fields & Schultz (1977)
	1978	14.4	Psacharopoulos (1985)
Guatemala	1977	11.3	Psacharopoulos (1985)
Mexico	1963	15.0	Carnoy (1967)
Venezuela	1984	11.7	Psacharopoulos (1985)
PANAMA		*12.56*	*This study*
Intermediate:			
Cyprus	1975	12.5	Demetriades & Psacharopoulos (1979)
Greece	1977	5.9	Psacharopoulos & Kazamias (1978)
Iran	1976	10.7	Scully (1979)
Advanced:			
Canada	1971	5.2	Gunderson (1979)
France	1964	10.9	Riboud (1975)
Japan	1970	7.3	Kuratani (1973)
Sweden	1974	6.7	Gustafsson (1977)
United Kingdom	1975	7.8	Psacharopoulos (1980b)
United States	1973	8.2	Young & Jamison (1975)

The Returns to Education Irrespective of Educational Level, Country Group Averages

Region or Country Type	N	Rate of Return (%)
Africa	(3)	13.4
Asia	(5)	12.8
Latin America	(3)	18.2
LDC average	(11)	14.4
Intermediate	(3)	9.7
Advanced	(6)	7.7

*See Psacharopoulos (1981) for the precise references for these studies.

Table 3
Definitions of Variables

lnEarn	Natural logarithm of Annual Earnings in the Survey Period (= Total Employment & Self Employment Income) of Male Head
Ed-Head	Number of School Years Completed by Male Head
Age	Age of Male Head at Survey
AgeSq	Age Squared
Training	Dummy Variable = 1 if Male Head received technical training, 0 otherwise
EmployIn	Intensity of Employment = ratio of months employed in the last 6 months in nonagricultural sector
Bocas	Dummy Variable = 1 if male head lives in Province of Bocas, 0 otherwise
Cocle	Dummy Variable = 1 if male head lives in Province of Cocle, 0 otherwise
Chiriqui	Dummy Variable = 1 if male head lives in Province of Chiriqui, 0 otherwise
Darien	Dummy Variable = 1 if male head lives in Province of Darien, 0 otherwise
Herrera	Dummy Variable = 1 if male head lives in Province of Herrera, 0 otherwise
Los Santo	Dummy Variable = 1 if male head lives in Province of Los Santo, 0 otherwise
Veraguas	Dummy Variable = 1 if male head lives in Province of Veraguas, 0 otherwise
Canal Zone	Dummy Variable = 1 if male head lives in the Canal Zone, 0 otherwise
Urban	Dummy Variable = 1 if male head lives in an Urban Area, 0 otherwise

Table 3 (Continued)

Low*Earn	Dummy Variable = 1 if male head's annual earnings are below the 25th percentile of the country's income distribution
Ed*Low	Interaction of Low*Earn and Educ
Age*Low	Interaction of Low*Earn and Age
AgeS*Low	Interaction of Low*Earn and AgeSq
Trn*Low	Interaction of Low*Earn and Training
Boc*Low	Interaction of Low*Earn and Bocas
Coc*Low	Interaction of Low*Earn and Cocle
Col*Low	Interaction of Low*Earn and Colon
Chi*Low	Interaction of Low*Earn and Chiriqui
Dar*Low	Interaction of Low*Earn and Darien
Her*Low	Interaction of Low*Earn and Herrera
LosS*Low	Interaction of Low*Earn and Los Santo
Vera*Low	Interaction of Low*Earn and Veraguas
CanZ*Low	Interaction of Low*Earn and Canal-Zo
Urb*Low	Interaction of Low*Earn and Urban
Low*Low	Low*Earn Squared
Ed-Wife	Number of School Years Completed by wife of male head
Ed-Child	Number of School Years Completed by male head's oldest son
Ed-Father	Number of School Years Completed by male head's father
Ed-Mother	Number of School Years Completed by male head's mother

variety of specifications of the earnings function. For each specification, we estimate the implied rate of return ($\partial \ell ny/\partial s$), the number of years after schooling completion that earnings peak, and the rates of growth of earnings with experience (= age - schooling - 6) for various numbers of years of post-schooling experience (0, 5, 10, 15, 20, 25 years). Estimates for each region, reported in the same format as Table 4, are presented in the Appendix.

Examining the estimates in Table 4 for the country as a whole, we find that estimated rates of return range from 7-12%. The estimated rate of return falls as more variables included in the regression. In addition, the regional dummy variables measured against the benchmark of Panama province (see Cols. (5) and (6)) indicate pronounced variations in regional earnings. Workers in the Canal Zone earn 40-50% more income than those outside the Zone. Workers in urban areas earn 55% more income. An F test indicates that the regional and geographical dummy variables are strongly significant.[4]

Table 5 summarizes the main features of alternative earnings function specifications for the country as a whole and by region. For the entire country, the peak in the earnings profile occurs 19-20 years after completing schooling. The rate of growth in earnings with experience starts at 3-4% and after ten years slows to 1-2%. Technical training raises earnings by 35%. Based on the individual region results, note the great range of variation in the estimates. Rates of return to schooling tend to be higher in less economically developed regions as do estimated effects of training on earnings. An F test for the hypothesis of equality of slope coefficients across regions (allowing separate intercepts in each region) is strongly rejected. Rates of return (in the language of human capital theory) or implicit prices for attributes (in the

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4. The F statistic is 84.87 with 10 and 4136 degrees of freedom.

Table 4
Male Head's Earnings Equation Estimates: ENTIRE COUNTRY

	(1)	(2)	(3)	(4)	(5)	(6)
Ed-Head	.1707	.1300	.1187	.1153	.0789	.0752
	(.0037)	(.0086)	(.0069)	(.0069)	(.0065)	(.0065)
Age		.0840	.0813	.0826	.0479	.0495
		(.0063)	(.0063)	(.0063)	(.0057)	(.0057)
AgeSq		-.0009	-.0009	-.0009	-.0007	-.0008
		(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
Training			.3449	.3346	.3230	.3109
			(.0439)	(.0438)	(.0401)	(.0399)
EmployIn				.2800		.2938
				(.0455)		(.0417)
Bocas					.4359	.4053
					(.0830)	(.0826)
Cocle					-.4583	-.4658
					(.0590)	(.0587)
Colon					.0188	.0071
					(.0715)	(.0711)
Chiriqui					-.0060	.0208
					(.0520)	(.0519)
Darien					-.2717	-.2491
					(.1240)	(.1233)
Herrera					-.3786	-.3670
					(.0593)	(.0589)
LosSanto					-.4188	-.3756
					(.0670)	(.0868)
Veraguas					-1.0033	-1.0202
					(.0566)	(.0563)
Urban					.5524	.5610
					(.0392)	(.0390)
Canal-Zo					.4508	.4031
					(.0901)	(.0898)
constant	6.3848	4.9193	5.0024	4.7761	5.5891	5.3410
	(.0335)	(.1361)	(.1356)	(.1399)	(.1275)	(.1315)
$tny/$s		.1207	.1092	.1056	.0697	.0656
peak		20.2855	20.0144	20.0133	18.9237	18.9339
growth(0.)		.0383	.0364	.0372	.0278	.0288
growth(5.)		.0288	.0273	.0279	.0205	.0212
growth(10.)		.0194	.0182	.0186	.0131	.0136
growth(15.)		.0100	.0091	.0093	.0058	.0060
growth(20.)		.0005	.0000	.0000	-.0016	-.0016
growth(25.)		-.0089	-.0091	-.0093	-.0089	-.0092
r squared	.3374	.3560	.3655	.3712	.4842	.4903
sigma	1.1343	1.1185	1.1104	1.1055	1.0023	.9965

language of hedonic theory) differ greatly among regions.[5] Judging by these criteria, the Panamanian labor market is strongly geographically segmented.

