DO WOMEN EARN LESS IN RURAL AREAS? AN EMPIRICAL ANALYSIS OF THE FEMALE RURAL-URBAN WAGE DIFFERENTIAL

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Key words: **female labor supply, two-step panel data estimation, rural-urban comparison, regional wage differential**

ABSTRACT

This study evaluates the possible reasons for the persistent rural-urban wage gap among women in the U.S. The paper uses two-step panel data estimations that can consider explanations including rural-urban differences in observed individual characteristics and work-related characteristics and at the same time control for both unobserved differences in amenities and productivities and for the potential effects of endogeneity and/or sample selection bias in hours worked. The paper finds that significant rural-urban female wage differential exist for many groups, indicating the functioning of rural and urban labor markets are different.

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INTRODUCTION

Empirical research indicates that urban wages exceed those in rural areas in all regions for both whites and blacks (Krumm 1984). Workers in cities earn 33 percent more than their non-urban counterparts (Glaeser and Mare). Rural areas have also been characterized by both unemployment rates and underemployment rates continuously above those in major urban economies (Lichter and Costanzo), especially for women (Findeis and Jensen; Jensen et al.). Rural mothers face unique barriers or disincentives to employment (Lichter and Jensen). Single mothers are found to receive lower hourly earnings in non-metropolitan areas than in metropolitan areas (Mills and Hazarika).

Such rural-urban differences in wages and employment may simply be due to differences in the composition of rural and urban populations. For example, lower job experience levels are associated with lower earnings, and average experience rates and levels of education tend to be lower in rural areas (Jensen and McLaughlin; Lichter et al.; Swaim and Teixeira). Some research considers that the nominal wage differentials between areas may be representative of compensation for cost of living and amenity differences, at least in part, rather than real wage differentials (Krumm 1987). There is some evidence showing that the cost of living is lower on average in rural than in urban areas (Citro and Michael; Nord) and urban workers face a higher cost of living and receive much higher nominal earnings (Kim). However, previous research has suggested that lower female earning rates are partly due to the way that rural labor markets disadvantage women (Davis, Connolly and Weber; Shaffer; Vera-Toscano, Phimister and Alfons). It is argued that even when workers' characteristics and jobs are identical, the structure and operation of nonmetro labor markets may provide lower returns to workers than metro labor markets (McLaughlin and Perman). The view persists that there is a lack of good rural jobs—those that pay a decent or family wage—in the 'new economy' (Flynt; Gale and McGranahan; Horan and Tolbert).

In general, women in rural areas are less likely than men to find adequate employment and more likely to become employed in low-wage or low-hour jobs (Findeis and Jensen). Rural women are largely confined to lower status occupations in which experience counts more than formal qualifications. Labor force hardship contributes to the economic vulnerability of women, especially among female heads of households with children (Pearce; Lichter et al.). Moreover, different dynamic patterns of labor force participation and hours worked between metro and nonmetro women may also play a role in the observed regional wage differentials (Krumm 1984; Vera-Toscano et al.). As shown by Krumm and Tolley, even in the absence of real wage differentials, the hours worked decision might be significantly affected by the location decision.

This paper examines the rural-urban wage gap among women in the United States to consider whether observed differences are attributable to differences in observed individual demographic characteristics, differences in hours worked, differences in the operation of rural labor markets or differences in preferences. The paper contributes to the literature in several significant ways. First, endogeneity and/or sample selection bias of the hours worked decision are controlled across rural-urban locations in determining the observed rural-urban female wage gap. Second, unobserved differences in amenity and productivity and/or preferences are controlled for in the estimation of the rural-urban wage gap. Third, this paper updates the literature by examining possible explanations determining the female wage gap across rural-urban areas and changes over time in the dynamic growing U.S. economy.

ECONOMETRIC MODEL AND ESTIMATION STRATEGY

To develop the theoretical framework to examine the rural-urban female wage gap, the general equilibrium model of interacting regions originated by Roback's seminal paper (1982, 1988) and extended by Dickie and Gerking (1998) is adopted. This model is flexible enough to consider explanations including interregional differences in production costs, changes in relocation (migration) costs, and differences in interregional transfer payments in addition to the regional amenities in the determination of regional wage differences. One key issue here is that the theoretical model treats labor as a homogeneous input. However, in fact, workers differ in their observed skills and human capital, demographic characteristics and unobserved ones. Moreover, many of the productivity differences and local amenities are individual specific and are generally unobservable. However, it is possible to control for individual observed and unobserved heterogeneity across workers using panel data in the estimation of regional wage differentials (Vera-Toscano et al.).

An econometric model that consists of a two-step estimation of the wage equation which accounts for the unobserved heterogeneity responsible for the endogeneity/sample selection bias of hours worked is used. The econometric model was examined by Ridder and Nijman and Verbeek and generalized by Vella and Verbeek. The model has the following form:

(1) $$\ln w_{it} = x_{1,it}^{'}\beta_1 + m(hours_{it};\beta_2) + \mu_i + \eta_{it},$$

(2) $$hours_{it}^{*} = x_{2,it}^{'}\theta_1 + hours_{i,t-1}\theta_2 + \alpha_i + \nu_{it},$$

(3) $$\begin{aligned} &hours_{it} = hours_{it}^{*} \quad if\ hours_{it}^{*} > 0, \\ &hours_{it} = 0,\ w_{it}\ not\ observed \quad if\ hours_{it}^{*} \le 0, \end{aligned}$$

where i indexes individuals (i=1,…, N) and t indexes time (t=1,…,T). The parameters of equation (1) are of primary focus while equation (2) is the reduced form for the explanatory variable of hours which is endogenous and the basis of the selection rule. Equation (3) reflects the censoring and selection rules. The w_{it} represents the offered hourly wage rate of individual i at time period t; $x_{1,it}$ represents vectors of observed exogenous variables specified in the wage equation; $x_{2,it}$ represents exogenous variables in the hours equation; $hours^*_{it}$ represents latent endogenous variables with its observed counterpart $hours_{it}$, the number of hours worked; m denotes a polynomial of known length with unknown coefficients β_2, while $\beta^{'} = (\beta_1^{'}, \beta_2^{'})$ and $\theta^{'} = (\theta_1^{'}, \theta_2^{'})$ are parameters to be estimated. The equations' errors comprise random individual effects, μ_i and α_i, and random individual-specific time effects, η_{it} and v_{it}, which are assumed to be independent across individuals. Denote $\varepsilon_{it} = \mu_i + \eta_{it}$; $u_{it} = \alpha_i + v_{it}$; and u_i as the T vector of u_{it}'s for individual i. Writing $x_i = [x_{i1}, ..., x_{iT}]'$ and $X_i = [x_{1i}, x_{2i}]$, we assume

