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Geographical and Sectoral Labor Market Segmentation and the Returns to Women's Human Capital in a Developing Economy: Labor Force Participation and Earnings in a Double Selectivity Model

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Three major strands in recent development literature are (1) that segmentation or pluralism is a prevalent feature of developing economies, (2) that human capital investments broadly defined may be very important in attaining growth, distribution and other goals, and (3) that women probably play a major role in the development process.[1] Despite considerable emphasis on their importance, many dimensions of these characterizations remain practically unexplored.

In this paper we contribute to the understanding of the empirical realities of these three dimensions of the development process by estimating micro labor force participation and ln earnings functions for women from different geographical regions and different sectors of a developing country, with an extended definition of human capital within a double-selection framework.[2] Our data are from a country-wide stratified random sample of women age 15-45 (excluding nonworking students) which we collected in the Central American developing country of Nicaragua in 1977-1978.[3] We distinguish among three geographical regions by the degree of urbanization: the central metropolis with about half a million inhabitants (almost a quarter of the country's population), towns and cities with from 500 to 76,000 inhabitants, and rural areas. We also distinguish among three sectors: formal (with on going implicit or explicit wage contracts, usually defined work hours, often explicit fringe benefits such as social security, and often large-scale employers), informal (no contracts, no benefits like social security, small production units which often operate out of the home, on the streets, in open markets or in other transitory quarters with many family workers), and domestic (in which women work in others' households at domestic tasks, often receiving room and almost always board as part of their payment). We use an extended definition

of human capital that includes nutrition, health, and migratory status[4] in addition to the standard schooling and work experience variables. In our ln earnings estimates we control for the "report inclination" in addition to the more common labor force participation on "work inclination" in a double selectivity model.

Before we turn to our empirical estimates of labor force participation and ln earnings functions, we sketch out our model in Section 1. Then we turn to our overall estimates, those for geographical disaggregation, those for sectoral disaggregation, and those for both geographical and sectoral disaggregations. Finally we present our conclusions in Section 6.

1. Model for labor force participation and double selectivity model for ln earnings

We begin with a standard Mincerian model in which ln earnings depend on formal education and linear and quadratic terms in experience. As we note above, we extend the definition of human capital variables to include nutrition, health and migratory status. We also note that the employment conditions in urban areas in Latin America such as the one from which our sample is drawn apparently satisfy at least one of the assumptions of most models of labor force supply better than do the conditions in labor market in the United States: hours worked can be adjusted to equate the market wage and the shadow wage (e.g., Heckman, 20). Casual empiricism suggests that there is much more flexibility in hours of employment in the labor markets that we study than is the case for most samples used from the United States and other developed economies.

But we can estimate such a ln earnings function only for the women in our sample who report earnings. The subsample of such women is a non-random subsample of women who are selected by rules pertaining to (1) labor force participation or "work inclination" and (2) "report inclination." In

our overall sample of 3773 women, 1533 participated in the labor force and 1411 participate and report earnings. This possibly leads to a double selection framework. A number of studies consider the first selection rule. Generally, however, the possibility of selectivity in reporting earnings has not been considered. Instead those for whom earnings are not reported are assumed to be a random subsample. But our earlier work suggests that reporting data may or not may cause selectivity (7,13). Therefore we posit a double selectivity framework which we formalize as follows.

For the ith individual in our random sample, we have:

(1) $Y_{1i}^* = \underline{\beta}_1'\underline{X}_i + U_{1i}$ "work inclination"

(2) $Y_{2i}^* = \underline{\beta}_2'\underline{X}_i + U_{2i}$ "report inclination"

(3) $Y_{3i} = \underline{\beta}_3'\underline{X}_i + U_{3i}$ ln earnings function

where $\underline{X}_i$ is a K x 1 vector of regressors, $\underline{\beta}_j$ is a K x 1 vector of unknown parameters, and

(4) $E(U_{ji}) = 0 \qquad j = 1,2,3;$

(5) $$E(U_{ji}U_{j'i'}) = \begin{cases} \sigma_{jj'} & j,j' = 1,2,3; \quad i = i' \\ 0 & j,j' = 1,2,3; \quad i \neq i' \end{cases}$$

Our main objective is to estimate the parameters of equation (3), with the unobservable continuous random variables Y_{1i}^* and Y_{2i}^* determining the subsample (or selecting individuals) for which complete observations satisfying equation (3) are available. We introduce the dichotomous variables Y_1 and Y_2 to indicate the outcomes of the selection processes in equations (1) and (2):

$$(6)\quad Y_{1i} = \begin{cases} 1 \text{ if } Y_{1i}^* > 0, & \text{individual participates in labor force.} \\ 0 \text{ if } Y_{1i}^* \leq 0, & \text{individual does not participate in labor force.} \end{cases}$$

$$(7)\quad Y_{2i} = \begin{cases} 1 \text{ if } Y_{2i}^* > 0 \text{ and } Y_{1i} = 1, & \text{individual reports earnings (and participates in the labor force).} \\ 0 \text{ if } Y_{2i}^* \leq 0 \text{ and } Y_{1i} = 1, & \text{individual does not report earnings (even though participates in the labor force).} \\ \text{unobserved if } Y_{1i} = 0, & \text{individual does not participate in the labor force.} \end{cases}$$

We observe Y_{3i} if and only if $Y_{2i} = 1$, that is if and only if

$$(8)\quad Y_{1i}^* > 0 \text{ and } Y_{2i}^* > 0.$$

This sequential selection process partitions the original random sample into three muturally exclusive non-random subsamples, namely those with $Y_1 = 0$, those with $Y_2 = 0$, and those with $Y_2 = 1$. We denote the subsamples by S_1, S_2 and S_3 respectively. Since S_3 consists of individuals for whom Y_3 is observed, the ln earnings regression equation of primary interest may be written as:

$$(9)\quad E(Y_{3i}|Y_{2i} = 1) = \underline{\beta}_3'\underline{X}_i + E(U_{3i}|Y_{2i} = 1)$$

$$= \underline{\beta}'_3\underline{X}_i + E(U_{3i}|Y_{1i}^* > 0,\ Y_{2i}^* > 0).$$

Therefore, if $E(U_{3i}|Y_{3i}^* > 0,\ Y_{2i}^* > 0) \neq 0$, ordinary least squares result in inconsistent parameter estimates, or "selection bias." Consistent estimation of the parameters in equation (9) requires knowledge of the form of the conditional expectation $E(U_{3i}|Y_{1i}^* > 0,\ Y_{2i}^* > 0)$, hence the conditional distribution of the error term. This calls for imposing additional structure on the model.

In earlier papers with Tunali (13, 32) we have discussed the maximum likelihood formulation of this double-selectivity problem,

identification, estimation, and prediction, as well as the properties of a constrained model in which we assume that the two selection rules are independent. We demonstrate that this constrained version is an extension of Heckman's (21, 22) selectivity estimator with sequential (independent) selection rules. In this case we can use S_1 to estimate the probability of labor force participation, use S_2 to estimate the probability of reporting earnings conditional on labor force participation, and use the inverses of Mill's ratios from the two selection rules to control for selection in the estimation of the ln earnings function with subsample S_3:

$$(10)\quad Y_{3i} = \underline{\beta}'_3 \underline{X}_i + \gamma_1^* \hat{\lambda}_1 + \gamma_2^* \hat{\lambda}_2 + W_3$$

where $E(W_3 | Y_1^* > 0,\ Y_2^* > 0) = 0$

$\hat{\lambda}_1 = \dfrac{f_1}{1-F_1}$ as estimated from probit for work inclination from S_1.

$\hat{\lambda}_2 = \dfrac{f_2}{1-F_2}$ as estimated from probit for reporting inclination from S_2.