Table 5

Summary of Results for Alternative Earnings Equation Specifications

Geographical Region	Rates of Return to Education (%)	Peaks in Earnings Profile (years since schooling)	Growth Rates in Earning at Schooling Completion (%)	Growth Rates in Earning at 10 Years After School (%)	Partial Effects Of Training (%)	Partial Effects Of Urban Environment (%)
Entire County	7-12	19-20	3-4	1-2	35	55
Bocas	6	31	4-5	3	insign.*	insign.
Colon (Excl. Canal Zone)	3-5	18	4.7	2	insign.	insign.
Colon (Incl. Canal Zone)	2-5	18	5	2	insign.	insign.
Canal Zone	3-5	24	2	1.2	27	insign.
Chiriqui	7-11	32	2-3	1-2	44	35
Cocle	8-12	16-18	3	2	70	68
Darien	7-10	9	3	1	68	insign.
Herrera	8-16	17-20	3	1-2	56	92
Los Santos	7-13	14-21	2	.5-1	68	insign.
Panama Province (Excl. Canal Zone)	8-9	26	2-3	1	19	45
Panama Province (Incl. Canal Zone)	8-10	30	2-3	1-2	20	47
Veraguas	7-15	15-17	3.5-5	2	68	102

*insign. = statistically insignificant

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5. The F statistic is 14.43 with 48 and 4099 degrees of freedom.

To compare our results with results from the U.S., consider the estimates of equation (2) given in column (2) of Table 4 and in all of the Appendix tables. The main features of these estimates are reported in Table 6. The final row of the table presents estimates of the coefficients of this specification for U.S. data on males age 25-64 reported by Mincer (1974, p.92). The results for the country as a whole suggest that the rate of return to schooling is higher, the profile of earnings peaks earlier, and the rate of growth of earnings is slower than is the case for U.S. data. The slower rate of growth of earnings and the earlier peak suggests that there is less on-the-job investment in Panama than in the U.S. However, there are regions of Panama with earnings functions that more closely resemble those for the U.S. Not surprisingly, these regions tend to be the more modern, urban areas such as the Canal Zone, Panama City and Bocas.

6. Testing the Dual Labor Market Hypothesis

In the preceding section we reported tests of the hypothesis of equality of the coefficients of earnings functions across geographical markets. We rejected the hypothesis for Panama and therefore accepted a form of the labor market segmentation hypothesis for the country. In the language of Mincer's model, rates of return differ greatly across regions of a very small country. In the language of Tinbergen's model, there is substantial regional variation in the hedonic function for productive characteristics. Such differences may be due to geographical immobility of labor (due to geographical preferences among workers) or may be due to regional variation in the unmeasured quality of the inputs.

A different type of segmentation hypothesis has been advanced in the "dual"

Table 6
Summary of Mincer Model (Eq.(2)) Estimates (Males, Age 25-64)

Geographical Region	Rate of Return to Education (%)	Peak in Earnings Profile* (years since schooling)	Growth Rates in Earnings at Schooling Completion (%)	Growth Rates in Earnings at 10 Years After School (%)
Entire Country	12.1	20	3.8	1.9
Bocas	6.0	34	4.0	2.8
Colon (Excl. Canal Zone)	5.3	18	4.7	2.1
Colon (Incl. Canal Zone)	4.7	18	5.0	2.2
Canal Zone	5.3	28	1.6	1.0
Chiriqui	10.5	30	2.9	1.9
Cocle	11.4	18	4.1	1.9
Darien	7.5	9	3.0	-0.03
Herrera	15.6	20	3.5	2.7
Los Santos	13.4	21	2.4	1.3
Panama Province (Excl. Canal Zone)	9.3	26	2.8	1.7
Panama Province (Incl. Canal Zone)	9.8	30	2.9	1.9
Veraguas	14.9	19	5.2	2.4
U.S. (1959)	*8.2*	*33.75*	*8.1*	*5.7*

*Measured in Years of Experience, i.e., Age-Schooling-6.

labor economics literature. According to that literature, the market for low income or marginal workers differs from the market for other workers. This has been interpreted by some to mean that the earnings equation is of a different functional form for "marginal" workers than for others. (See Cain(1976) and the references cited therein).

A superficially attractive way to test this hypothesis in a regression framework divides the data on earnings into two sectors and fits separate earnings equations for the two sectors. Evidence that estimated earnings equations are different in the two sectors appears to suggest that there are in fact two different markets for workers. This empirical strategy is pursued in many studies of "dual" labor markets (See Cain (1976)).

Table 7 records the result of one such partition of the Panamanian data.

Dividing workers into a low earnings group--occupied by those at the bottom 25 percentile points of the labor earnings distribution--and the rest, separate earnings equations are fit for each group of workers. Column one records the coefficients of earnings function fit for all workers. Column two reports the coefficients of earnings functions for high income workers while column three reports differences between the earnings functions of low income and high income workers (i.e., low - high). There are clearly sharp differences in the estimated earnings functions for the two sectors, and these differences are statistically significant. By the standards of evidence offered in many analyses of "dualism", Panama has a dual labor market.

In our view, such evidence is not very convincing. First, as noted by Cain (1976), dividing samples on the basis of the dependent variable of a regression analysis and running separate regressions within each subsample can produce sharply biased estimated coefficients. Figure 1 illustrates the point. The solid line in that figure shows a hypothetical population earnings equation based on the simple schooling model of equation (1). The line assumes a positive relationship between income and schooling. The dots around that line represent the residual variability in the earnings equation due to unmeasured variables such as ability and motivation, i.e., the u of equation (1).