(4) $$u_i \mid X_i \sim N.I.D.(0, \sigma_\alpha^2 ll' + \sigma_v^2 I)$$

(5) $$E(\varepsilon_{it} \mid X_i, u_i) = \tau_1 u_{it} + \tau_2 \overline{u}_i$$

where l is a T vector of ones; $\overline{u}_i = T^{-1} \sum_{t=1}^{T} u_{it}$; and τ_1 and τ_2 are unknown constants. Equation (4) imposes normality and a strict error components structure and excludes any form of autocorrelation in v_{it}. Equation (5) allows for heteroskedasticity and autocorrelation in η_{it} but imposes the strict exogeneity of x_{it}. This model incorporates a potential role for state dependence in the reduced form (equation (2)). This ensures that the error components do not incorrectly capture the dynamics which should be attributed to lagged dependent variables. To estimate this model, the two-step estimation with censored endogenous variables and selection bias in the spirit of Heckman's (1979) sample selection procedure is used (Vella and Verbeek). In the first step, it is possible to consistently estimate the parameters in equation (2) by estimating a random effect Tobit model using maximum likelihood under the usual regularity conditions. In this procedure, adjustment for the initial condition problem is accomplished using a procedure suggested by Heckman (1981) and Vella and Verbeek. Given the estimates of equation (2) it is possible to construct estimates of the two correction terms, the generalized residual and its average over time to be included in the primary equation (1), with coefficients τ_1 and τ_2. These parameters can be estimated jointly with β in the second step from conditional moment restrictions such as ordinary least squares. Under the null hypothesis of no endogeneity $\tau_1 = \tau_2 = 0$ standard errors can be computed in the usual way. Consequently, the standard Wald test of the significance of the additional terms is an endogeneity test. In general, standard errors should be adjusted for heteroskedasticity, autocorrelation and for the estimation of the correction terms. The second-step wage equation is estimated over the sub-sample women reporting positive hours. The strength of this model is that the inclusion of the correction terms simultaneously accounts for the endogeneity of the participation decision and hours worked. As the decision to not participate corresponds to a zero value for $hours_{it}$, the inclusion of the correction terms also account for the selection bias from estimating over the sub-sample of workers. Moreover, the inclusion of a lagged dependent variable in the reduced form isolates the role of dynamics and state dependence.

DATA

Panel Study of Income Dynamics for the years 1986-1993 of Public Release II data are used for this study. The PSID, begun in 1968, is a longitudinal study of a representative sample of U.S. individuals (men, women, and children) and the family units in which they reside. The PSID sample, originating in 1968, consisted of two independent samples: a cross-sectional national sample and a national sample of low-income families. The cross-sectional sample was drawn by the Survey Research Center (SRC) and was an equal probability sample of households from the 48 contiguous states and was designated to yield about 3,000 completed interviews. The second sample came from the Survey of Economic Opportunity (SEO), conducted by the Bureau of the Census for the Office of Economic Opportunity. In the mid-1960's, the PSID selected about 2,000 low-income families with heads under the age of sixty from SEO respondents. The sample, known as the SEO sample, was confined to Standard Metropolitan Statistical Areas (SMSA's) in the North and non-SMSA's in the Southern region. This study uses the core sample SRC and SEO samples as the data source.

The definition of rural and urban samples is based upon the concept of the rural-urban continuum codes devised by Calvin Beale and Peggy Ross of the U.S. Department of Agriculture in the PSID data. The codes form a classification scheme that distinguishes metropolitan counties by size, and non-metropolitan counties by degree of urbanization and proximity to metro areas. Considering that the rural counties in the U.S. are heterogeneous in population size, urbanization and degree of accessibility to larger economies - centers of information, communication, trade, and finance, etc, the paper further differentiates the nonmetro (rural) counties adjacent to metro areas and nonmetro (rural) counties not adjacent to metro areas.

The sample of women includes female heads or spouses (including cohabitants) of male heads in the family who were aged between 20 and 57 in 1986. This makes the oldest sample observation 64 years old in 1993. The sample excludes women who indicated retirement in the survey. Five types of information, obtained from the sampled women, are used in this study (see Table 1 for variable definitions). The residence was

Table 1. Variable Definitions

Variables	Definition
A. Endogneous variables	
LNWAGE	Log real average hourly earnings
HOURS	Total annual work hours for t year
LAGHOUR	Total annual work hours for t-1 year
B. Personal and family characteristics	
AGE	Age of individual
AGESQ	Age squared
MARYST	(Dummy) 1 if spouse/cohabitant present
WHITE	(Dummy) 1 if non-hispanic white
BLACK	(Dummy) 1 if non-hispanic black
HISPANIC	(Dummy) 1 if hispanic origin
OTHERACE	(Dummy) 1 if other than above race/ethnicity category
NUMCHILD	Number of children under 18 years of age in family unit
LITKID	(Dummy) 1 if presence of children younger than 6 years old
DISABILITY	(Dummy) 1 if have work limitation
ASSET	Her share of real asset income
HOUVAL	Real housing value
C. Human capital variables	
EDUIN	Actual grades of school completed
EDULESS	(Dummy) 1 if schooling ended in grades 1-11
EDUHIGH	(Dummy) 1 if schooling ended in grades 12
EDUSOME	(Dummy) 1 if schooling ended in grades 13-15
EDUMORE	(Dummy) 1 if schooling ended in grades 16 or more
FULLEXP	Years worked full-time since age 18
FULLEPSQ	FULLEXP squared
TENURE	Months worked for present employer
D. Work environment variables	
UNION	(Dummy) 1 if job under union contract
INDUSTRY DUMMIES	
AGFOR	(Dummy) 1 if in Agriculture, Forestry or Fisheries
CONSTRUC	(Dummy) 1 if in Mining or Construction
MANUFACT	(Dummy) 1 if in Manufacturing
TRANSPT	(Dummy) 1 if in Transportation, Communications, or other Public Utilities
TRADE	(Dummy) 1 if in Wholesale or Retail Trade
FINANCE	(Dummy) 1 if in Finance, Insurance, or Real Estate
SERVICES	(Dummy) 1 if in Business, Repair Services, Personal Services, Entertainment, Recreation Services, or Professional and Related Services
PUBLIC	(Dummy) 1 if in Public Administration
MISSIND	(Dummy) 1 if main industry information is missing.
OCCUPATION DUMMIES	
PROFESSO	(Dummy) 1 if professional, technical and kindred worker
MANAGER	(Dummy) 1 if manager, administrator except farm
SALE	(Dummy) 1 if sales worker
CLERICAL	(Dummy) 1 if clerical and kindred worker
CRAFT	(Dummy) 1 if craftsman and kindred worker
OPERATOR	(Dummy) 1 if operative except transport
TRANOPER	(Dummy) 1 if transport equipment operative
LABORER	(Dummy) 1 if laborer
SERVOCC	(Dummy) 1 if service worker except private household
PRIVATE	(Dummy) 1 if private household worker
MISSOCC	(Dummy) 1 if main occupation information is missing
UNEMRATE	Annual average unemployment rate for county of residence
E. Location specific variables	
URBAN	(Dummy) 1 if lives in metropolitan areas
RURALADJ	(Dummy) 1 if lives in non-metropolitan areas, adjacent to metro area
RURALNAD	(Dummy) 1 if lives in non-metropolitan areas, not adjacent to metro areas
NORTHEAST	(Dummy) 1 if lives in Northeast
NORTHCEN	(Dummy) 1 if lives in North Central
SOUTH	(Dummy) 1 if lives in South
WEST	(Dummy) 1 if lives in West
AMENRANK	Mean rank of natural amenities scale for location of residence

measured by three dummy variables: metro, nonmetro (rural) adjacent and nonmetro (rural) nonadjacent. To control for the natural amenity differences by the location of residence of sampled women, the study includes the measure of natural amenities scale from the USDA Economic Research Service. The natural amenities scale is a composite measure of county physical characteristics presumed to enhance area attractiveness as a place to live. The scale combines six measures of climate, typography, and water area that reflect environmental qualities people tend to prefer (U.S. Department of Agriculture).