We adopt this procedure for the present study, and refer the interested reader to (13, 32) for further details.

In Table 1 we present our probit estimates for the work inclination for the overall S_1 sample and for various geographical and sectoral subsamples. In each case we follow the standard model by positing that the decision whether or not to participate in the labor force depends upon a comparison of market wages and shadow wages in home production. Therefore we include among the determinants the above-mentioned human capital variables, a set of variables related to child care (whether there are children under 5, whether home child care can be provided by other adults and children over 14), a set of variables related to marital status (single, previously cohabited) and other income sources (with an added term if the

other income is from own-farm activity since the opportunities for home production differ significantly if the household operates a farm), and a set of variables related to norms about females working, both intergenerational (mother or other female raiser was not a housewife) and intragenerational (population and proportion of the labor force that is female).

In Table 2 we present our probit estimates for reporting inclination S_2 subsamples for the whole country and for various geographical and sectoral subsamples. This reporting inclination depends upon whether or not a labor market participant has a job and, if she has a job, whether or not she reports her earnings in the interview.[5] We think that it is plausible that the woman's human capital stock affects the reporting inclination for both of these reasons. For example women with more human capital probably are more likely to have a job (conditional on labor force participation) and possibly are more likely to report earnings (conditional on having a job) -- although the opposite in the latter case is not completely implausible.[6] We also think that it is plausible that background variables such as are mentioned above and age, number of siblings, and whether the woman had two adult raisers (generally parents) may affect the reporting inclination.

In Table 3 we present our ln earnings regression estimates for our S_3 subsamples for the whole country and for various geographical and sectoral subsamples. These are estimates of equation (10) above, with the extended human capital variables in $\underline{X}_i$ and controls for selectivity due to work inclination and to reporting inclination.

In the next four sections we discuss in detail our labor force participation and ln earnings estimates in Tables 1 and 3. We discuss below much less the reporting inclination probits in Table 2 because they are of interest in this paper primarily to control for possible selectivity.

However the general question of selectivity in missing data is a possibly important one which usually is ignored. Therefore we now briefly summarize our results regarding the reporting inclination estimates before we turn to the estimates of primary interest for this study.

The probits in Table 2 are not very successful in capturing the reporting inclination. Chi squared tests indicate that the estimated association could have occurred by chance with probability as low as 10 percent only for the central metropolis and town and cities subsample on the regional level and for the central metropolis-domestic and towns and cities-domestic subsamples on the regional-sectoral level. Not surprisingly, there are not many individual coefficient estimates that are signficantly non zero at standard levels. Among the human capital variables, the estimates suggest that more schooling increases the probability of reporting earnings in towns and cities on the regional level, but reduces it in rural areas on the regional level, for the informal sector on the sectoral level, and for the rural informal sector on the geographical-sectoral level. These results suggest that the effect of schooling on reporting is nonlinear, with an increased reluctance to provide information that outweighs the higher probability of having a job at lower, but not higher schooling levels.

The only other human capital variable with significantly nonzero coefficients is the nutrition state with a positive impact for the central metropolis, particularly for the domestics in that region. Among the background variables the presence of children under five has a significantly positive effect on reporting earnings for the overall sample, the central metropolis, and the informal sector. The number of siblings has a significantly positive effect in towns and cities (particularly in the informal sector), but a negative one in the central metropolis (also

particularly in the formal sector). Given the marginal quality of the probits in Table 2, the payoff from attempting to understand the pattern of these estimates probably is not very high.

In the ln earnings regressions in Table 3 the coefficient estimates of the reporting inclination are significantly nonzero for the formal sector (in all regions combined and in the central metropolis and towns and cities separately) and in the domestic sector. Given the weakness in the underlying probits, even this frequency of significance for the reporting selectivity terms is surprisingly high. While it hardly confirms that reporting selectivity is a problem, it suggests that it possibly should be more widely explored rather than just ignored, as usually is the case.

2. Overall labor force participation and ln earnings estimates.

The first row in Table 1 gives a significant probit for the overall labor force participation of women. On this level of aggregation, more human capital in the form of schooling, work experience (increasingly so up to about 20 years), and nutrition state all significantly raise market wages relative to shadow wages and increase the probability of labor force participation. As is indicated in Table 4, on the average women currently in the labor force have 5.0 years of schooling versus 3.7 years for those who are not, 9.6 versus 4.2 years of experience, and 66 versus 60 percent of international caloric intake standards. They also tend to be ill more often (4.6 versus 4.0 days) and to migrate less (47 versus 45 percent have never migrated), but neither of these human capital variables has a significant impact on overall labor force participation.

The estimates for the other variables in the overall labor force participation probit generally have the a priori anticipated patterns. The presence of children under 5 years of age significantly reduces the probability of participation, unless this effect is offset by home child

care options due to older children or adults in an extended family. Women who have always been single or previously have cohabitated are less likely to receive income transfers and are significantly more likely to participate in the labor force. The significantly negative impact of other income is due to the same phenomenon (but there is no special effect of agricultural income). Finally the tastes for work conditioned by the woman's mother working has a significantly positive intergenerational impact on the probability of her working, even though the other variables pertaining to norms do not.

The first row in Table 3 gives the estimated overall ln earnings function with control for double selectivity. Under Mincerian assumptions, the estimated return to schooling is 12.0 percent per year, which makes investment in schooling for women reasonably attractive. We also report on two alternative specifications in regard to schooling which we explored.[7] First, often it is hypothesized that the quality of schooling differs between urban and rural areas. However if we include a dichotomous variable for urban-rural upbringing in addition to the linear schooling term, it does not have significant coefficient estimates at this or any other level of aggregation. Second, there may be increasing returns (over a range) to schooling. If a quadratic term in schooling is added, the linear coefficient estimate drops to .079 and the quadratic coefficient estimate is .0032, with both significantly nonzero. This might seem to indicate increasing returns to schooling over a broad range of grades (eg., 9.8 percent for 3 years of schooling, 11.7 percent for 6 years of schooling, 14.3 percent for 10 years of schooling). However this appears to be an artifact of aggregation. On the geographical and sectoral levels, there is no evidence of increasing returns to schooling. At these levels of aggregation, the quadratic schooling terms generally do

not have significant coefficient estimates.[8] Therefore we focus on the specification with only a linear schooling term in what follows.

Experience has a significant quadratic return, which reaches a maximum after 29 years.[9] In addition to the standard schooling and experience human capital variables, nutrition and health (the inverse of days ill) both have significantly positive effects on earnings, apparently by increasing productivities in a Leibensteinian (23) fashion.[10] Migratory status is the only one of our human capital variables that does not have a significantly nonzero coefficient estimate. Finally, work inclination is significant at the standard 5 percent level, but report inclination is significant only at the 10 percent level.

Thus, these overall results suggest that the returns in terms of productivities and earnings to human capital investments in women are significant, that a broader definition of human capital to include nutrition and health in addition to schooling and work experience may be important that these human capital variables work through the probability of labor force participation in addition to the level of earnings conditional on labor force participation, and that selectivity for labor force participation and perhaps for reporting earnings may be important.

Section 3. Geographical disaggregation by degree of urbanization.

The development literature is full of assertions about the importance of geographical segmentations of markets, particularly across varying degrees of urbanization. In this section we explore whether or not women's labor force participation, ln earnings functions, and therefore the impact of human capital vary significantly across three geographical areas defined by the degree of urbanization: the central metropolis, towns and cities, and rural areas.