Suppose that there is no segmentation of the market in the sense that the solid line represents the mean earnings function for everyone at all levels of schooling. Creating a sample of low earners (people whose earnings are below c) and running regressions on the sample produces a biased estimate of the true regression function. As the level of education increases, the proportion of people in the low income category declines. Those who are in the category tend to have low values of u in equation (1). The measured relationship between income and schooling from samples of low income workers is biased toward zero because the level of u in the sample of low income workers is negatively

Table 7
Tests of the Dual Labor Market Model*

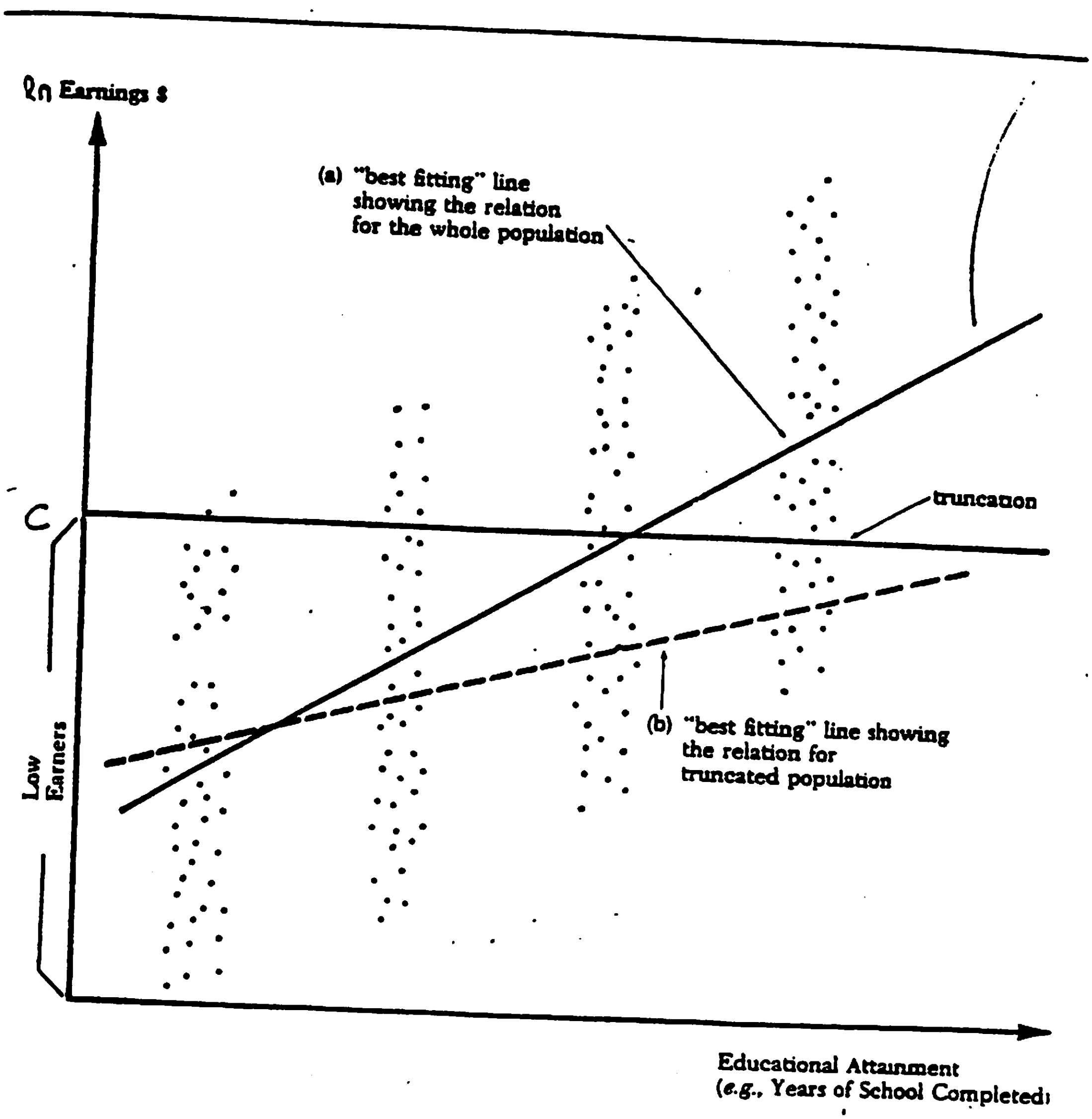
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	5.589	6.577	-2.28	.81	.515		
	(.127)	(.1036)	(.03)	(.46)	(.043)		
Ed-Head	.079	.0683	5.32	-.21	-.152	-2.65***	-1.92***
	(.006)	(.006)	(1.9)	(.024)	(.002)		
Age	.048	.0318	-.0007	-.035	-.0052	-.729	-.108***
	(.006)	(.004)	(.0002)	(.020)	(.0019)		
AgeSq	-.0007	-.00039	-.11145	.0005	.00011	-1.66***	-1.43***
	(.0001)	(.00009)	(.021)	(.0003)	(.00003)		
Training	.322	.186	.035	-.8995	-.0626	-2.79***	-.293***
	(.04)	(.032)	(.011)	(.175)	(.0136)		
Bocas	.436	.135	1.787	-1.28	-.128	-2.93***	-.242***
	(.083)	(.069)	(.86)	(.39)	(.028)		
Cocle	-.458	-.166	-.07	1.07	.111	-2.33***	-.278***
	(.059)	(.065)	(.23)	(.16)	(.021)		
Colon	.019	-.062	.48	.185	-.0251	9.73	-1.32
	(.071)	(.057)	(.41)	(.28)	(.0234)		
Chiriqui	-.006	-.112	.693	.466	.0088	-77.67	-1.46
	(.052)	(.047)	(.227)	(.16)	(.0177)		
Darien	-.272	-.129	-.253	.419	.01965	-1.54***	-.239***
	(.124)	(.133)	(.399)	(.32)	(.0421)		
Herrera	-.379	-.184	.284	1.29	.137	-3.40***	-.361***
	(.059)	(.06)	(.227)	(.18)	(.021)		
Los Santo	-.419	-.377	.762	1.27	.159	-3.03***	-.379***
	(.067)	(.084)	(.24)	(.18)	(.023)		
Veraguas	-1.003	-.299	-.132	1.98	.306	-1.97***	-.305***
	(.056)	(.08)	(.21)	(.167)	(.019)		
Canal Zone	.451	.357	.426	-1.04	-.0082	-2.31	-.018
	(.090)	(.066)	(.244)	(.74)	(.03)		
Urban	.552	.1429	.51	-1.34	-.193	-2.43***	-.349***

Column (1): Population as a Whole
Column (2): Upper Sector (top 75%)
Column (3): (Lower Sector - Upper Sector) Difference

Column (4): Logistic Regression**
Column (5): Linear Probability Model
Column (6): Ratio of Col.(4) to Col.(1)
Column (7): Ratio of Col.(5) to Col.(1)

*The provincial dummies are measured with respect to Panama Province (Panama City and environs).
**The dependent variable = 1 if person is poor (i.e., in lower 25%); 0 otherwise.
***Both coefficients statistically significant

Figure 1
Hypothetical Scatter Diagram and Regression of Earnings on Educational Attainment, with and Without Truncated Earnings



correlated with s even though u is uncorrelated with s in the population. The dashed line in Figure 1 indicates the impact of this bias on fitted regression equations. Low income workers and high income workers whose behavior is generated by a common regression function (the solid line) appear to be different (the dashed line) only because of the statistical methods used.