EMPIRICAL RESULTS

Descriptive analysis

To estimate the model, data for women from the PSID for the period 1986-1993 are used; the PSID years 1986-1993 correspond to the endogenous variable values for the years 1985-1992. For the period examined, there are 3988 women who satisfied the sample selection criteria. They comprise an unbalanced panel including 26641 observations. Table 2 summaries nominal and real average hourly earnings by year and across rural-urban locations for women.

Table 2. Nominal and Real Female Average Hourly Earnings.

	Urban			Adjacent rural			Nonadjacent rural		
Year	N	Nominal	Real	N	Nominal	Real	N	Nominal	Real
				All sampled women					
1985	2497	6.82	8.25	306	5.65	6.84	451	4.68	5.66
1986	2536	7.03	8.36	320	5.86	6.97	462	4.49	5.34
1987	2584	7.70	8.85	333	6.08	6.99	451	5.02	5.78
1988	2576	8.13	8.94	335	6.43	7.07	448	5.69	6.26
1989	2569	8.62	9.05	332	6.62	6.95	458	5.60	5.88
1990	2555	9.22	9.22	329	7.17	7.17	459	6.05	6.05
1991	2548	9.54	9.16	326	7.08	6.80	475	6.49	6.23
1992	2528	10.36	9.64	317	8.50	7.90	446	7.80	7.25
Total	20393			2598			3650		
				Subsample women reporting positive hours of work					
1985	1887	8.68	10.50	220	7.43	8.99	326	6.19	7.49
1986	1915	9.10	10.83	228	7.89	9.39	337	6.07	7.22
1987	1955	9.85	11.33	244	7.91	9.10	332	6.64	7.64
1988	1951	10.40	11.42	243	8.58	9.44	342	7.40	8.14
1989	1971	11.02	11.57	250	8.43	8.85	347	7.30	7.67
1990	1945	11.81	11.81	239	9.42	9.42	348	7.77	7.77
1991	1922	12.29	11.80	242	9.33	8.95	353	8.73	8.38
1992	1890	13.46	12.52	235	11.08	10.31	340	10.15	9.44
Total	15436			1901			2725		

Residents of urban areas earned the highest mean nominal and real wages followed by adjacent rural residents and nonadjacent rural residents. Differences between the urban and rural areas are significantly different from zero at the 5 percent level for all available years. Differences in the rural-urban wage gap are apparent across the subsample of women reporting positive hours of work.

Hours Worked by Women

Three variants of the random effect Tobit model for hours worked in equation (2) are estimated. To highlight differences that may arise from misspecifying the dynamics, the model is estimated with and without the lagged dependent variable. Given the presence of the individual effects α_i, it is unlikely that one can validly assume that hours worked in the first period are truly exogenous (Vella and Verbeek). Therefore, the dynamic model is estimated either treating initial hours worked as exogenous, which ignores the initial conditions problem (model A) or modeling the initial value in the spirit of Heckman (1981) (model B). For this last approach, the reduced form for $hours_{i0}$ is approximated by a Tobit model using pre-sample information for individuals whose working histories were collected in the 1985 PSID, or when this is not the case, using within-sample first-year labor supply information available for individuals whose observed first-year working information was within the panel. The results of all three specifications are presented in Table 3.

The estimated coefficients of the personal and family characteristics of all three specifications are generally in line with prior expectations and most variables have statistically significant impacts on hours worked. That is, life-cycle effects are observed for hours of work for both the static and dynamic specifications. Additional education is also related to more hours spent at work. When a spouse/cohabitant is present in the family, women work fewer hours at their jobs, on average. This is also the case when there are more children in the family or when young children are present. Disability also reduces hours at work. Finally, as the woman's share of assets in the family increases, she generally works fewer hours, consistently with labor supply theory (Killingsworth).

In the static model (without the lagged dependent variable), rural women are employed fewer hours than urban women. In the dynamic models (model A and B), the effects of residence are generally not statistically significant. However, it should be noted that the presence of state dependence is likely reflecting the *consistently longer* hours of work that are the experiences of rural women in early 1990s. This can be seen that the impact of lagged hours of work, in columns 3 (model A) and 5 (model B), is highly significant and positive indicating the presence of 'state dependence'. These findings support the inclusion of the lagged dependent variable in model set up in equation (2). The inclusion of the lagged hours variable has some impact on the coefficients of the other variables--it generally reduces their magnitude. The coefficients of the time dummy variables indicate an increasing trend in hours worked over the period examined in the static model. However, the coefficients of the time variables for the dynamic models are only significant in the late 1980s but not in the early 1990s. Comparing the columns with exogenous (model A) and endogenous (model B) treatment of the initial value, we can see that exogeneity of initial hours of work is strongly rejected, since the t-statistic of ξ is highly significant at the 0.01 level. Comparing the static model to the dynamic models, the static model which omits the lagged dependent variable attributes approximately 64 percent of the total variance to the individual effects. The specifications in columns 3 and 5, where the contribution of the individual effects reduces to approximately 15-22 percent, indicate that this may be due to the failure to account for dynamics.

Table 3. Maximum Likelihood Estimation Results for Hours of Work Equation.