As is indicated in Table 5, in our sample there are 1586 women in the central metropolis (722 of whom have participated and reported earnings), 1241 (509) in towns and cities, and 946 (180) in rural areas. Tables 4 and 6 give the mean values of our human capital values for the three regions. Schooling (5.2, 4.9, 1.6 years) and work experience (6.5, 6.6, 5.3 years) tend to be higher in the central metropolis and towns and cities than in rural areas. Caloric intake is highest in towns and cities, next in the central metropolis, and lowest in the rural areas (60, 74, 51 percent of international standards). Days ill are higher in the central metropolis than in the other two areas (5.4, 3.3, 3.3). Migrants are most common in the rural areas and least common in the towns (45, 53, 38).[11,12]

Table 6 gives the mean earnings in cordobas per half month (at the time of the survey 7 cordobas equaled one U.S. dollar): 275 for the central metropolis, 226 for towns and cities, and 145 for rural areas. These certainly differ across regions, with much lower levels in the rural sectors than elsewhere. But whether these differences are due to the above mentioned differences in the distributions of the human capital variables or to differences in the returns to human capital variables is not immediately obvious. Therefore we turn to estimates of labor force participation and ln earnings estimates on the regional level.

Rows 2, 3, and 4 of Table 1 give regional labor force participation probits that differ significantly from the overall estimates in row 1. We consider first the human capital variables. In each of the regions the same three human capital variables significantly increase women's labor force participation: schooling, work experience, and nutrition. But ceteris paribus the impact of schooling and work experience is greater in towns and cities than in the central metropolis and rural areas, and the impact of experience is greater in the central metropolis than in rural areas.[13] In contrast, the effect of nutrition is greater in the central

metropolis than elsewhere, although this may reflect a simultaniety problem between nutrition and domestic sector participation to which we return below.

The impact of the other variables varies more substantially across the regions. The coefficient estimates for having children under five and for the availability of home child care are significantly nonzero only for the central metropolis. Apparently in other areas extended families are so common and neighborhood environments are perceived generally to be sufficiently adequate, that differences in numbers of small children and in home child care do not significantly alter labor force participation. The coefficient estimate for having previously cohabited is much larger for the rural area than for the more urban areas, apparently because options for finding new male companions are much less. On the other hand the coefficient estimates for being single are largest for the central metropolis, about half as large for towns and cities, and insignificant for rural areas. This pattern apparently reflects the stronger tendency for single women to be on their own in more urban areas, and thus to be participants in the paid labor force instead of receiving transfers from their families or participating in household (or farm) production. For a similar reason, other income has significantly negative effects on labor force participation in towns and cities and the central metropolis, but not in rural areas.

Finally, the impact of the variables to represent norms also differs across regions. The intergenerational role model of the mother's (or other female raiser) participating in the labor force has a significantly positive effect only in the central metropolis. The influence of intragenerational norms which differ across city sizes has a significantly positive effect for the towns and cities, but not for the other areas.[14]

Rows 2, 3, and 4 of Table 3 give regression estimates of the <u>ln earnings functions</u> with control for double selectivity for the three regions. An F

test indicates that these three differ significantly from the overall relation in row 1.[15] The formulation is much more consistent with variations in ln earnings for the central metropolis and towns and cities than for rural areas. Comparison of the point estimates across these three relations points out some important details of these differences and some similarities. First of all, the returns to the standard schooling and work experience human capital variables are significantly positive and not statistically different between the central metropolis and the towns and cities, but are not significantly nonzero for rural areas. For schooling this may reflect a nonlinear or a threshold effect, but as we note above, quadratic schooling terms do not have significant coefficient estimates. We expect that the return to schooling simply is not very great for women in rural areas. The real return may be in migrating to other labor markets, a possibility that we are exploring in another study (9), or in farming one's own farm. But if the latter is the case, it would seem that there would be a negative effect of schooling on labor force participation, not the positive one that we have found.[16]

Second, the returns to nutrition in the form of caloric intake are significantly positive in all three regions, but do not differ significantly among the regions. The returns to health (the inverse of days ill) also do not vary among regions, but are not significantly nonzero at the regional level of aggregation.

Third, we interpret the "never migrated" variable to relate to three phenomena: (1) the extent to which one is plugged into the local labor market and can gain rents from one's personal contacts, (2) the existence of limited motivation and/or ability to exploit better opportunities elsewhere, if they exist[17] and (3) the environment in which one's work habits and attitudes have been formed.[18] In our overall relation we find no significant

effect of this variable. But with regional disaggregation we find a significantly positive one for the central metropolis and a significantly negative one for the rural areas. This could reflect a combination of the dominance of the first and third phenomena for the central metropolis (the second one may not be relevant in this case since there may not be dominant alternatives elsewhere) and of the second and third for the rural market (the first may not be very important because of the limited rural labor market). Such a pattern is lost in the overall aggregation, or in the towns and cities in which the opposing effects cancel each other out.

Fourth, the work inclination selectivity term has significantly non-zero coefficient estimates for the central metropolis and the towns and cities, but not for rural areas. Such a result is consistent with the suggestion above that there may not be much return to many kinds of ability, whether observed or not, in the rural labor market. Therefore there is not correlation between the disturbance term in the first selection rule of equation (1) and that in the ln earnings function of equation (3) which originate in unobserved abilities in both.

Section 4. Sectoral disaggregation

Another form of labor market segmentation which is widely emphasized is among the formal, informal, and domestic sectors. In our sample we have 569 women in the formal sector, 679 in the informal sector, and 163 in the domestic sector (Table 5).[19] Mean fortnightly earnings in cordobas vary significantly among these three sectors: 358, 192, and 128 (Table 6). However the means in Table 4 suggest that the distributions of human capital also vary significantly across this disaggregation. The formal sector averages much more schooling (7.3 versus 3.3 and 3.5 years), somewhat better caloric intake (68 versus 64 and 66 percent of international standards), less days ill than at least the informal sector (3.8, 5.5,4.0), many more

women who never have migrated than has the domestic sector (53, 50, 17 percent), and is second to the informal sector in regard to average years of work experience (8.8, 10.8, and 7.5 years). Therefore we again need to estimate labor participation and ln earnings relations to tell if the returns to various types of human capital vary across this disaggregation or if only the distributions vary.

Rows 5, 6, and 7 of Table 1 give sectoral labor force participation probits that differ significantly from the overall probit of row 1. A number of the differences are quite striking.

Consider first the human capital variables. The pattern of the coefficient estimates for schooling suggest that the least educated women select into the domestic sector, the next least into the informal sector, the somewhat more educated into no labor force participation (the excluded category), and the most educated into the formal sector. A very important return to schooling in developing countries which is not often emphasized is earnings studies, therefore, may be in regard to selection among sectors.

The estimated coefficients of work experience are basically the same for the participation in the formal and informal sectors, with a peak after about 20 years in both cases. For the domestic sector the effect is much smaller (with the linear term not significant) and the peak is after only 10 years. There seems to be much more serial correlation in labor force experience for the formal and informal sectors, therefore, than for the domestic sector. The domestic sector apparently often is an entry point for inexperienced women.

The caloric intake variable has a large significant positive coefficient estimate for the domestic sector, a smaller one for the informal sector, and an insignificant positive coefficient estimate for the formal sector. The first of these probably reflects simultaniety. Domestics usually receive a substantial portion of their salary in the form of board,

which often includes a more nutritious diet than they could buy on their own because of the food purchasing patterns of their relatively high income employers. Simultaniety is possibly a problem for the informal sector as well, although we feel much more comfortable in this case with the interpretation that more nutritious women are morely likely to participate in this sector of the labor force as opposed to not participating.[20] The nutrition state for women who are likely candidates for the formal sector may be enough better (and above some threshold) that it does not enter into the selection process in this case.

Days ill has a significantly negative coefficient estimate for the formal sector, but no significantly nonzero impact on selection into the other two sectors. This may reflect that bad health is much more of a deterent for working regular hours with limited rest breaks in the formal sector than in the much more flexible informal and domestic sectors.