It is possible to correct this bias using sample selection bias techniques developed by Heckman (1976). These methods correct for sample selection by accounting for the effect of income truncation (or other selection rules) on the mean of u in the low income sample. Correcting for sample selection, it is possible to provide a valid test for differences in the coefficients of the earnings function for high income and low income workers.

In the sample selection bias literature it is recognized that equation (1) describes a hypothetical population and random samples drawn from it. The regression function for the population is:

$$E(\ell ny|s) = \alpha_0 + \alpha_1 s. \tag{3}$$

For a low income population ($\ell ny < c$ where, c is the cut off level) the regression function is:

$$E(\ell ny|s,\ \ell ny < c) = \alpha_0 + \alpha_1 s + E(u|\ell ny < c). \tag{4}$$

The final term on the right hand side of equation (4) is the effect of selection on the mean of the unobservables. Omitting the final term from the regression produces biased estimates of α_0 and α_1. Using equation (1) it is possible to substitute for ℓny in the income truncation inequality ($\ell ny < c$) to write it as:

$$u < c - \alpha_0 - \alpha_1 s \tag{5}$$

This inequality restricts the range of unobservable u in the sample in the fashion depicted in Figure 1.

Assuming that the distribution of u is known, it is possible to estimate $E(u|u < c - \alpha_0 - \alpha_1 s)$ and insert it as a regressor in the earnings function. Under the null hypothesis that equation (1) is the true population earnings function, it is possible to estimate α_0 and α_1 by least squares pooling the data from all subpopulations. It is possible to consistently estimate the variance of u from the regression residuals. Assuming that u is normally distributed (or is characterized by any other finite mean two parameter distribution) it is possible to consistently estimate $E(u|\ell ny < c)$ for each observation. One test of dual labor market theory partitions the data into high income and low income samples, corrects for sample selection, and then determines whether the estimated coefficients are different in the two subsamples. The test is valid only if (a) the functional form of the population regression function under the null hypothesis of no dualism is known, (b) u is distributed independently of s[6] and (c) it is possible to consistently estimate the conditional mean of u given selection rule (5).[7]

An alternative test of the same hypothesis asks whether or not the earnings function fit for the population as a whole predicts low income status. Under the null hypothesis of no dual labor market, equation (1) characterizes earnings for everyone. The probability that someone is poor should be related to the earnings equation.

The probability that a person is poor given his schooling is

$$\Pr(\ell ny < c|s) = \Pr(u < c - \alpha_0 - \alpha_1 s)|s). \tag{6}$$

Let F be the distribution of u divided by its standard error and let σ_u be the standard error. Then

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6. It is only required that u be uncorrelated with s in order to obtain consistent regression estimators.

7. In applications, this requires specifying the distribution of u. Using goodness of fit tests, it is possible to use the least squares residuals from

$$\Pr(\text{person is poor}|s) = F\left(\frac{c - \alpha_0 - \alpha_1 s}{\sigma_u}\right) \tag{7}$$

where we use the fact that division by an arbitrary constant does not change the probability content of inequality (5). Logistic or linear probability model estimates of the probability of low income status should estimate α_1/σ_u assuming that the distribution of u is known to be logistic or uniform respectively. If instead of a single variable, there are many variables that determine earnings, (as in earnings function (2)), the slope coefficients determining earnings should be proportionately related to the slope coefficients of the model determining the probability that someone is in the low income sector. Moreover, the constant of proportionality should be the standard deviation of the earnings function fit over the entire sample of workers. Recent work by Stoker (1984) demonstrates that if the regressors of the model are approximately normally distributed, a linear regression of a dummy variable indicating poverty status (=1 if a person is poor, =0 otherwise) on regressors consistently estimates the coefficients of the probability of poverty up to an unknown factor of proportionality.

Thus, if a common model describes the earnings of all persons, there should be proportionality between the coefficients of earnings equations fit on the entire sample and the coefficients of linear probability models (or logistic models if u is logistically distributed) determining membership in the low income sector. Put another way, if a selection bias corrected earnings function fit on the non-poor is extrapolated to the poor and does not explain their earnings, a dual labor market is said to be present.

Columns 4 and 5 of Table 7 record the regression coefficients of logistic

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estimates of (1) to test for any assumed distribution against the data.

and linear probability regression models in which the dependent variable equals 1 if a person is poor (in the lower 25% of the distribution) and is zero otherwise. These columns produce estimates of the parameters of equation (7) under various assumptions about the distribution of u and the distribution of the regressors. The numbers reported in column (4) are correct if u follows a logistic distribution. The numbers in column (5) are correct if u is uniformly distributed or else the regressors are approximately normally distributed (Stoker (1984)). Columns (6) and (7) record the ratio of the coefficients of Columns (4) and (5) to the coefficients reported in Column (1). Under the null hypothesis of no dual labor market and under the additional hypothesis of correct specification of the logistic or linear probability model, the numbers reported (6) or (7) respectively should be similar. There is a lot of fluctuation even for coefficients which are statistically significant in both the earnings and dummy variable regressions. An eyeball test rejects the hypothesis that the earnings equation and the equation determining participation in low income status are generated by the same model (except for the intercept and constant of proportionality).[8] By this test, there is dualism in Panama.

In our view, tests of the sort just described are intrinsically unconvincing. Evidence that the coefficients of the equation determining poverty status are not proportional to the coefficients in the earnings equation may simply indicate that earnings are not logistically or uniformly distributed, that the regressors of the earnings equations are not approximately normally distributed, that the earnings equation is misspecified, or all of the above reasons. Evidence of differences in the earnings functions of high income and low income persons produced from sample selection corrected regressions may simply indicate misspecification of the functional form of the "true" earnings

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8. A more formal test requires computational facilities and access to data that were not at our disposal.

function or that the sample selection correction terms have been misspecified, e.g., by imposing an incorrect distributional assumption about u. Evidence of similarity in the estimated regression coefficients from such analyses may only be a consequence of misspecifying the "true" cut off line for low income workers, and incorrectly mixing both high income and low income workers into the same category.

At the heart of all of these tests of dual labor market theory--and their central defect--is the assumption that the true functional form of the earnings equation under the hypothesis of no dualism is simple (e.g., a linear or log linear regression). Hedonic models can produce earnings functions that are highly nonlinear in productive attributes. Prices of attributes are determined by supply and demand. Since workers with three years of schooling are not guaranteed to be half as productive as workers with six years of schooling, and indeed may even perform different tasks in the market, there is no necessarily simple functional relationship between income and education. The same can be said for the relationship between income and any other productive attribute. Since there is no necessarily simple relationship between measured schooling (or work experience) and human capital, similar remarks also apply to human capital earnings models.

If the underlying earnings function is sufficiently nonlinear, dualism will always be found by the tests considered above. Yet there is no necessary economic content in this observation. Such evidence may just indicate the nonlinearity of the pricing equations for attributes characterizing functioning competitive markets.