	Static model			Dynamic model				
				[A]			[B]		
Variables	Coeff.		S.e.	Coeff.		S.e.	Coeff.		S.e.
Constant	-0.152	*	0.085	-0.216	**	0.085	-0.209	**	0.087
AGE	0.072	***	0.004	0.019	***	0.004	0.026	***	0.004
AGESQ/100	-0.108	***	0.005	-0.032	***	0.005	-0.042	***	0.005
EDULESS (REFERENCE)									
EDUHIGH	0.498	***	0.018	0.137	***	0.015	0.184	***	0.016
EDUSOME	0.637	***	0.020	0.173	***	0.018	0.231	***	0.019
EDUMORE	0.696	***	0.023	0.212	***	0.022	0.285	***	0.023
MARYST	-0.121	***	0.012	-0.040	***	0.012	-0.060	***	0.012
WHITE (REFERENCE)									
BLACK	0.019		0.015	0.014		0.014	0.016		0.015
HISPANIC	-0.052		0.034	0.017		0.031	0.076	**	0.033
OTHERACE	-0.100		0.068	-0.004		0.057	-0.016		0.059
DISABILITY	-0.249	***	0.013	-0.242	***	0.012	-0.243	***	0.011
NUMCHILD	-0.140	***	0.005	-0.031	***	0.005	-0.048	***	0.005
LITKID	-0.229	***	0.010	-0.142	***	0.012	-0.148	***	0.011
ASSET	-0.003	**	0.001	-0.004	**	0.002	-0.0004		0.002
URBAN (REFERENCE)									
RURALADJ	-0.040	**	0.018	0.005		0.017	-0.022		0.017
RURALNAD	-0.045	***	0.016	0.027	*	0.016	0.009		0.016
DUMMY85 (REFERENCE)									
DUMMY86	0.018		0.021	0.015		0.015	0.016		0.014
DUMMY87	0.045	**	0.018	0.035	**	0.015	0.030	**	0.014
DUMMY88	0.078	***	0.018	0.043	***	0.016	0.046	***	0.015
DUMMY89	0.088	***	0.018	0.027	*	0.016	0.033	**	0.014
DUMMY90	0.090	***	0.019	0.007		0.016	0.015		0.015
DUMMY91	0.094	***	0.018	0.011		0.016	0.022		0.015
DUMMY92	0.067	***	0.017	-0.020		0.016	-0.014		0.015
NORTHEAST (REFERENCE)									
NORTHCEN	-0.029		0.020	-0.009		0.019	-0.014		0.020
SOUTH	0.041	**	0.019	-0.004		0.018	-0.002		0.019
WEST	-0.058	***	0.022	-0.041	**	0.021	-0.063	***	0.022
LAGHOUR/1000				0.864	***	0.006	0.787	***	0.006
Sigma(α)	0.836	***	0.007	0.249	***	0.007	0.299	***	0.007
Sigma(v)	0.621	***	0.002	0.590	***	0.002	0.558	***	0.002
ξ							0.057	***	0.011
Number of observations	26641			26641			26641		
Log likelihood	-27202			-24347			-24194		
Restricted Log Likelihood	-35668			-24950			-24946		
Chi squared	16932.3	***		1206.56	***		1505.17	***	

*Notes: * p<0.1, ** p<0.05, *** p<0.01.*
Dynamic model [A] assumes exogeneous initial labor supply.
Dynamic model [B] employs a specification for the initial distribution.

Wages Earned by Women

To appropriately identify the wage equation for women, exclusion restrictions should be considered. As suggested by Vella and Verbeek, the variables employed are disability status and lagged hours. Disability status is excluded on the basis that while health will influence one's ability to seek employment it is increasingly difficult for employers to offer different wage levels on the basis of an individual's health. The lagged hours

Table 4. Wage Equation Estimates for All Sampled Women Reporting Positive Hours of Work.

Model	I			II			III			IV		
Estimation method	OLS			OLS			OLS			OLS		
Correction of hours	No			Yes			Yes			Yes		
Hours equation				Static			Dynamic			Dynamic		
Initial value							Exogenous			Endogenous		
Variables	**Coeff.**		**S.e.**	**Coeff.**		**S.e.**	**Coeff.**		**S.e.**	**Coeff.**		**S.e.**
Constant	1.821	***	0.049	1.660	***	0.051	1.738	***	0.049	1.721	***	0.048
URBAN (REFERENCE)												
RURALADJ	-0.094	***	0.014	-0.098	***	0.014	-0.097	***	0.014	-0.094	***	0.014
RURALNAD	-0.203	***	0.012	-0.199	***	0.012	-0.200	***	0.012	-0.198	***	0.012
EDULESS (REFERENCE)												
EDUHIGH	0.157	***	0.013	0.128	***	0.015	0.127	***	0.013	0.120	***	0.013
EDUSOME	0.301	***	0.014	0.267	***	0.018	0.262	***	0.015	0.253	***	0.015
EDUMORE	0.548	***	0.017	0.507	***	0.021	0.502	***	0.017	0.491	***	0.018
FULLEXP	0.025	***	0.002	0.020	***	0.002	0.021	***	0.002	0.021	***	0.002
FULLEPSQ/100	-0.064	***	0.005	-0.052	***	0.005	-0.054	***	0.005	-0.053	***	0.005
MARYST	0.007		0.009	0.030	***	0.009	0.024	***	0.009	0.028	***	0.009
WHITE (REFERENCE)												
BLACK	-0.106	***	0.010	-0.099	***	0.010	-0.099	***	0.010	-0.098	***	0.010
HISPANIC	-0.065	***	0.023	-0.062	***	0.022	-0.062	***	0.022	-0.067	***	0.022
OTHERACE	-0.148	***	0.043	-0.151	***	0.043	-0.143	***	0.043	-0.141	***	0.042
HOURS/100	-1.057	***	0.161	-0.950	***	0.159	-0.986	***	0.157	-0.973	**	0.157
$(HOURS/100)^2$	1.714	***	0.290	1.854	***	0.284	1.815	***	0.284	1.818	***	0.283
$(HOURS/100)^3$	-1.093	***	0.226	-1.241	***	0.221	-1.206	***	0.221	-1.212	***	0.221
$(HOURS/100)^4$	0.338	***	0.084	0.398	***	0.083	0.387	***	0.083	0.389	***	0.083
$(HOURS/100)^5$	-0.052	***	0.015	-0.062	***	0.015	-0.060	***	0.015	-0.061	***	0.015
$(HOURS/100)^6$	0.003	***	0.001	0.004	***	0.001	0.004	***	0.001	0.004	***	0.001
UNION	0.168	***	0.012	0.177	***	0.012	0.171	***	0.012	0.172	***	0.012
TENURE	0.001	***	0.000	0.001	***	0.000	0.001	***	0.000	0.001	***	0.000
NORTHEAST (REFERENCE)												
NORTHCEN	-0.073	***	0.014	-0.075	***	0.014	-0.073	***	0.014	-0.072	***	0.014
SOUTH	-0.121	***	0.012	-0.134	***	0.012	-0.130	***	0.012	-0.130	***	0.012
WEST	-0.072	***	0.024	-0.076	***	0.024	-0.073	***	0.024	-0.071	***	0.024
UNEMRATE	-0.004	**	0.002	-0.002		0.002	-0.003		0.002	-0.003		0.002
AMENRANK	0.035	***	0.008	0.036	***	0.008	0.036	***	0.008	0.036	***	0.008

(continued)