Never migrated has a significantly positive effect on selection into the informal sector and a negative one for selection into the domestic sector. The former probably reflects that informal sector options are greater for women who are not migrants because such options often involve family enterprises that are more likely to be available if one has not moved away from one's family. The latter is due to the dominance of domestic work as an entry point for female immigrants into towns and cities and the central metropolis.

Rows 5, 6, and 7 of Table 3 present regression estimates of the <u>ln earnings functions</u> with control for double selectivity for the three sectors. An F test once again indicates that these three differ significantly from the overall relation in row 1 of the same table. The overall formulation is much more consistent with ln earnings variations in the formal than in the other two sectors.

The returns to the standard human capital variables in terms of earnings are much higher in the formal sector than in the other two sectors. Under Mincerian assumptions, the returns in the form of earnings to schooling are 15.2 percent per year in the formal sector, 8.4 percent in the informal sector, and not significantly different from zero in the domestic sector. The returns to work experience are almost twice as high in the formal as in the domestic sector (with a peak after 17 years in the formal and after 15 years in the domestic), but insignificantly nonzero in the informal sector.

Among the extended set of human capital variables, only the returns to nutritional status in the informal sector is significantly nonzero at the 5 percent level. For participants in this sector their nutritional state is low enough that there are Liebensteinian(23) increases in productivity and ln earnings that are associated with better nutrition. For the other two sectors, the nutritional states tend to be enough higher that there is not a significantly positive return. For the domestic sector, in fact, the coefficient estimate is significantly negative at the 10 percent level, probably due to our undervaluation of food received in kind as part of the earnings in this sector. The only other coefficient estimate that is significantly nonzero at the 10 percent level in this group is the negative one for days ill in the informal sector. Although a poor health state does not significantly deter one from participating in this sector, there is some suggestion that it reduces earnings more in the informal sector in which earnings are more closely tied to effort than in the other two sectors.

The coefficient estimates of the report inclination are significantly nonzero (but of opposite sign) for the formal and domestic sector. For the work inclination, only the one for the domestic sector is significantly nonzero. At least one form of double selectivity may be important, therefore, in two of the three sectors.

5. Geographical and sectoral disaggregation

The patterns of estimates which we have discussed in the previous two sections suggest that both geographical and sectoral segmentation of labor markets may be important. We now consider segmentation by both factors at once into eight subsamples.[21] Table 5 gives the resulting sample sizes for the ln earnings estimates, which range from 45 for domestics in cities and towns to 322 for the formal sector in the central metropolis. Table 6 gives the mean half-monthly earnings in cordobas, which range from 103 to 405 between the same two sectors. Table 4 indicates the means for the distributions of our human capital variables: mean years of schooling range from 1.4 for the rural informal sector to 7.9 for the town and cities formal sector; mean work experience ranges from 6.7 years for town and cities domestics to 11.7 for town and cities informal sector; mean caloric intakes range from 53 percent of international standards for rural informal workers to 79 percent for towns and cities formal and domestic workers; mean days ill range from 1.9 for towns and cities domestics to 7.1 for central metropolitan informal workers; the mean percentage which has never migrated ranges from 16 for central metropolitan domestics to 63 for town and cities formal workers. Thus the earnings outcomes and the distributions of human capital vary substantially across the eight regional and sectoral subsamples.

The last eight rows in Table 1 give the estimated probits for labor force participation in these eight subsamples. These differ significantly from the overall probit and from the regional and sectoral aggregates.

We follow the pattern of the previous two sections by discussing first

the human capital variables and then turning to the others. The sectoral disaggregation within regions leads to a different understanding of the role of schooling than do the overall and regional aggregates in rows 1-4 with their positive estimates for the coefficient of schooling. In the central metropolis and towns and cities, schooling selects among the sectors in much the same way as at the sectoral level of aggregation in rows 4-6: as schooling increases from very low levels, the probability shifts from being in the domestic to being in the informal to being a nonparticipant to being in the formal sector. In the rural areas more schooling selects into the formal sector as opposed to the informal sector or nonparticipation.

Work experience has a significant quadratic impact on participation in all of the subsamples except for town and cities domestics. The magnitudes of this impact are larger for town and cities formal and informal sectors (particularly the latter) and for the same sectors in the central metropolitan and rural areas, and are smallest among the significant cases for central metropolitan domestics. Within the central metropolitan area, the peak impact of experience occurs with more years as one moves from the domestic to the informal to the formal sector, but the same pattern does not prevail elsewhere. All in all serial correlation in labor force experience appears to be strong generally for the nondomestic sectors, particularly in the towns and cities.

Caloric intake has a significant association at the 5 percent level with labor force participation only in the domestic sectors, a result which is quite obscured at the overall or regional level of aggregation in rows 1-4. This association, once again, probably reflects reverse casuality. At the 10 percent level of significance, there also is a suggestion of a positive impact on participation in the other sectors in the central metropolis and in the informal sector in rural areas, but not in the higher mean

caloric intake towns and cities. Once again this pattern may be due to a threshold effect of nutrition on participation.

The regional-sectoral estimates for days ill and never migrated also reflect the sectoral aggregation of rows 5-7 much more directly than the regional aggregation of rows 2-4. The only significantly zero coefficient estimates for days ill even at the 10 percent level is the one for towns and cities formal sector participation, which apparently underlies the significant negative effect of this variable on overall formal sector participation in row 5. For reasons that we discuss in the previous section, never migrated has significantly positive effects on participation in the informal sectors in towns and cities and the central metropolis (but not in rural areas) and strong negative effects on participation in the domestic sector.

We turn now to the variables related to home child care and other sources of family income. The presence of small children lessens labor force participation unless offset by home child care only in the central metropolitan formal and domestic sectors (and, at the 10 percent level of significance, in the town and cities domestic sector). There is no effect on participation in the central metropolitan informal sector because of the possibility of on-the-job child care in this case. The more aggregate estimates in rows 1-7 tend to obscure this disaggregate pattern.

The quantity of other income generally has a negative impact on participation (once the added term with the agricultural dummy is incorporated for the rural sector), but one that is significantly nonzero only for the central metropolitan formal and domestic participation and for the towns and cities informal and domestic participation. This effect is significantly reinforced by the absence of a companion except in the informal sector in the central metropolis and in towns and cities.

For the variables pertaining to norms the more aggregate relations again may obscure the underlying patterns. Underlying the significance of the female raiser's labor force participation in the overall estimates of row 1 and in the central metropolitan estimate of row 2, and in the informal estimates of row 6, for example, is a significant coefficient estimate only for participation in the informal sector in the central metropolis and in towns and cities. This is a less strong intergenerational norm effect than the more aggregate estimates suggest. Likewise population has no significant effect on participation at this level of aggregation, despite some suggestions of significance at more aggregate levels.

The last eight rows in Table 3 give estimates of the ln earnings functions with control for double selectivity for the eight regional-sectoral subsamples. F tests indicate that these differ significantly from the more aggregate overall, regional, and sectoral estimates in rows 1-7 of the same table. They are most consistent with variations in ln earnings for formal sectors in the central metropolis and cities and towns and least consistent (and in fact not significantly so) for domestics in towns and cities.

The estimated returns to schooling in terms of earnings are significantly nonzero only for half of these eight subsamples: quite high levels of 19.9 percent per year for the formal sector in the central metropolis and of 12.9 percent for the formal sector in towns and cities and more moderate rates of 7.8 and 6.6 percent for the informal sector in these two areas. The returns to work experience in terms of earnings have significant effects only for the central metropolitan formal and domestic sector (and much larger for the former than for the latter), although the estimates for the formal sector in towns and cities are significantly nonzero at the 10 percent level. In regard to returns to the traditional human capital variables, therefore, the labor markets appear to be quite

different across both regions and sectors.