7. The Impact of Family Background on Earnings and Educational Attainment

In this section, we examine the importance of family background in determining the economic and educational status of Panamanian males. Table 8 presents evidence on the earnings of Panamanian males age 25-64. These earnings functions differ from the ones analyzed in Section 5 by including the education of the mother and the father as determinants of male earnings. In all specifications of the earnings functions presented, both variables play a powerful role with the education of the mother playing a larger role than that of the father both in the size of the effect of an additional year of her schooling on her son's earnings and in the statistical precision with which the coefficient on her education is estimated. The mother's education is statistically significant in all specifications while the father's education is sometimes statistically insignificant. An increase in the mother's education by one year raises her son's earnings by 3-5% per annum. The introduction of the background variables has a tendency to reduce the estimated effects of the son's own education on earnings and the associated rates of return. This evidence indicates that a part of the estimated effect of own education on earnings from regressions that do not control for parental background is due to parental influence on earnings.

We have been unable to find published studies for U.S. data that report results directly comparable to those of Table 8. Thus we are unable to determine if the estimated effects of family background on earnings are stronger in Panama than in a more mature economy such as the U.S. However, we note that Featherman and Hauser (1978, pp. 293 and 305) find important effects of father's background variables on earnings controlling for some of the same characteristics we use here. In particular, they find that family background variables have an important effect on early earnings but that such effects

Table 8
Earnings Functions with Family Background Variables for the Country as a Whole

Constant	4.99	5.04	5.0133	4.782	5.549	5.294
	(.134)	(.134)	(.1336)	(.138)	(.127)	(.1311)
Ed-Head	.0905	.092	.0856	.0820	.0642	.060
	(.0073)	(.0073)	(.0074)	(.0074)	(.0069)	(.0068)
Age	.0611	.0605	.0607	.0621	.0485	.0502
	(.0062)	(.006)	(.0062)	(.006)	(.0057)	(.0057)
AgeSq	-.0009	-.0009	-.0009	-.0009	-.0007	-.0008
	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
Training	.3173	.3116	.3089	.2984	.3025	.2897
	(.0434)	(.0436)	(.0434)	(.0432)	(.040)	(.0398)
Ed-Mother	.0592		.0417	.0231	.0260	.0273
	(.0055)		(.0673)	(.0063)	(.0067)	(.0066)
Ed-Father		.0475	.0237	.0427	.0095	.0093
		(.0049)	(.0064)	(.0072)	(.0059)	(.0058)
Emp				.2855		.3012
				(.0448)		(.0415)
Bocas					.455	.424
					(.082)	(.082)
Cocle					-.468	-.476
					(.059	(.058)
Colon					.032	.0197
					(.071)	(.071)
Chiriqui					.0287	.0568
					(.052)	(.052)
Darien					-.2560	-.2326
					(.1234)	(.1227)
Herrera					-.327	-.3140
					(.06)	(.0593)
Los Santos					-.383	-.3386
					(.067)	(.0668)
Urban (=1 if urban)					.511	.5197
					(.04)	(.039)
Canal Zone (=1 if in zone)					.434	.384
					(.09)	(.089)
<u>Rate of Return to Schooling</u>: ($\partial \ell ny/\partial s$)	.082	.083	.077	.0736	.056	.051
<u>Peak Age of Earnings</u>:	20.7	20.2	20.5	20.6	19.47	19.48
<u>Growth Rates of Income (with Post-Schooling Experience)</u>:						
0 yrs.out	.036	.036	.0365	.037	.0285	.0295
5 yrs.out	.028	.027	.0276	.028	.0212	.0219
10 yrs.out	.019	.018	.0188	.019	.0139	.0144
15 yrs.out	.010	.009	.0099	.010	.0065	.0068
20 yrs.out	.001	.0004	.0010	.001	-.0008	-.0008
25 yrs.out	-.008	-.0085	-.0078	-.008	-.0081	-.0084
R^2	.383	.3798	.3846	.391	.489	.496
Residual Variance	1.095	1.0979	1.0937	1.089	.9975	.9913

weaken over the life cycle. Leibowitz (1974) presents evidence on the relative importance of mother's education on the earnings of sons that is consistent with what we find here.

The interpretation to be placed on these findings is ambiguous. Radical economists use such evidence to argue that society is stratified along class lines. Neoclassical economists argue that background variables proxy the quality of the learning environment when the child is young. The fact that the mother's education tends to have a persistently stronger and more robust effect on earnings than the father's education is interpreted as evidence that such background variables proxy home quality. Unfortunately, it is not possible to distinguish between these competing hypotheses distinguish between these competing hypotheses with cross section earnings data of the type at our disposal.

We now turn to the question of the influence of familial background on the educational attainment of Panamanian males. Evidence on this questions sheds additional light on the importance of background variables on determining economic status.

Table 9 presents means, standard deviations and intergenerational correlation coefficients for three generations of Panamanians. The data in this table are obtained from households which had at least one son over 18 years of age. Examining the first column of numbers for the country as a whole, note that the educational level of the population has been steadily rising (2.41 for the Grandfather, 4.63 for the Father, and 8.11 for sons). Although the variance or standard deviation of schooling attainment is considerably higher in Panama than in the U.S., there is no discernable trend in either measure of variability. (See Table 1.) Also note that the correlation between the father's education and his father's education (.68) is quite high. The correlation between the father's education and his son's education is lower.

The observed weakening over time in the intergenerational correlation of educational attainment is consistent with the emergence of state supported educational programs. The correlation between mother's education and son's is much higher than between father's education and son's. This evidence is consistent with the work of Leibowitz (1974) who reports a powerful role of mother's education on son's educational attainment. Such evidence would seem to indicate the importance of the mother in providing a learning environment for her child. It demonstrates a potentially important non-market benefit of mother's education that should be evaluated in assessing the value of subsidies to women's education.

To put these numbers in perspective, we collect comparable results for the U.S. (See Table 10). In 1962, the correlation between father's education and son's is .453 -- substantially lower than the corresponding correlation for Panama. Measured by U.S. standards, there is substantially greater intergenerational correlation in educational attainment in Panama than in the U.S.

Looking at the data in Table 9 disaggregated by province, and breaking out the Canal Zone data for separate treatment (the remaining columns of the Table), the pattern observed for the country as a whole is generally found for each province. The educational attainment correlation for fathers and sons weakens over time, and the correlation between mother's education and son's education is stronger than is the correlation between father's education and son's education. The correlations for the Canal Zone constitute a striking exception to this rule. Note that schooling levels for all generations are substantially higher in the Canal Zone than in other regions of the country, and the variance in the son's educational attainment is much lower.