DUMMY85 (REFERENCE)								
DUMMY86	0.012	0.016	0.011	0.016	0.010	0.016	0.010	0.015
DUMMY87	0.033 **	0.016	0.029 *	0.016	0.030 **	0.015	0.032 **	0.015
DUMMY88	0.035 **	0.016	0.028 *	0.016	0.030 *	0.016	0.030 **	0.016
DUMMY89	0.041 ***	0.016	0.033 **	0.016	0.032 **	0.015	0.032 **	0.015
DUMMY90	0.042 ***	0.016	0.037 **	0.016	0.036 **	0.015	0.037 **	0.015
DUMMY91	0.037 **	0.016	0.034 **	0.015	0.030 *	0.015	0.030 **	0.015
DUMMY92	0.105 ***	0.016	0.105 ***	0.016	0.100 ***	0.016	0.102 ***	0.016
SERVICES (REFERENCE)								
AGFOR	-0.213 **	0.070	-0.185 ***	0.068	-0.195 ***	0.068	-0.194 ***	0.068
CONSTRUC	0.168 ***	0.038	0.160 ***	0.037	0.162 ***	0.037	0.162 ***	0.037
MANUFACT	0.121 ***	0.016	0.102 ***	0.016	0.104 ***	0.016	0.103 ***	0.016
TRANSPT	0.245 ***	0.023	0.228 ***	0.023	0.231 ***	0.023	0.230 ***	0.023
TRADE	-0.114 ***	0.014	-0.116 ***	0.013	-0.119 ***	0.013	-0.120 ***	0.013
FINANCE	0.102 ***	0.017	0.087 ***	0.017	0.090 ***	0.017	0.089 ***	0.017
PUBLIC	0.208 ***	0.018	0.188 ***	0.018	0.194 ***	0.018	0.193 ***	0.018
MISSIND	0.051	0.053	0.056	0.052	0.042	0.052	0.042	0.052
MANAGER (REFERENCE)								
PROFESSO	0.045 **	0.018	0.054 ***	0.018	0.058 ***	0.017	0.059 ***	0.017
SALE	-0.117 ***	0.025	-0.101 ***	0.025	-0.098 ***	0.025	-0.097 ***	0.025
CLERICAL	-0.190 ***	0.016	-0.174 ***	0.016	-0.171 ***	0.016	-0.170 ***	0.016
CRAFT	-0.172 ***	0.033	-0.174 ***	0.032	-0.171 ***	0.032	-0.171 ***	0.032
OPERATOR	-0.322 ***	0.023	-0.308 ***	0.023	-0.307 ***	0.023	-0.306 ***	0.023
TRANOPER	-0.227 ***	0.047	-0.191 ***	0.047	-0.189 ***	0.046	-0.187 ***	0.046
LABORER	-0.270 ***	0.047	-0.249 ***	0.046	-0.251 ***	0.046	-0.249 ***	0.046
SERVOCC	-0.320 ***	0.018	-0.294 ***	0.018	-0.298 ***	0.018	-0.296 ***	0.018
PRIVATE	-0.407 ***	0.041	-0.372 ***	0.041	-0.377 ***	0.041	-0.375 ***	0.041
MISSOCC	-0.403 ***	0.055	-0.330 ***	0.054	-0.369 ***	0.054	-0.365 ***	0.054
u_{it}			-0.287 ***	0.020	-0.235 ***	0.008	-0.256 ***	0.008
$\bar{u}_i$			0.286 ***	0.010	0.144 ***	0.022	0.159 ***	0.020
Adjusted R^2	0.3843		0.4075		0.4099		0.4114	
Number of observations	20062		20062		20062		20062	
F-test	F[49, 20012] = 256.57		F[51, 20010] = 271.58		F[51, 20010] = 274.23		F[51, 20010] = 275.87	
Probability value	0.000		0.000		0.000		0.000	

*Note: * p<0.1, ** p<0.05, *** p<0.01.*

variable is excluded on the basis that the variable has no direct effect but rather operates through its impact on current hours (Vella and Verbeek). To judge the effect of allowing for endogeneity/sample selection (i.e., not correcting for estimation problems that may well exist), the simple OLS wage results without two correction terms are included and compared with the estimates from the two-step procedure. This is shown in Table 4.

The results of the wage equation show some interesting relationships. As the dependent variable is the log of average hourly earnings, the coefficients of the rural (residence) dummy variables provide a simple measure of the rural-urban wage gap after accounting for the individual observed and/or unobserved heterogeneity. In all four wage model specifications, the rural dummy variable coefficients are very significant at the 0.01 level. Women from both adjacent rural counties and remote-rural counties have significantly lower wages than urban women. Women living in adjacent rural areas earn almost 10 percent less in wages than urban women. Women living in remote-rural areas are even more disadvantaged. Their wages are around 20 percent lower than urban women.

The personal characteristics and work-related variables are important determinants of women's wages. Being single, a minority, living in the North Central, South, or West regions, as compared to being married, white, and living in the Northeast, is linked to lower wages. In contrast, higher levels of education, job under union contract, longer tenure with the present employer, and employment in highly-skilled industries and occupations are significantly associated with high wages. The work experience variable has significant non-linear effects on the offered wage. The county unemployment rate has a statistically significant negative association with wages in the simple OLS wage model. The mean rank of the natural amenities scale has a statistically significant positive effect across four models on wage rates-- locations with high natural amenities are associated with high wages. The positive effects of the time dummy variables generally reveal that the real wage of women increased steadily over the study period. Finally, lagged hours variables are incorporated to test for a potential nonlinear relationship between hours and wages. The wage equation is estimated for the sub-sample of women reporting positive hours of work, specifying *m* as a sixth-order polynomial. The OLS results reported in all four models of Table 4, reveal a significant nonlinear relationship between the numbers of hours worked and the wage rate.

Comparisons across Wage Equations

Model IV is chosen as the preferred specification due to the statistically significant role of lagged work hours and the strong rejection of exogeneity of the initial value (shown in Table 4). Both correction terms in model IV are statistically significant, indicating that the two forms of endogeneity/selectivity are present. The Wald test strongly rejected the null hypothesis of no endogeneity of hours. The positive coefficients on the individual effects ($\overline{u}_i$) indicate that the individual worker's unobserved characteristics that do not change over time result in higher wages as hours increase. For example, if the unobserved (time-invariant) individual effects reflect unmeasured individual ability, this will increase both her working hours and her offered wage. In contrast, the individual's unobserved characteristics that change over time (u_{it}) appears decrease wages for women. For example, if the unobserved time-varying effects reflect the unmeasured productivity, this will decrease her wages and increase her working hours as she becomes older. This result is consistent with the finding from Vella and Verbeek for young females by using National Longitudinal Survey for the period 1980-1987.