The estimated returns in terms of earnings to our extended set of human capital variables also reflects considerable differences across labor markets. They are significant for nutritional status for the informal sectors in each region, which sector averages the lowest caloric intakes among labor force participants in each region. This pattern may reflect a threshold effect, although the significance in additional of nutrition for the metropolitan formal sector is not easily to interpret in such a manner. There are no significant estimates of health effects, despite the significant coefficient estimates of days ill in the overall relation in row 1. Never migrated has a significantly positive coefficient estimate for the central metropolitan formal sector and negative ones for the formal sector in towns and cities and for the informal sector in rural areas. In the central metropolitan formal sector there apparently are rents to long-established contacts and modern work attitudes and habits, as well as no general incentives to migrate elsewhere in the country. In the other two cases, in contrast, selectivity in regard to migration probably has left the less talented behind.

The work inclination has significantly nonzero coefficient estimates only for the formal and domestic sectors in the central metropolis. The report inclination has significantly nonzero coefficient estimates only for the formal sectors in the central metropolis and in towns and cities. Possible selection biases thus appear to be more limited than the more aggregate estimates might suggest.

6. Conclusions

We have explored the existence of differential returns to human capital across geographical and sectoral labor markets among women in a developing economy with a more satisfactory data set and model of labor force

participation and earnings determination under double selectivity than here-to-fore has been undertaken. We do not repeat here the details of our empirical results, but summarize them briefly with seven major conclusions.

(1) Selectivity terms tend to be significant for more organized sectors in the more urban areas. In addition to selectivity due to labor force participation, selectivity in reporting earnings also may be a relevant factor. However, selectivity is not a major problem in that the substantive interpretations of the point estimates of interest do not change if the selectivity controls are not included.

(2) Disaggregation into regions and sectors is important for our sample. Labor force participation and ln earnings relations differ significantly among regions and among sectors. Therefore, labor market integration may increase overall income (although we have no estimate of the cost of such integration), but see point 7 below.

(3) The returns to human capital investments with the present labor market segmentation include not only higher marginal productivities and earnings in certain regions and sectors, but higher probabilities of being in sectors (and possibly regions, although we do not explore migration determinants in this paper) with higher marginal returns to such investments. Schooling, for example, has a strong impact on the selection into the formal sector as well as a high marginal return in that sector.

(4) Overall estimates or even regional and sectoral estimates may be misleading in regard to the impact of human capital investments. Overall estimates for example, suggest that the marginal returns to schooling are quadratic in the ln earnings function, a pattern which is not supported in the disaggregate estimates. Regional estimates, for another example, miss

the highly differential impact across sectors on participation and on ln earnings of schooling, experience, nutrition status, and migratory status. Disaggregation to the regional-sectoral level is preferable, but aggregation across regions probably is somewhat less misleading than is aggregation across sectors.

(5) The marginal returns to the standard human capital variables of schooling and work experience are particularly large in the formal sectors of the central metropolis and, to a lesser extent, of towns and cities. Marginal returns to schooling are significant, but smaller, in the informal sectors in these regions and marginal returns to experience are significant, but smaller, in the central metropolitan domestic sector. For other region-sector combinations, the marginal returns are insignificant.

(6) The marginal returns to our extended set of human capital variables also are significant for some particular regional-sectoral combinations. For example the marginal returns to nutrition in terms of earnings appears to have a threshold effect, with relatively high returns for the relatively malnourished informal sector participants.[22] Also there may be a significant effect of migratory status in certain sector-region combinations. On the other hand we find evidence of a significant health impact on earnings only in our overall estimates, and not for the more disaggregated ones.[23] Nevertheless our results suggest that a broader definition of human capital beyond the standard schooling and work experience variables may be important in analyses and in efficient policy design at least for poorer target groups.

(7) However there are important differences between marginal and average returns.[24] Despite the generally higher marginal returns to the standard human capital varibles in the more "modern" regions and sectors

(i.e., more urban, more formal), because of the pattern of constants the average earnings are not necessarily higher in the more modern sectors. For example, the estimates in rows 2-4 in Table 3 imply that at the point of overall sample means estimated earnings in the rural area are higher than in other towns and cities, although both are lower than are those for the central metropolis. Similarly, the estimates in rows 5-7 imply at the point of overall sample means, estimated earnings are highest in the informal sector and second in the formal sector. Therefore only for those with relatively high stocks of these human capital variables do the more modern sectors tend to be preferable. And even in such cases there may be relatively high non-pecuniary returns elsewhere, such as the possibility of on-the-job child-care in the informal sector. Thus it would be incorrect to conclude that most women would be better off in the more modern regions and sectors, even though those with high schooling and experience are more likely to be.[25]

Table 1. Probit estimates for labor force participation or work inclination[a]