Table 11 presents univariate and multivariate regression results on intergenerational educational attainment. We present results only for the

Table 9
Intergenerational Educational Attainment in Panamafor the Country as a Whole and by Region

	Country		Panama		Colon	
	Means	Standard Deviation	Means	Standard Deviation	Means	Standard Deviation
Grandfather	2.41	4.07	5.22	5.55	3.91	4.05
Father	4.63	4.33	7.65	5.09	6.22	3.52
Son	8.11	4.36	10.76	4.11	9.22	4.41
Mother	4.63	4.16	7.37	4.70	7.12	4.65
Correlation (Grandfather-Father)	.68		.65		.53	
Correlation (Father-Son)	.57		.54		.68	
Correlation (Mother-Son)	.75		.71		.37	

	Darien		Los Santos		Veraguas	
	Means	Standard Deviation	Means	Standard Deviation	Means	Standard Deviation
Grandfather	2.60	4.05	1.09	2.37	.52	1.53
Father	4.10	4.32	3.41	3.01	2.45	3.01
Son	5.80	3.65	7.75	3.97	6.04	3.91
Mother	3.29	4.32	3.71	2.71	2.29	3.09
Correlation (Grandfather-Father)	.73		.58		.36	
Correlation (Father-Son)	.12		.35		.47	
Correlation (Mother-Son)	.21		.43		.63	

	Herrera		Bocas del Toro		Cocle	
	Means	Standard Deviation	Means	Standard Deviation	Means	Standard Deviation
Grandfather	.85	2.68	3.3	2.54	1.85	2.63
Father	2.73	2.99	5.2	2.48	4.14	3.41
Son	6.92	4.24	8.7	3.26	7.06	3.83
Mother	3.06	3.11	3.9	2.11	3.99	3.03
Correlation (Grandfather-Father)	.61		.62		.5656	
Correlation (Father-Son)	.56		.63		.467	
Correlation (Mother-Son)	.54		.801		.55	

	Chiriqui		Canal Zone	
	Means	Standard Deviation	Means	Standard Deviation
Grandfather	1.67	3.18	6.75	6.57
Father	4.16	3.88	8.50	5.75
Son	7.93	4.05	12.63	3.16
Mother	4.22	3.96	6.25	3.41
Correlation (Grandfather-Father)	.569		.499	
Correlation (Father-Son)	.478		.569	
Correlation (Mother-Son)	.4648		.049	

Table 10
Intergenerational Educational Attainment Data From the U.S.

Country	Year	Correlation	Age Groups	Source
U.S.	1962	.453	All Age groups	Blau and Duncan (1967, p. 169)
U.S.	1962	.416	Age 25-34	Blau and Duncan (1967, p. 170)
		.424	Age 35-44	
		.373	Age 45-54	
		.409	Age 55-64	
U.S.	1973	.568 (Upper Bound)	ALL AGE Groups*	Featherman and Hauser (1978, pp. 235, 242)
		.577-.504	For recent groups	Featherman and Hauser

*This is the square root of the R^2 of a regression of son's educational attainment on father's education, mother's education, number of siblings, farm origin, a variable indicating whether or not the son grew up in a broken home, and race, and thus overstates the simple correlation between father's education and son's education.

country as a whole. The following patterns emerge from this table: (1) The regression coefficients of parental education on son's educational attainment weaken over time, i.e. they are weaker for more recent generations than older generations. (2) The effect of father's education and mother's education on son's educational attainment are virtually identical in regressions in which both background variables appear. Both coefficients tend to be smaller for the more recent generation. (3) There are pronounced regional variations in the educational attainments of both the son and the father controlling for background variables. Residents in urban areas have substantially higher educational attainment. This effect is stable over generations. (4) Holding parental education constant, the education of the paternal grandfather has no effect on the education of his grandson in most specifications of the intergenerational transmission equations (see columns (3)-(5)). However, in one specification, (column (8)), grandfather's education has a negative effect on his grandson's education holding the effects of age, parental education and regional variables constant, although the coefficient is not very precisely determined. Assuming that education proxies income, such a negative relationship is predicted by Becker and Tomes (1979, p. 1170) in their theory of intergenerational income transfers.

8. SUMMARY

This paper presents new empirical evidence on the determinants of the earnings of Panamanian males. We reach the following main conclusions. First the estimated rates of return to schooling are high in Panama, especially in the less economically advanced regions of the country. Rates of return are higher in Panama than in the U.S. and other advanced countries but are lower than estimates reported for other Latin American countries. Rates of return to schooling in urban Panama (especially Panama City and the Canal Zone) are comparable with estimates for the U.S. In addition, rates of growth of earnings with experience are lower and earnings functions peak earlier in Panama than in the U.S. This pattern indicates less on-the-job training in Panama than in the U.S. An exception to this pattern occurs in the urban and more advanced sector of the economy.

We find strong regional differences in earnings functions. In the language of Mincer's model, this finding indicates sharp geographical differences in rates of return. In the language of Tinbergen's hedonic model, prices for the same characteristic differ greatly across regions. These differences are surprising in view of the small size of Panama. Labor markets appear to be geographically segmented. There are also strong differences in the functional forms of earnings functions fit for samples of high earnings and low earnings workers. Tests that do not generate spurious differences indicate that earnings functions are not described by a simple functional form. However, there is little behavioral content in this observation. The evidence does not decide the

Table 11
Estimates of Intergenerational Influences on Educational Attainment

Dependent Variable: Ed-Head
Entire Country

Ed-Fathr	.6597		.3865	.3825	.3132
	(.0126)		(.0197)	(.0194)	(.0188)
Ed-Mothr		.7481	.3980	.3715	.2871
		(.0146)	(.0227)	(.0224)	(.0216)
Age				-.0646	-.0710
				(.0056)	(.0054)
Bocas					-1.9471
					(.2719)
Cocle					-.8186
					(.1936)
Colon					.0913
					(.2357)
Chiriqui					-.0490
					(.1729)
Darien					-1.0518
					(.4083)
Herrera					-.5163
					(.1971)
LosSanto					-.0514
					(.2219)
Veraguas					-.5585
					(.1879)
Canal-Zo					.4067
					(.2971)
Urban					2.2641
					(.1259)
constant	4.9345	4.8322	4.5579	7.1888	7.0729
	(.0772)	(.0797)	(.0775)	(.2422)	(.2536)
r squared	.3988	.3886	.4404	.4575	.5154
sigma	3.6770	3.7080	3.5479	3.4936	3.3058

Table 11 (continued)

Dependent Variable: Ed-Child
Entire Country

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ed-Head	.5722		.3292	.3262	.2355	.3274	.3240	.2631
	(.0298)		(.0495)	(.0490)	(.0449)	(.0444)	(.0437)	(.0486)
Ed-Wife		.5965	.3424	.3433	.2592	.3419	.3427	.2657
		(.0309)	(.0460)	(.0460)	(.0453)	(.0455)	(.0454)	(.0455)
Ed-Fathr			-.0034	-.0041				-.0616
			(.0423)	(.0422)				(.0418)
Age			.0055		.0013	.0055		.0007
			(.0126)		(.0122)	(.0125)		(.0122)
Bocas					-1.1579			-1.2024
					(1.1005)			(1.1001)
Cocle					-.8626			-.9167
					(.4225)			(.4238)
Colon					-.6257			-.6480
					(.7409)			(.7404)
Chiriqui					-.2835			-.3578
					(.4229)			(.4255)
Darien					-1.6905			-1.6896
					(.8104)			(.8098)
Herrera					-.3714			-.4411
					(.4579)			(.4600)
LosSanto					.3879			.3173
					(.4787)			(.4807)
Veraguas					-.8586			-.9326
					(.4440)			(.4465)
Urban					2.1693			2.2306
					(.3370)			(.3393)
constant	5.4585	5.3477	4.7020	5.0181	5.3784	4.7026	5.0212	5.4329
	(.1888)	(.1926)	(.7509)	(.1941)	(.7887)	(.7504)	(.1913)	(.7890)
r squared	.3222	.3237	.3686	.3685	.4206	.3686	.3685	.4222
sigma	3.5971	3.5930	3.4785	3.4767	3.3496	3.4763	3.4745	3.3470

issue of whether or not there are dual labor markets in Panama.