Labor Mobility and the Rural-Urban Wage Gap

It follows from the theoretical model presented in section 4 that increases in relocation costs increase interregional wage disparities. Thus, workers facing relatively high relocation costs (for example, those with greater family responsibilities, greater regional ties, or higher costs of acquiring information about opportunities elsewhere) or lower returns to migration (for example, those with fewer opportunities to earn income) are expected to exhibit greater rural-urban wage differentials (Dickie and Gerking; Vera-Toscano et al.). The relocation costs are difficult to measure directly. However, their effect can be assessed indirectly by analyzing the extent of interregional wage differences among different types of workers (Dickie and Gerking; Vera-Toscano et al.). Thus, the rural-urban wage gap is examined by looking at the coefficient estimates of the rural dummy variables for female workers by selected socio-demographic characteristics, as shown in Table 5. In general, the wage gap between urban women and women living in those rural areas not adjacent to urban centers is greater than the wage gap between urban women and rural women living near the cities. There is no evidence that the wage gap increases with age. Actually, the estimated coefficients for the rural dummy variables are smallest among older women (50-64 years old). Women younger than 50 living in remote-rural areas *consistently* earn around 22-24 percent lower than urban women.

The wage gap is smallest for women who have not graduated from high school but relatively larger for women with some college education. The wage gap declines somewhat when those who have graduated from college are compared to those with only some college education. Interpretation of this result from the standpoint of differential mobility is not clear. The general results show that the returns to different levels of education differ by location. However, for women living in remote-rural areas, graduating from high school and even gaining some education beyond high school does not result in the level of returns as accrue to urban women. Only when a college education is attained, does the wage gap decline.

Interestingly, there is a large wage differential for Hispanic women living in adjacent rural areas compared to Hispanic women living in urban areas. Hispanic women living in adjacent rural areas earn 46 percent lower than their urban counterparts. There is also a large

Table 5. Coefficient Estimates for Rural Variables by Selected Characteristics in the Wage Equations for Women Reporting Positive Hours of Work.

Model		**III**			**IV**		
Estimation method		**OLS**			**OLS**		
Correction of hours		**Yes**			**Yes**		
Hours equation		**Dynamic**			**Dynamic**		
Initial value	**Sample**	**Exogenous**			**Endogenous**		
Variables	**size**	**Coeff.**		**S.e.**	**Coeff.**		**S.e.**
Full sample	20062	-0.105	***	0.014	-0.103	***	0.014
Age							
20-29	4351	-0.078	***	0.029	-0.077	***	0.029
		-0.225	***	0.026	-0.224	***	0.026
30-39	8270	-0.139	***	0.023	-0.134	***	0.023
		-0.219	***	0.020	-0.217	***	0.020
40-49	4578	-0.102	***	0.027	-0.102	***	0.027
		-0.235	***	0.024	-0.235	***	0.024
50-64	2863	-0.059		0.040	-0.059		0.040
		-0.177	***	0.033	-0.176	***	0.033
Education							
EDULESS	2758	-0.072	*	0.039	-0.080	**	0.038
		-0.099	***	0.031	-0.101	***	0.031
EDUHIGH	8842	-0.104	***	0.019	-0.105	***	0.019
		-0.239	***	0.018	-0.241	***	0.018
EDUSOME	4879	-0.127	***	0.036	-0.124	***	0.036
		-0.292	***	0.028	-0.291	***	0.028
EDUMORE	3583	-0.103	***	0.034	-0.110	***	0.034
		-0.197	***	0.030	-0.202	***	0.030
Race/ethnicity							
WHITE	12018	-0.095	***	0.017	-0.090	***	0.017
		-0.238	***	0.016	-0.242	***	0.016
BLACK	7203	-0.088	***	0.030	-0.088	***	0.030
		-0.208	***	0.020	-0.208	***	0.020
HISPANIC	676	-0.462	***	0.101	-0.462	***	0.101
		-0.021		0.111	-0.020		0.111
OTHERACE	165	0.474		0.514	0.319		0.397
		0.607	**	0.298	0.609	**	0.279
Marital Status							
MARYST=1	13872	-0.109	***	0.016	-0.110	***	0.016
		-0.223	***	0.015	-0.223	***	0.015
MARYST=0	6190	-0.089	***	0.029	-0.090	***	0.029
		-0.204	***	0.023	-0.204	***	0.023
Child Status							
LITKID=1	5566	-0.084	***	0.030	-0.084	***	0.030
		-0.218	***	0.025	-0.223	***	0.025
LITKID=0	14496	-0.111	***	0.016	-0.109	***	0.016
		-0.222	***	0.014	-0.222	***	0.014
Women (20-44)							
Married with children	8530	-0.107	***	0.021	-0.108	***	0.021
		-0.214	***	0.019	-0.216	***	0.019
Married no children	2342	-0.127	***	0.035	-0.127	***	0.035
		-0.277	***	0.035	-0.276	***	0.035
Single with children	2742	-0.094	**	0.047	-0.091	*	0.047
		-0.228	***	0.036	-0.226	***	0.036
Single no children	1795	-0.181	***	0.055	-0.182	***	0.055
		-0.187	***	0.048	-0.185	***	0.048
Health status							
DISABILITY=0	18127	-0.111	***	0.015	-0.109	***	0.015
		-0.225	***	0.013	-0.223	***	0.013
DISABILITY=1	1935	-0.075		0.053	-0.074		0.053
		-0.173	***	0.046	-0.172	***	0.046

wage gap for other race/ethnicities across rural-urban locations. Women of other race/ethnicities living in remote-rural areas on average earn 60 percent more than their urban counterparts. Family characteristics may influence locational decisions and thereby wage dispersions. Mincer argues that migration is discouraged when people are married, as well as by the presence of school-age children. The results show that being married in general is associated with a slightly higher wage differential than for other women. But the wage gap is not appreciably different for women when young children are present or not. Since household composition, particularly the presence of children, is closely tied to age and marital status, results are presented for women aged 20-44 by marital status and child status. The results show that the wage gap across residence is greater for married women without children compared to married women with children, especially for married women without children living in remote-rural areas. They on average earn 28 percent lower than their urban counterparts. There are also severe disadvantages for single mothers living in remote-rural areas compared to urban women. The wage for single women with children living in remote-rural areas is 23 percent lower than their urban counterparts. In general, the results provide some, but mixed support, for the idea that the deterrent effect of family ties on migration is reflected in interregional wage differentials.

The locational wage dispersion may be different for women with different disability status. The coefficients of the rural dummy variables were estimated separately for sub-groups of women with work limitations and without. It is interesting to find that there is less wage dispersion for women with work limitations by location. This supports the previous exclusion restriction that it is increasingly more difficult for employers to offer different wage levels on the basis of an individual's health. Overall, the results provide weak support for the idea that part of the rural-urban wage differential arises from immobility.

Differences in returns

Further evidence can be observed on the source of the rural-urban wage gap. Table 6 provides the results of specification IV from Table 5 where the returns by location for selected variables are allowed to vary across the rural and urban samples.

Table 6. Wage Equation for Rural-Urban Differences.