Sample	Constant	Schooling	Experience	Experience^2	Calories	Days Ill	Never Migrated[b]	Children under 5	Home Child Care[b]	Single[b]	Previously Cohabited[b]	Other Income	Agricultural Dummy * Other Income	Female Raiser Not Housewife[b]	Population	Proportion of Labor Force Female	-2.0 Log Likelihood Ratio	Participants S_2 / S_1
Overall (1)	-2.21	.067	.195	-.0049	.958	-.0015	.031	-.126	.137	1.78	.285	-.211	.042	.111	.0040	.247	1440	153 / 377
	(15.2)	(8.2)	(21.0)	(13.1)	(6.6)	(0.8)	(0.6)	(2.1)	(2.2)	(11.2)	(5.5)	(5.2)	(0.5)	(2.3)	(1.8)	(0.5)		
Regions																		
Central Metropolis (2)	-1.82	.054	.196	-.0048	1.05	-.0015	.010	-.337	.335	2.01	.221	-.220		.095			628	770 / 1586
	(9.4)	(4.4)	(13.2)	(7.7)	(4.0)	(0.8)	(0.1)	(3.2)	(3.4)	(8.3)	(2.8)	(4.2)		(12.9)				
Towns and Cities (3)	-2.12	.074	.238	-.0060	.546	-.0053	.082	-.032	.012	1.29	.230	-.304		.117	.035	.210	531	565 / 1241
	(7.7)	(5.3)	(14.8)	(9.8)	(2.0)	(1.2)	(1.0)	(0.3)	(0.1)	(5.5)	(2.4)	(4.1)		(1.3)	(2.4)	(0.3)		
Rural (4)	-2.06	.052	.131	-.0034	.624	-.0031	-.079	.054	.106	5.17	.407	-.543	-.046	.087	.0002	.346	145	198 / 946
	(8.3)	(2.0)	(6.6)	(4.2)	(2.0)	(0.6)	(0.8)	(0.4)	(0.8)	(0.5)	(3.9)	(0.3)	(0.2)	(0.8)	(0.0)	(0.5)		
Sectors																		
Formal (5)	-2.88	.171	.134	-.0038	.235	-.0050	.055	-.118	.092	.691	.296	-.089	-.011	-.042	.0003	.603	832	568 / 3773
	(14.6)	(17.9)	(11.5)	(7.9)	(1.3)	(2.1)	(0.9)	(1.5)	(1.2)	(5.8)	(4.5)	(2.1)	(0.1)	(0.7)	(0.1)	(0.9)		
Informal (6)	-1.98	-.046	.135	-.0032	.645	.0024	.192	.070	.018	-.093	.038	-.103	-.103	.192	.0005	-.113	539	767 / 3773
	(12.7)	(5.3)	(14.2)	(8.6)	(4.3)	(1.4)	(3.8)	(10.7)	(0.3)	(0.7)	(0.7)	(2.2)	(0.9)	(3.8)	(0.2)	(0.2)		
Domestic (7)	-2.90	-.098	.031	-.0015	1.88	-.0017	-.749	-.852	.671	1.16	.365	-1.22	.934	-.012	.0119	1.61	534	179 / 3773
	(8.8)	(5.6)	(1.6)	(2.0)	(6.3)	(0.5)	(6.9)	(5.5)	(4.1)	(7.0)	(3.3)	(6.9)	(3.2)	(0.1)	(2.5)	(1.4)		
Regions & Sectors																		
Central Metropolis																		
Formal (8)	-2.86	.191	.137	-.0036	.483	-.0035	.089	-.303	.226	.710	.237	-.116		-.076			422	333 / 1586
	(12.6)	(13.5)	(7.9)	(4.9)	(1.7)	(1.3)	(1.1)	(2.3)	(1.8)	(4.5)	(2.5)	(2.1)		(0.9)				
Informal (9)	-1.56	-.079	.112	-.0024	.436	.0008	.242	.113	-.010	-.327	-.028	-.075		.254			228	311 / 1586
	(7.6)	(5.9)	(7.3)	(3.9)	(1.6)	(0.4)	(3.0)	(1.0)	(0.1)	(1.7)	(0.3)	(1.1)		(3.2)				
Domestic (10)	-.853	-.111	.059	-.0029	.844	.0001	-.727	-1.23	1.07	.902	.160	-1.27		-.092			294	126 / 1586
	(2.7)	(5.3)	(2.4)	(2.7)	(2.0)	(0.0)	(5.4)	(4.5)	(3.9)	(4.3)	(1.2)	(5.9)		(0.8)				
Towns & Cities																		
Formal (11)	-3.22	.173	.145	-.0043	.360	-.0102	.131	-.051	.012	.572	.325	-.125		-.098	.012	1.06	263	203 / 1241
	(9.0)	(10.9)	(7.5)	(5.7)	(1.1)	(1.8)	(1.3)	(0.4)	(0.1)	(2.8)	(2.8)	(1.6)		(1.0)	(0.7)	(1.2)		
Informal (12)	-1.45	-.045	.182	-.0045	.002	.0054	1.85	.127	-.056	-.227	-.124	-.208		.210	.023	-.535	288	310 / 1241
	(5.2)	(3.1)	(11.3)	(7.5)	(0.0)	(1.2)	(2.1)	(1.2)	(0.5)	(1.1)	(1.3)	(2.5)		(2.4)	(1.5)	(0.7)		
Domestic (13)	-3.11	-.107	-.022	.0005	2.48	-.023	-.964	-.430	.014	.157	.822	-1.80		.050	.026	1.37	102	52 / 1241
	(4.8)	(3.1)	(0.6)	(0.4)	(4.1)	(1.5)	(4.6)	(1.8)	(0.0)	(4.5)	(3.0)	(4.2)		(0.3)	(0.8)	(0.9)		
Rural																		
Formal (14)	-2.64	.107	.115	-.0033	.268	-.004	-.200	-.028	.168	.757	.221	.448		.127	.011	-.235	53	52 / 946
	(7.1)	(3.1)	(3.8)	(2.6)	(0.6)	(0.5)	(1.2)	(0.1)	(0.9)	(1.4)	(2.1)	(1.8)		(0.8)	(0.6)	(0.2)		
Informal (15)	-2.04	-.003	.102	-.0026	.618	.0048	.004	.062	.066	.186	.320	-.271		.048	-.002	.503	87	146 / 946
	(7.9)	(0.1)	(4.9)	(3.1)	(1.9)	(0.9)	(0.0)	(0.5)	(0.5)	(3.6)	(2.9)	(1.4)		(0.4)	(0.2)	(0.7)		

Notes to Table 1

[a]Underneath the point estimates in parentheses are the aboslute values of the ratios of the maximum likelihood point estimates to the asymptotic standard errors. Chi squared tests indicate that all the relations are significantly nonzero at the 0.5 percent level. S_1 is the sample size. S_2 is the number of labor force participants.

[b]Dummy variables.

Table 2. Probit estimates for report inclination[a]

	Constant	Schooling	Experience	Experience^2	Calories	Days Ill	Children under 5[b]	Home Child care[b]	Single[b]	Previously Cohabited[b]	Other Income	Agricultural Dummy & Other Income	Population[b]	Proportion of Labor Force Female	Age	Number of Siblings	Both Raisers Present in Childhood[b]	-2.0 Log Likelihood Ratio[c]	Reporters S_2 / S_3
Overall (1)	.914	.021	.020	-.0007	.499	.0060	.403	-.205	.064	.097	.046	-.037	.0044	-.165	.0065	.002	.044	22.2	1411
	(2.1)	(1.3)	(1.0)	(1.0)	(1.6)	(1.1)	(2.7)	(1.3)	(0.3)	(0.8)	(0.5)	(0.2)	(0.8)	(0.1)	(0.8)	(0.1)	(0.4)	25	1533
Regions																			
Central Metropolis (2)	.917	.008	.049	-.0016	1.25	.0077	.651	-.464	.096	.048	.118				-.0137	-.0602	.159	21.8	725
	(1.6)	(0.4)	(1.5)	(1.5)	(2.3)	(1.0)	(2.0)	(1.4)	(0.3)	(0.3)	(0.9)				(1.0)	(2.5)	(1.0)	10	770
Towns & Cities (3)	.505	.091	.024	-.0007	.077	.012	.354	.010	.021	.035	-.110		-.0079	-.513	-.0011	.088	-.299	25.5	522
	(0.7)	(3.1)	(0.7)	(0.6)	(0.1)	(1.0)	(1.7)	(0.0)	(0.1)	(1.5)	(0.7)		(0.3)	(0.3)	(0.1)	(2.7)	(1.6)	5	565
Rural (4)	2.43	-.174	-.018	.0004	1.05	-.012	-.270	-.209	3.33	-.474	.811	-.565	-.0007	.508	-.026	.0195	-.543	16.1	185
	(2.0)	(2.3)	(0.2)	(0.1)	(0.9)	(0.9)	(0.7)	(0.5)	(0.1)	(1.3)	(0.9)	(0.6)	(0.0)	(0.2)	(1.0)	(0.3)	(1.4)	50	198
Sectors																			
Formal (5)	2.36	.040	.003	-.0006	.946	.0020	.588	-.343	.567	.132	-.108	.504	.0021	-.149	-.0323	.0098	-.470	19.4	572
	(1.9)	(1.0)	(0.1)	(0.3)	(1.3)	(0.1)	(1.3)	(0.7)	(1.3)	(0.4)	(0.9)	(0.1)	(0.1)	(0.0)	(0.0)	(0.2)	(1.6)	25	588
Informal (6)	.969	-.058	.045	-.0015	.550	.0065	.431	-.203	.014	.062	.217	-.239	.0046	-.568	-.0091	-.0031	.052	20.4	697
	(1.8)	(2.2)	(1.8)	(1.7)	(1.3)	(1.1)	(2.4)	(1.1)	(0.0)	(0.4)	(1.4)	(0.7)	(0.7)	(0.4)	(0.8)	(0.0)	(0.4)	25	767
Domestic (7)	-.514	.075	-.158	.0077	.965	.0536	-.113	.216	.462	.222	-.499		.0149	.623	.0188	-.0125	.263	14.3	163
	(0.3)	(1.1)	(1.6)	(1.5)	(0.9)	(1.1)	(0.2)	(0.3)	(0.8)	(0.5)	(0.7)		(0.8)	(0.1)	(0.6)	(0.3)	(0.8)	50	178
Regions & Sectors																			
Central Metrop.																			
Formal (8)	3.22	.033	.018	-.0006	.671	-.0054	2.74	-2.44	-.952	.328	.049				-.061	-.0378	.0149	15.2	323
	(2.3)	(0.6)	(0.2)	(0.2)	(0.7)	(0.3)	(0.2)	(0.1)	(1.6)	(0.7)	(0.3)				(1.7)	(0.7)	(0.0)	50	333
Informal (9)	.584	-.061	.059	-.0021	1.11	.0096	.704	-.521	.006	-.120	.215				.0053	-.0789	.109	17.5	284
	(0.7)	(1.5)	(1.4)	(1.5)	(1.4)	(0.9)	(1.8)	(1.4)	(0.0)	(0.5)	(1.0)				(0.3)	(2.2)	(0.4)	25	311
Domestic (10)	-3.12	.029	-.008	.0034	6.45	.1269	2.70	-2.43	2.07	.383	1.25				.0150	-.143	.812	19.8	118
	(1.6)	(0.3)	(0.1)	(0.5)	(2.8)	(1.2)	(0.1)	(0.1)	(1.9)	(0.6)	(1.1)				(0.0)	(1.9)	(1.6)	10	126
Towns & Cities																			
Formal (11)	5.44	.210	-.066	.0003	1.33	.0491	.417	-.633	2.42	.150	-.589		-.124	-2.67	-.0037	.181	-4.55	18.9	198
	(0.1)	(1.8)	(0.4)	(0.1)	(0.7)	(0.7)	(0.5)	(0.7)	(0.0)	(0.2)	(1.7)		(1.2)	(0.4)	(0.0)	(1.2)	(1.2)	25	203
Informal (12)	.444	.006	.070	-.0018	.257	.0128	.480	.125	.084	.431	.205		.031	.945	-.011	.089	-.078	21.3	279
	(0.4)	(0.1)	(1.8)	(1.5)	(0.4)	(1.0)	(1.8)	(0.4)	(0.2)	(1.8)	(0.8)		(0.9)	(0.4)	(0.6)	(2.2)	(0.3)	25	310
Domestic (13)	2.88	-2.18	-11.2	.352	15.6	1.26	-13.1	19.9	-23.3	-32.7	31.9		5.51	-2.49	2.10	2.77	-23.9	41.1	45
	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)		(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	0.5	52
Rural																			
Formal (14)	-4.28	.392	.147	-.0169	10.1	-.200	4.91	1.64	1.18	-2.53	5.72	-.804	.461	2.89	.182	-.129	-4.56	9.9	51
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	90	52
Informal (15)	3.36	-.286	-.0371	.0012	1.25	-.0133	-.147	-.103	3.46	-.531	.365	-.225	-.015	1.91	.049	.023	-.561	16.8	134
	(2.4)	(2.7)	(0.4)	(0.3)	(0.9)	(0.9)	(0.3)	(0.2)	(0.2)	(1.2)	(0.4)	(0.2)	(0.4)	(0.6)	(1.6)	(0.4)	(1.3)	50	146