Finally with respect to the impacts of social background, there is a strong effect of parental education and especially mother's education on male earnings. Family background plays an important role in determining Panamanian male earnings. We also find a strong effect of parental education on the son's educational attainment. While this relationship is weaker for more recent cohorts of Panamanians, it is still much stronger than intergenerational educational attainment relationships found in U.S. data.

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Appendix

Table A1
Estimates for Earnings Function Specifications for Each Region of Panama

BOCAS

Ed-Head	.0622	.0493	.0492	.0518
	(.0140)	(.0226)	(.0225)	(.0225)
Age		.0560	.0614	.0660
		(.0213)	(.0215)	(.0217)
AgeSq		-.0006	-.0007	-.0007
		(.0004)	(.0004)	(.0004)
Training			-.2651	-.2600
			(.1793)	(.1789)
Urban				-.1573
				(.1158)
constant	7.7729	6.1698	6.0518	6.0142
	(.0986)	(.4611)	(.4663)	(.4659)
$\partial \ell ny/\partial s$		.0596	.0587	.0614
peak		33.9786	32.3452	31.8424
growth(0.)		.0399	.0432	.0462
growth(5.)		.0340	.0365	.0389
growth(10.)		.0282	.0298	.0317
growth(15.)		.0223	.0232	.0244
growth(20.)		.0164	.0165	.0172
growth(25.)		.0105	.0098	.0099
r squared	.1063	.1981	.2088	.2178
sigma	.6979	.6651	.6627	.6610

Table A1 (continued)

CANAL ZONE

Ed-Head	.0598	.0520	.0322	.0309
	(.0164)	(.0321)	(.0330)	(.0335)
Age		.0231	.0343	.0342
		(.0246)	(.0248)	(.0249)
AgeSq		-.0003	-.0005	-.0005
		(.0005)	(.0005)	(.0005)
Training			.2735	.2757
			(.1278)	(.1285)
Urban				.0501
				(.1819)
constant	8.2947	7.6219	7.3873	7.3587
	(.1791)	(.5356)	(.5398)	(.5516)
$\partial \ln y/\partial s$		.0534	.0309	.0295
peak		27.5881	23.7879	23.7171
growth(0.)		.0155	.0218	.0217
growth(5.)		.0127	.0172	.0172
growth(10.)		.0099	.0126	.0126
growth(15.)		.0071	.0081	.0080
growth(20.)		.0043	.0035	.0034
growth(25.)		.0014	-.0011	-.0012
r squared	.0894	.1029	.1330	.1335
sigma	.6865	.6865	.6775	.6798

COCLE

Ed-Head	.1830	.1292	.1296	.0960
	(.0159)	(.0271)	(.0268)	(.0272)
Age		.0710	.0634	.0497
		(.0247)	(.0247)	(.0243)
AgeSq		-.0011	-.0010	-.0008
		(.0004)	(.0004)	(.0004)
Training			.6805	.6841
			(.2531)	(.2470)
Urban				.6974
				(.1516)
constant	5.9375	4.4299	4.5724	4.9518
	(.1198)	(.5504)	(.5488)	(.5418)
$\partial \ln y/\partial s$		.1138	.1163	.0824
peak		18.3073	18.4938	16.8443
growth(0.)		.0407	.0365	.0274
growth(5.)		.0296	.0266	.0193
growth(10.)		.0185	.0168	.0111
growth(15.)		.0073	.0069	.0030
growth(20.)		-.0038	-.0030	-.0051
growth(25.)		-.0149	-.0128	-.0133
r squared	.2460	.2612	.2742	.3106
sigma	1.2918	1.2818	1.2720	1.2413

Table A1 (continued)

COLON, Including Canal Zone

Ed-Head	.1175	.0662	.0574	.0438
	(.0158)	(.0249)	(.0260)	(.0266)
Age		.0865	.0885	.0903
		(.0207)	(.0208)	(.0207)
AgeSq		-.0014	-.0014	-.0014
		(.0004)	(.0004)	(.0004)
Training			.1439	.1376
			(.1265)	(.1256)
Urban				.2582
				(.1236)
constant	7.1146	5.1901	5.1729	5.0969
	(.1521)	(.4401)	(.4401)	(.4383)
∂ℓny/∂s		.0473	.0367	.0215
peak		18.2786	17.8729	17.5474
growth(0.)		.0495	.0501	.0508
growth(5.)		.0360	.0361	.0363
growth(10.)		.0224	.0221	.0218
growth(15.)		.0089	.0081	.0074
growth(20.)		-.0047	-.0060	-.0071
growth(25.)		-.0182	-.0200	-.0216
r squared	.1952	.2649	.2691	.2830
sigma	.9018	.8656	.8650	.8586

COLON, Excluding Canal Zone

Ed-Head	.1214	.0716	.0631	.0505
	(.0170)	(.0268)	(.0281)	(.0288)
Age		.0829	.0842	.0856
		(.0228)	(.0229)	(.0227)
AgeSq		-.0013	-.0013	-.0014
		(.0004)	(.0004)	(.0004)
Training			.1465	.1385
			(.1413)	(.1405)
Urban				.2472
				(.1374)
constant	7.0005	5.1841	5.1813	5.1166
	(.1624)	(.4828)	(.4827)	(.4813)
∂ℓny/∂s		.0526	.0422	.0290
peak		17.9587	17.5261	17.4155
growth(0.)		.0471	.0473	.0480
growth(5.)		.0340	.0336	.0342
growth(10.)		.0209	.0203	.0204
growth(15.)		.0078	.0068	.0067
growth(20.)		-.0054	-.0067	-.0071
growth(25.)		-.0185	-.0202	-.0209
r squared	.2078	.2679	.2720	.2841
sigma	.9210	.8899	.8897	.8846

Table A1 (continued)

CHIRIQUE

Ed-Head	.1156	.1005	.0876	.0699
	(.0097)	(.0176)	(.0175)	(.0179)
Age		.0413	.0344	.0297
		(.0165)	(.0164)	(.0162)
AgeSq		-.0005	-.0004	-.0004
		(.0003)	(.0003)	(.0003)
Training			.4968	.5097
			(.1139)	(.1125)
Urban				.3582
				(.0946)
constant	6.8893	5.7607	5.9410	6.0928
	(.0793)	(.3555)	(.3522)	(.3503)
$\partial \ell n y/\partial s$		.1053	.0931	.0713
peak		30.3447	32.5187	27.2418
growth(0.)		.0285	.0242	.0197
growth(5.)		.0238	.0205	.0161
growth(10.)		.0191	.0168	.0125
growth(15.)		.0144	.0130	.0089
growth(20.)		.0097	.0093	.0053
growth(25.)		.0050	.0056	.0016
r squared	.2042	.2243	.2503	.2695
sigma	1.0139	1.0029	.9868	.9750