Model IV	Urban		Adjacent rural interaction		Nonadjacent rural interaction	
Variables	**Coeff.**	**S.e.**	**Coeff.**	**S.e.**	**Coeff.**	**S.e.**
Constant	1.368		-0.161		-0.532	
URBAN (REFERENCE)						
RURALADJ			-0.289 *	0.176		
RURALNAD					-0.212	0.165
EDULESS (REFERENCE)						
EDUHIGH	0.209 ***	0.015	0.029	0.041	-0.117 ***	0.033
EDUSOME	0.408 ***	0.017	0.039	0.050	-0.167 ***	0.039
EDUMORE	0.751 ***	0.018	0.060	0.050	-0.035	0.043
FULLEXP	0.030 ***	0.002	-0.011 **	0.006	-0.017 ***	0.004
FULLEPSQ/100	-0.081 ***	0.006	0.013	0.021	0.041 ***	0.014
MARYST	0.033 ***	0.010	-0.039	0.035	-0.007	0.028
WHITE (REFERENCE)						
BLACK	-0.108 ***	0.011	-0.039	0.040	-0.048 *	0.029
HISPANIC	-0.031	0.025	-0.336 ***	0.086	0.252 ***	0.086
OTHERACE	-0.223 ***	0.049	0.246	0.149	0.369 **	0.154
HOURS/100	-0.922 ***	0.207	-1.897 ***	0.566	1.301 **	0.508
$(HOURS/100)^2$	1.947 ***	0.401	3.199 ***	0.995	-2.945 ***	0.966
$(HOURS/100)^3$	-1.387 ***	0.336	-2.220 ***	0.757	2.586 ***	0.790
$(HOURS/100)^4$	0.484 ***	0.136	0.717 **	0.278	-1.047 ***	0.310
$(HOURS/100)^5$	-0.084 ***	0.026	-0.106 **	0.048	0.195 ***	0.057
$(HOURS/100)^6$	0.006 ***	0.002	0.006 *	0.003	-0.013 ***	0.004
TENURE	0.002 ***	0.0001	0.001 ***	0.0002	-0.0001	0.0002
NORTHEAST (REFERENCE)						
NORTHCEN	-0.095 ***	0.016	0.188 ***	0.055	-0.223 **	0.092
SOUTH	-0.171 ***	0.013	0.156 ***	0.045	-0.166 *	0.089
WEST	-0.041	0.027	-0.101	0.119	-0.347 ***	0.109
UNEMRATE	-0.011 ***	0.003	0.017 ***	0.006	0.016 ***	0.004
AMENRANK	0.017 **	0.009	0.091 **	0.040	0.053 **	0.027
DUMMY85 (REFERENCE)						
DUMMY86	0.007	0.016				
DUMMY87	0.029 *	0.016				
DUMMY88	0.029 *	0.016				
DUMMY89	0.029 *	0.016				
DUMMY90	0.026	0.016				
DUMMY91	0.028 *	0.016				
DUMMY92	0.099 ***	0.016				
u_{it}	-0.269 ***	0.009				
$\bar{u}_i$	0.208 ***	0.021				
Adjusted R^2			0.3704			
Number of observations			20062			
F-test			F[74, 19987] = 160.46			
Probability value			0.000			

Specifically, the rural dummy variables are interacted with all regressors in specification IV (except for time variables). Thus, column 1 in Table 6 reports the estimated coefficients for the explanatory variables for the urban sample, column 3 the estimated coefficients for the interaction terms between explanatory variables and the adjacent rural dummy variable, and column 5 the estimated coefficients for the interaction terms between explanatory variables and the nonadjacent rural dummy variable. Joint Wald tests on selected different sets of regressors to test the equality of the coefficients of explanatory variables on rural and urban labor markets are reported in Table 7.

Table 7. Wald Test of Equality of Rural-Urban Coefficients in Wage Equation.

Variables	Wald test	*p-value*
Ho: Urban education coefficients=adjacent rural education coefficients	1.5	0.685
Ho: Urban education coefficients=nonadjacent rural education coefficients	23.9	0.000
Ho: Urban experience coefficients=adjacent rural experience coefficients	14.2	0.003
Ho: Urban experience coefficients=nonadjacent rural experience coefficients	17.3	0.001
Ho: Urban race/ethnicity coefficients=adjacent rural race/ethnicity coefficients	19.3	0.000
Ho: Urban race/ethnicity coefficients=nonadjacent rural race/ethnicity coefficients	18.8	0.000
Ho: Urban hours of work coefficients=adjacent rural hours of work coefficients	23.0	0.001
Ho: Urban hours of work coefficients=nonadjacent rural hours of work coefficients	13.9	0.031
Ho: Urban tenure coefficients=adjacent rural tenure coefficients	14.9	0.002
Ho: Urban tenure coefficients=nonadjacent rural tenure coefficients	0.5	0.913
Ho: All urban coefficients=all adjacent rural coefficients	103.3	0.000
Ho: All urban coefficients=all nonadjacent rural coefficients	112.1	0.000

There are a number of variables where rural-urban differences are significantly different from zero. The structure of returns to education differs significantly between urban and remote-rural labor markets in particular. The joint Wald test of equality of urban education coefficients to remote-rural education coefficients provides a test statistic of 23.9, which is very significant at the 0.001 level. This means that regardless of education level, the urban wage is consistently higher in this overall model. *However, there is no evidence that the returns to education differ across urban and adjacent rural areas.* This result differs from the previous result that compares the rural adjacent and urban wages by education level, but without controlling other characteristics. Once these characteristics are controlled across areas, the differential by education vanishes. Remote-rural areas remain disadvantaged but rural areas adjacent to the cities do not.

There is strong evidence that returns to full-time work experience are lower in rural areas than urban ones. The coefficient estimates for experience in both rural adjacent and nonadjacent areas are negative and statistically significant. The joint Wald test rejected the equality of returns to experience across rural-urban areas. This means that full-time work experience in rural areas pays off less than for women in urban areas. The implicit conclusion from this result coupled with the previous result for education is that even among women living in adjacent rural areas with the same education as urban women find that their wages over time fail to reflect *to the same extent* the positive effects of work experience.

There is mixed evidence that minorities are disadvantaged if they live in rural areas. Black women earn significantly less than white women whether they live in urban or remote-rural areas. In general, the wage gap differs for different race/ethnicity women across rural-urban locations. In addition, there is evidence that returns to (lagged) hours of work different in rural and urban areas. The joint Wald test rejected the equality of urban hours of work coefficients to adjacent rural ones and the equality of urban hours of work coefficients to nonadjacent rural ones. Further, there is evidence that returns to tenure with the present employer differ in adjacent rural labor markets from urban ones. In adjacent rural areas, staying employed with the same employer appears to be a rewarding strategy for enhancing wages. In urban areas, women may need to switch jobs to enhance their upward wage mobility. Also in rural areas there may be more of an incentive to maintain consistent full-time employment with the same employer-- the sample may reflect this likely reality. Finally, the joint Wald test rejected the equality of all coefficients in rural versus urban areas. This implies that the rural-urban female wage gap persists after controlling for observed individual characteristics and unobserved ones suggesting the functioning of the rural and urban labor markets different.