Notes to Table 2

[a]Underneath the point estimates in parentheses are the absolute values of the ratios of the maximum likelihood point estimates to the asymptotic standard errors. S_2 is the sample size (i.e., the number of labor force participants). S_3 is the number with reported earnings.

[b]Dummy variables.

[c]Beneath - 2 log likelihood ratio is the significance level of the overall relation according to a Chi squared test.

Table 3. Regression estimates for ln earnings functions with extended human capital variables under double selectivity[a]

Sample	Constant	Schooling	Experience	Experience^2	Calories	Days Ill	Never Migrated[b]	Work Inclination[c]	Report Inclination[c]	$\bar{R}^2$ / SE	RSS / S_3
Overall (1)	4.23	.120	.053	-.00090	.386	-.0037	.028	.189	-.940	.29	844
	(21.6)	(17.6)	(4.7)	(2.3)	(3.0)	(2.3)	(0.7)	(2.8)	(1.8)	.776	1411
Regions											
Central Metropolis (2)	3.57	.121	.088	-.0020	.904	-.0027	.212	.276	.369	.32	378
	(13.5)	(4.9)	(5.7)	(3.7)	(4.2)	(1.5)	(3.8)	(3.1)	(0.7)	.729	722
Towns and Cities (3)	3.41	.134	.077	-.0017	.722	-.0051	-.014	.338	.358	.31	302
	(11.3)	(12.0)	(3.7)	(2.6)	(3.2)	(1.4)	(0.2)	(2.4)	(0.8)	.778	509
Rural (4)	4.29	.053	.001	.001	.888	-.0083	-.300	.124	.327	.07	116
	(9.2)	(1.7)	(0.0)	(0.5)	(2.1)	(1.2)	(2.3)	(0.6)	(0.5)	.824	180
Sectors											
Formal (5)	3.87	.152	.080	-.0024	.216	-.0011	-.042	.203	2.39	.41	225
	(11.1)	(9.5)	(5.0)	(4.3)	(1.4)	(0.4)	(0.8)	(1.6)	(4.7)	.633	569
Informal (6)	4.69	.084	-.007	.0007	.939	-.0046	-.031	-.140	-.875	.12	511
	(6.2)	(4.3)	(0.2)	(0.7)	(3.7)	(1.9)	(0.3)	(0.4)	(1.5)	.873	679
Domestic (7)	4.90	-.013	.048	-.0016	-.455	-.0006	-.142	.153	-1.03	.11	28.0
	(23.3)	(0.8)	(2.8)	(2.3)	(1.8)	(0.2)	(1.3)	(2.1)	(2.6)	.426	163
Regions and Sectors											
Central Metropolis											
Formal (8)	2.46	.199	.123	-.0034	.642	-.0033	.181	.739	2.06	.35	116
	(5.0)	(8.7)	(5.8)	(4.4)	(3.0)	(1.2)	(2.6)	(4.3)	(3.8)	.610	322
Informal (9)	3.98	.078	.044	-.0010	1.60	-.0027	.176	-.170	.089	.15	195
	(4.8)	(2.3)	(1.0)	(0.8)	(3.9)	(1.0)	(1.3)	(0.4)	(0.1)	.845	282
Domestic (10)	4.50	-.004	.036	-.00087	-.061	.0003	-.228	.225	-.454	.13	17.7
	(14.5)	(0.2)	(2.1)	(1.2)	(0.1)	(0.1)	(1.8)	(2.9)	(1.7)	.403	118
Towns and Cities											
Formal (11)	4.65	.129	.051	-.0015	.228	-.0052	-.223	-.164	1.14	.50	67.2
	(7.5)	(4.8)	(1.8)	(1.6)	(0.7)	(1.0)	(2.3)	(0.7)	(2.3)	.599	196
Informal (12)	3.92	.066	.006	.0003	1.38	-.0051	.007	-.019	-.022	.11	198
	(4.8)	(2.8)	(0.1)	(0.2)	(4.1)	(1.0)	(0.1)	(0.0)	(0.0)	.874	268
Domestic (13)	5.13	-.011	-.044	.0016	-.509	.0136	.182	.013	-24812	-.10	7.7
	(11.0)	(0.3)	(0.9)	(1.0)	(1.0)	(0.8)	(0.8)	(0.1)	(0.6)	.461	45
Rural											
Formal (14)	5.76	.050	.027	-.0008	-.414	.0110	-.166	-.358	.000	.04	22.0
	(3.8)	(1.1)	(0.4)	(0.3)	(0.6)	(0.8)	(0.5)	(0.6)	(0.0)	.723	51
Informal (15)	4.27	.058	-.014	.0010	1.13	-.0101	-.343	.121	-.256	.06	89.4
	(6.5)	(1.1)	(0.4)	(0.7)	(2.1)	(1.2)	(2.1)	(0.4)	(0.4)	.863	129

Notes to Table 3

[a]Beneath the point estimates are the absolute values of the t-statistics; a value equal to or greater than 2.0 indicates significance at the 5 percent level. $\bar{R}^2$ is the coefficient of determination corrected for degrees of freedom. SE is the standard error of the regression. RSS is the residual sum of squares. S_3 is the sample size. F tests indicate that all of the overall reations are significantly nonzero at the 5 percent level except that for domestics in towns and cities (significant only at the 85 percent level) and that for rural formal sector (significant at 30 percent level).