DARIEN

Ed-Head	.2257	.1289	.1548	.1545
	(.0386)	(.0644)	(.0707)	(.0712)
Age		.0752	.0796	.0723
		(.0603)	(.0606)	(.0646)
AgeSq		-.0017	-.0017	-.0016
		(.0010)	(.0010)	(.0011)
Training			-.3990	-.4040
			(.4463)	(.4495)
Urban				.1530
				(.4459)
constant	5.9234	5.0301	4.8707	5.0294
	(.2572)	(1.2602)	(1.2746)	(1.3641)
$\partial \ell n y/\partial s$		.0750	.1020	.1027
peak		8.9997	9.7258	8.9893
growth(0.)		.0299	.0331	.0287
growth(5.)		.0133	.0161	.0127
growth(10.)		-.0033	-.0009	-.0032
growth(15.)		-.0199	-.0179	-.0192
growth(20.)		-.0365	-.0350	-.0351
growth(25.)		-.0531	-.0520	-.0511
r squared	.3307	.3718	.3794	.3805
sigma	1.3242	1.3019	1.3038	1.3126

Table A1 (continued)

HERRERA

Ed-Head	.2048	.1653	.1461	.0925
	(.0122)	(.0225)	(.0225)	(.0217)
Age		.0594	.0475	.0526
		(.0212)	(.0210)	(.0193)
AgeSq		-.0009	-.0007	-.0008
		(.0004)	(.0004)	(.0003)
Training			.5616	.4352
			(.1326)	(.1232)
Urban				.9262
				(.1137)
constant	6.0359	4.7174	5.0142	4.7821
	(.0969)	(.4527)	(.4482)	(.4140)
$\partial \ln y/\partial s$		.1562	.1377	.0797
peak		20.0863	19.4240	17.6427
growth(0.)		.0353	.0279	.0296
growth(5.)		.0265	.0207	.0212
growth(10.)		.0177	.0135	.0128
growth(15.)		.0090	.0064	.0044
growth(20.)		.0002	-.0008	-.0040
growth(25.)		-.0086	-.0080	-.0124
r squared	.4325	.4459	.4716	.5525
sigma	1.0421	1.0326	1.0097	.9304

LOS SANTOS

Ed-Head	.1596	.1386	.0959	.0809
	(.0174)	(.0282)	(.0310)	(.0317)
Age		.0387	.0379	.0354
		(.0263)	(.0260)	(.0259)
AgeSq		-.0006	-.0006	-.0006
		(.0004)	(.0004)	(.0004)
Training				.6246
				(.2183)
Urban			.6829	.4089
			(.2175)	(.2009)
constant	6.0791	5.1735	5.3895	5.5219
	(.1227)	(.5896)	(.5852)	(.5858)
$\partial \ln y/\partial s$		.1345	.0862	.0682
peak		21.4839	17.3087	14.9228
growth(0.)		.0236	.0212	.0185
growth(5.)		.0181	.0151	.0123
growth(10.)		.0126	.0089	.0061
growth(15.)		.0071	.0028	-.0001
growth(20.)		.0016	-.0033	-.0063
growth(25.)		-.0039	-.0094	-.0125
r squared	.2163	.2226	.2473	.2575
sigma	1.2184	1.2174	1.2000	1.1937

Table A1 (continued)

PANAMA PROVINCE, Including Canal Zone

Ed-Head	.1107	.0937	.0883	.0789
	(.0046)	(.0084)	(.0085)	(.0084)
Age		.0418	.0401	.0348
		(.0075)	(.0074)	(.0073)
AgeSq		-.0005	-.0005	-.0004
		(.0001)	(.0001)	(.0001)
Training			.2020	.1923
			(.0468)	(.0458)
Urban				.4661
				(.0550)
constant	7.2253	6.1002	6.1377	6.0014
	(.0498)	(.1553)	(.1547)	(.1521)
$\partial \ell ny/\partial s$		.0979	.0929	.0848
peak		29.5135	30.3008	33.1834
growth(0.)		.0286	.0276	.0247
growth(5.)		.0238	.0231	.0209
growth(10.)		.0189	.0185	.0172
growth(15.)		.0141	.0139	.0135
growth(20.)		.0092	.0094	.0098
growth(25.)		.0044	.0048	.0061
r squared	.2663	.2992	.3074	.3378
sigma	.8417	.8231	.8185	.8006

PANAMA PROVINCE, Excluding Canal Zone

Ed-Head	.1114	.0916	.0869	.0776
	(.0047)	(.0085)	(.0086)	(.0085)
Age		.0418	.0398	.0350
		(.0076)	(.0076)	(.0075)
AgeSq		-.0005	-.0005	-.0004
		(.0001)	(.0001)	(.0001)
Training			.1862	.1742
			(.0485)	(.0474)
Urban				.4546
				(.0557)
constant	7.1768	6.1108	6.1533	6.0154
	(.0503)	(.1587)	(.1583)	(.1558)
$\partial \ell ny/\partial s$		.0925	.0883	.0803
peak		26.1053	26.6884	28.4125
growth(0.)		.0275	.0263	.0236
growth(5.)		.0222	.0214	.0195
growth(10.)		.0169	.0165	.0153
growth(15.)		.0117	.0115	.0112
growth(20.)		.0064	.0066	.0070
growth(25.)		.0012	.0017	.0028
r squared	.2765	.3042	.3111	.3411
sigma	.8338	.8183	.8144	.7968

Table A1 (continued)

VERAGUAS

Ed-Head	.2276	.1669	.1423	.0910
	(.0123)	(.0208)	(.0217)	(.0223)
Age		.0902	.0818	.0640
		(.0219)	(.0218)	(.0211)
AgeSq		-.0014	-.0013	-.0011
		(.0004)	(.0004)	(.0003)
Training			.6413	.6770
			(.1819)	(.1748)
Urban				1.0264
				(.1605)
constant	5.1840	3.2555	3.5377	4.0400
	(.0899)	(.4927)	(.4934)	(.4801)
$\partial \ell n y/\partial s$		.1485	.1214	.0687
peak		18.6348	17.3417	15.1931
growth(0.)		.0521	.0457	.0337
growth(5.)		.0381	.0326	.0226
growth(10.)		.0241	.0194	.0115
growth(15.)		.0102	.0062	.0004
growth(20.)		-.0038	-.0070	-.0107
growth(25.)		-.0178	-.0202	-.0218
r squared	.4215	.4416	.4560	.4996
sigma	1.3033	1.2831	1.2678	1.2172

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