Further Robustness Test

This subsection considers the robustness of the results just presented in the empirical analysis. Tests are conducted for: (1) separate samples for the 1980s and 1990s data; (2) separate samples for the PSID random sample and low-income sample; (3) the sample created by removing women who moved the year previous to the survey; and (4) cost of living adjustments.

To check whether the (time) period effect matters, the paper estimated the wage equation for the late 1980s sample and the early 1990s sample separately using the same two-step panel data estimation procedure. As can be observed, the rural-urban wage gap is stronger in the late 1980s. But there still exists considerable wage differentials between rural and urban areas even in the early 1990s, especially for remote rural areas. Since the PSID sample in the study is composed of equal probability samples (SRC sample) and the low-income families (SEO sample), the study also examines whether the rural-urban wage gap results are sensitive to the data source. As shown in Table 8, there is no evidence that the coefficient estimates of rural-urban dummy variables are much different in the SRC sample as compared to the SEO sample.

As discussed previously, the persistent rural-urban wage disparities may be related to immobility. In the PSID data, there is information available to identify who moved in the year previous to the survey year. Using this information, a sample is constructed for women who did not move the year prior to the survey for the entire sampled period. The estimated coefficients for the rural dummy variables for non-movers are presented in Table 8. The results are very close to the general sample. That is, there is no evidence that the sub-sampled women who do not move (in the next time period) experience a larger (or smaller) wage gap.

In this study, the Consumer Price Index , produced by the Bureau of Labor Statistics, serves as an approximation the of cost-of-living index to deflate the price data year by year (Fixler). However, the BLS only produces price indexes for a limited number of metropolitan areas, but not for rural areas (Citro and Michael). A comprehensive cost-of-living index does not exist. This paper adopts two approaches to examine the robustness of results of the demonstrated rural-urban wage gap subject to cost-of-living adjustments.

Table 8. Coefficient Estimates for Rural Variables for Different Specifications.

Model		III			IV		
Estimation method		OLS			OLS		
Correction of hours		Yes			Yes		
Hours equation	Sample	Dynamic			Dynamic		
Initial value	size	Exogenous			Endogenous		
Variables	**N**	**Coeff.**		**S.e.**	**Coeff.**		**S.e.**
Full sample	20062	-0.105	***	0.014	-0.103	***	0.014
		-0.219	***	0.012	-0.217	***	0.012
Sample for 1980s	12548	-0.113	***	0.018	-0.112	***	0.018
		-0.221	***	0.015	-0.220	***	0.015
Sample for 1990s	7514	-0.081	***	0.023	-0.080	***	0.023
		-0.190	***	0.020	-0.188	***	0.020
SRC sample	10785	-0.102	***	0.017	-0.103	***	0.017
		-0.222	***	0.016	-0.218	***	0.016
SEO sample	9277	-0.111	***	0.026	-0.106	***	0.026
		-0.224	***	0.019	-0.222	***	0.019
Subsample women	16166	-0.110	***	0.015	-0.111	***	0.015
who did not move		-0.228	***	0.013	-0.226	***	0.013
Add cost-of-housing	20062	0.040	**	0.016	0.041	**	0.016
index variable		-0.050	***	0.015	-0.050	***	0.015
Add housing value	20062	-0.082	***	0.014	-0.080	***	0.014
variable		-0.194	***	0.012	-0.192	***	0.012

First, this paper adds a regressor in the wage equation – the cost-of-housing index, developed by the National Academy of Sciences to capture the housing component of the cost-of-living. The NAS's housing index is calculated from 1990 census data on gross rent for two-bedroom apartments with specified characteristics. Index values were drawn from the 45^{th} percentile of the gross rent distribution (Citro and Michael, p197). The housing cost indexes are subdivided by census division and size of metropolitan areas. Using this method, the wage equation was re-estimated under the four specifications. Unexpectedly, women living in adjacent rural areas earn about 4 percent higher than urban women after controlling for other regressors. The magnitude of the coefficient estimates for the nonadjacent rural areas declined significantly. But there still exists a statistically significant wage gap (about 5 percent) between urban women and remote-rural women. Since the measure of the cost-of-housing index developed by NAS uses only 1990 rental cost information and assumes non-metropolitan areas homogeneous in terms of rental cost within each census division, this approach to cost-of-living adjustment may not be appropriate to apply uniformly to the 1985-1992 data.

The second approach to adjust for cost-of-living is to use the housing value variable collected for each family unit every year in the PSID data. This variable was added to the wage equation as a regressor. *The results show that even with this adjustment there are still significant wage gaps between rural and urban areas.* Women living in adjacent rural areas earn wages that are 8 percent lower than the wages earned by urban women after controlling for other explanatory variables. Women in remote-rural areas are significantly more disadvantaged. On average, their average hourly earnings are 19 percent lower than their urban counterparts. This provides additional support for the robustness of the empirical results of this paper.

CONCLUSIONS

This paper has provided an empirical analysis of the wage gap between women living in rural as compared to urban locations in the United States. Using PSID data for the period 1985-1992, this study estimated a two-step wage equation which took into account a set of potential important characteristics and effects. The paper finds that the wage gap between women living in rural and urban areas is significant, especially between women living in remote-rural areas and urban women. Women living in rural areas adjacent to the cities earn almost 10 percent less than urban women. Women living in remote-rural areas are even more disadvantaged. Their wages are around 20 percent lower than urban women. In addition, the study finds that individual demographic characteristics are important determinants of women's wages, as anticipated. The work-related variables also have significant effects on women's wages. Interestingly, the significant positive effect of the mean rank of the natural amenities scale shows that locations with high natural amenities are associated with high wages, not lower wages as might be expected if there are trade-offs between wages and amenities. To test the role of mobility costs, the results provide some but mixed support for the idea that part of the rural-urban wage differential arises from immobility—e.g., family responsibilities, regional ties, or higher costs of acquiring information about opportunities elsewhere, and so on (Dickie and Gerking; Greenwood; Osberg, Gordon and Lin). The findings suggest that the persistent rural-urban female wage gap cannot simply be explained by the immobility across rural and urban labor markets.

Nonetheless, the results provide support that the returns to certain characteristics are significantly different in rural and urban labor market (McLaughlin and Perman; Vera-Toscano et al). Further tests in the paper show that the paper's results are very robust subject to different sample selection criteria. That is, the results are very robust regardless of the time period, the subsample (SEO low-income PSID sample vs. random PSID sample, and non-movers). The conclusion does not change.

But could the conclusion change given adjustment for cost-of-living differentials across rural-urban locations? The result depends on the measure used. Using the cost-of-housing index developed by the National Academy of Sciences to adjust for cost of living, women in remote-rural areas still earn lower wages than urban women but women in rural areas near the cities actually earn slightly more. Using an alternative method -- housing value -- to adjust the cost-of-living, the paper finds that women living in rural areas earn 8-19 percent lower wages than urban women. The results suggest that current policy may need to focus on the cause of a rural-urban wage gap—which is likely to be the different structure of the rural-urban labor markets—to effectively mitigate the rural-urban wage gap among women.

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