[b]Dummy variable.

[c]Selectivity variable, see Section 2.

Table 4. Means of distributions of human capital variables for different regional-sectoral and participation subsamples.

	Geographical Regions \ Work Sectors	Participate and Report: Formal	Participate and Report: Informal	Participate and Report: Domestic	Participate and Report: All Sectors	Do not Participate and/or Do Not Report	Total
Schooling (Years)	Central Metropolis	7.8	3.7	3.7	5.5	5.0	5.2
	Towns and Cities	7.9	3.9	3.2	5.4	4.6	4.9
	Rural	2.4	1.4	--	1.7	1.4	1.6
	All Regions	7.3	3.3	3.5	5.0	3.7	4.2
Work Experience (Years)	Central Metropolis	8.9	10.8	7.8	9.5	4.0	6.5
	Towns and Cities	8.9	11.7	6.7	10.2	4.1	6.6
	Rural	9.2	8.7	--	8.8	4.4	5.3
	All Regions	8.9	10.8	7.5	9.6	4.2	6.2
Calories (% of International Standards)	Central Metropolis	63	60	61	62	58	60
	Towns and Cities	79	73	79	76	73	74
	Rural	56	53	--	54	50	51
	All Regions	68	64	66	66	60	62
Days Ill (Days Since Last Christmas)	Central Metropolis	4.3	7.1	4.8	5.4	5.4	5.4
	Towns and Cities	3.1	4.6	1.9	3.8	3.0	3.3
	Rural	2.9	3.9	--	3.6	3.2	3.3
	All Regions	3.8	5.5	4.0	4.6	4.0	4.2
Never Migrated (%)	Central Metropolis	51	47	16	43	46	45
	Towns and Cities	63	58	20	56	50	53
	Rural	27	39	--	36	39	38
	All Regions	50	50	17	47	45	46

Table 5. Distribution of women by work status, regions, and sectors

Geographical Regions \ Work Sectors	Participate and Report				Do Not Participate and/or Do Not Report	Total
	Formal	Informal	Domestic	All Sectors		
Central Metropolis	332	282	118	722	864	1586
Towns and Cities	196	268	45	509	732	1241
Rural	51	129	0	180	766	946
All Regions	569	679	163	1411	2362	3773

Table 6. Mean earnings for women in different regions and sectors (in cordobas per fortnight).

Geographical Regions \ Work Sectors	Participate and Report			
	Formal	Informal	Domestic	All Sectors
Central Metropolis	405	226	140	275
Towns and Cities	337	192	103	226
Rural	171	136	---	145
All Regions	358	192	128	236

FOOTNOTES

1. There is a large literature on pluralism in developing countries, much of which follows (but some of which preceeds) the seminal work by Lewis (24). There is a growing literature on human capital in developing countries, some references to which are given in note 3 below and in other studies in this project (2-15,33-39,41). Boserup (16) is an early and quite well known general summary of the role of women in development; Burvinić (17) provides a recent bibliography. Also see our other studies in this project (2-15, 33-39, 41).

2. Earlier studies touch on some of these issues, but none of them have all of these characteristics. For example, see Behrman, Wolfe and Tuanli (13), Chiswick (18), Desai and Edison (19), Psacharopoulos (27), Rosenzweig (28) and Ryan (29).

3. For more details concerning this data set, see (12,37,38).

4. We discuss our rationale for including migratory status below in Section 5.

5. Our data do not permit us to distinguish between these reasons for not reporting earnings in all cases. If they did, we could consider the procedure as a triple selectivity model.

6. We also are assuming that our observable variables capture all dimensions of the human capital variables that also enter into the work inclination selection rule. That is, our assumption of independence between the disturbance terms in equations (1) and (2) precludes the possibility of common unobserved human capital (or background or whatever) variables in U_{1i} and U_{2i}. In light of results which emphasize the importance of unobserved ability, motivation, and family background variables for more developed economies (1), this may be a strong assumption indeed. In other work in progress we are exploring it for our sample (5).

7. We thank Peter Linneman for suggesting that these alternatives might be of interest to explore.

8. There is one exception! For the domestic sector if both linear and quadratic schooling terms are included, they have respective coefficients of 0.75 and - .0102, respectively, but only the latter is significantly nonzero.

9. In contrast to most studies, our experience variable is actual recalled work experience, not some artifact such as age minus years of schooling minus six (which would be particularly unsatisfactorily for women given their low labor force participation rates). Studies for the United States indicate that for women who do not have continuous labor force experience, the actual experience is much more important than the potential experience (26).

10. Of course there may be a simultaniety problem with these variables in that nutrition and health status may be dependent upon earnings. We have explored this question in (32,36) and have found but a very limited impact of total household income (of which the woman's earnings is a small part on the average) on nutrition inputs and no significant impact on her health. Therefore, with the possible exception of domestics to whom we return below, simultaneity does not seem to be an important problem.

11. These refer to migrants by destination. The large proportion of migrants in rural areas may be surprising to many. We explore the determinants of migration in (9).

12. We find many other differences in distributions of socioeconomic variables across these three regions in (12).

13. Since probit estimates are nonlinear, comparisons across point estimates are straightforward only if the overall probabilities are the same for the different probits. We are making such an assumption for purposes of our comparisons across probits. That is, we are assuming that the sums of the arguments are the same in each row and then, for example, we ask what would be the relative effects of adding one more year of schooling. Under such an assumption, this comparison reduces to a comparison of the estimated coefficients of schooling across relations.

However this is not the same as comparing at the point of means. If the overall probability of labor force participation is lower at the point of means in one case than in another (e.g. for rural areas as compared to the central metropolis), one more year of schooling in the former may increase the probability of participation more than in the latter even if the coefficient estimate of schooling is lower for the former than for the latter.

14. There also is an effect for the central metropolis area in that population would have a significantly positive coefficient if the subsample for it were combined with the subsample for the towns and cities. However this effect is not apparent in the subsample for the central metropolis alone since all women in that subsample live in a city with the same population.

15. One basic assumption underlying this test is that the errors are homoscedastic. Judging by our estimates in Table 3, this assumption probably is satisfied in this case, but may be stronger for some applications that we make below. See Maddala (25) and Toyoda (31).

16. Ryan (29) also reports no significant return to schooling for women in rural India and suggests that this reflects that returns are relatively high in rural India in nonmarket acticities, such as household and own-farm production, not in the daily labor market. However he does not test to see if schooling has a negative coefficient estimate in the probit for rural labor force participation.

17. Of course this relates to the selectivity problem in analyzing migrants (9).

18. Schultz (30) emphasizes the third and possibly the first of these.

19. We have dropped from our sample 11 women in the domestic sector in rural areas because they comprise too small a subsample for statistical analysis.

20. See note 10 above.

21. We have too few rural domestics for analysis. See note 19 above.

22. However, if we include a quadratic term in nutrition, it does not have significant coefficient estimates in any of our relations.

23. At Robert Pollak's suggestion, we also added quadratic terms in days ill to our specification to test for nonlinearity, but the coefficient estimates are not significantly nonzero.

24. We thank Claudia Goldin for suggesting this point.

25. This observation relates to the stronger incentives for migration to more urban areas for women with greater human capital stocks that is frequently reported (30).

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