INVESTIGATING DUAL LABOR MARKET THEORY FOR WOMEN

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INTRODUCTION

The theory of dual labor markets posits that the labor market is best described by two separate segments each possessing distinct features [Doeringer and Piore, 1971]. The primary sector is characterized by higher wages, greater returns to human capital, stable employment and desirable working conditions, while, in stark contrast, secondary sector jobs lack these attributes. Additionally, there are barriers to mobility between the two sectors, leading some workers to be rationed into the undesirable secondary sector. The theory of dual labor markets has been validated in the men's labor market [Dickens and Lang, 1985]. However, no evidence of segmentation was found for the women's labor market using a pooled sample of men and women from 1976 to 1984 [Friedberg, Lang and Dickens, 1988].

Since the early 1980's, many changes have occurred in the women's labor market. Women's labor force participation rates have continued the increase seen since the 1940's, with white women's participation rising from 53 percent in 1984 to 58 percent in 1992 and to 59% in 2004. For black women, the participation rates increased from 55 percent to 59 percent and then to 62% during the same time period [Economic Report of the President, 2005]. The largest increases in participation were seen among women with small children [Blau, Ferber, and Winkler, 1998].

Women's earnings were also catching up with those of men during that same period. The ratio of median female to median male earnings for year-round, full-time workers rose from 0.64 in 1984 to 0.72 in 1992 [U.S. Census Bureau, 1997a]. One contributing factor to this narrowing of the gender wage gap was the changing occupational mix of women [Sorensen, 1991]. Women have tended to move into executive and managerial occupations and away from administrative support occupations [U.S. Census Bureau, 1997b]. In addition, the labor market experience of women has also increased. These gender specific factors [Blau and Kahn, 1997] were strong enough to overcome the effects of a changing wage distribution that was increasing the rewards to both measured and unmeasured skills and thus adversely affecting low-wage workers. [1]

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In light of the many changes affecting the women's labor market, our objective is to re-examine the dual market hypothesis to see if later evidence, taking into account certain unique features of the women's labor market, supports a homogenous or a dual market for women. The dual labor market theory consists of two tenets: different wage setting mechanisms for different sectors and the presence of rationing in the primary sector. Rationing is an important part of the dual labor market theory because it implies that workers are not choosing the secondary sector because it has certain desirable yet unobservable characteristics. Rather, because of discrimination or other factors, a certain class of workers, distinguishable by race or other traits, is disproportionately found in the secondary sector. As Dickens and Lang [1985] discussed, if rationing exists then policy measures designed to train and further educate women in the secondary sector to facilitate their move into the primary sector are unlikely to succeed. On the other hand, if rationing is not present and women are choosing to be in the secondary sector, training programs may also fail if women are choosing secondary sector jobs for their non-pecuniary characteristics. This choice of labor market sector may also be related to decisions regarding education, fertility or the continuity of labor force participation [McCrate, 1990].

Section II reviews the existing literature on the dual labor market and segmentation theory. Section III includes a brief description of the econometric model used (the switching model with unknown regimes) and the data set. Section IV gives the results of the switching model, while section V summarizes and concludes.

LITERATURE REVIEW AND METHODOLOGY

Several authors have tested the theory of a segmented labor market for men in the United States. The first empirical tests of the dual-labor market theory divide workers into two sectors based on characteristics of their jobs (see Dickens and Lang [1993] for a comprehensive literature review). This work is criticized because it fails to account for the endogeneity of the sector in which a worker was employed. The most recent and rigorous of the various tests of the dual labor market is by Dickens and Lang [1985] utilizing a switching regression model with unknown regimes to test the theory of two labor markets. They find evidence that the men's labor market is significantly better described by two wage equations than by one, and that returns to education and experience, while positive and significant in the primary market, are insignificant in the secondary market. Friedberg, Lang, and Dickens [1988] test the dual labor market theory for men and women simultaneously, and find that, since more than 95 percent of women over the age of 30 fall into the secondary labor market, the dual labor market theory does not apply to the women's labor market.

There are several ways in which our work differs from, and improves upon, their analysis. First, we use a later data set (1992) than the one used by Friedberg, Lang, and Dickens which spanned 1976 until 1984. Arguably, women were still relatively new in the labor force during that time period, and their rewards to human capital, for example, may have subsequently changed. Evidence of these changes is seen in their study when they compare women of age 20-29 with their counterparts of age 30 and older. In 1984, while 95 percent of the older women were classified as being in the

secondary sector, only 25 percent of the younger workers were clearly in the secondary sector. This suggests a change in the women's labor market, which we investigate by analyzing the labor market in 1992 for 25-32 year old women.

Second, Friedberg, Lang, and Dickens estimate one model for both men and women simultaneously. Since it is certainly possible and evidence suggests [Blau and Beller, 1988] that men's and women's wages are determined by different factors, we estimate the switching model for women only.

Third, they use age minus schooling minus six as a proxy for years of experience. Based on the observation that women are more likely to move in and out of the labor force over the course of their lifetimes, it is vital to use a more precise experience measure to avoid as much measurement error as possible with respect to this variable (see Lambert [1993] for a comparison of various experience measures).[2] Our data set allows us to construct two additional proxies for human capital namely, tenure and time out of the labor force. Both these measures have a significant effect in our model.

SWITCHING MODEL AND DATA

Switching regression models are appropriate when determination of wages (or another outcome variable) is governed by different sets of parameters in different sectors and when these sectors cannot be exogenously defined. [3] In this paper, use of the switching regression technique is based on the theory that two wage equations may specify the women's labor market better than only one wage equation.[4] The labor market can be thought of as being divided into two sectors, each described by a semi-log wage equation:

$$ln(W_1) = X\beta_1 + \varepsilon_1 \qquad \text{and} \tag{1}$$

$$ln(W_2) = X\beta_2 + \varepsilon_2 \tag{2}$$

where W_1 is the wage in the first sector, X is the set of explanatory variables, including individual characteristics and labor demand factors (since these are reduced form wage equations), β_1 is the set of coefficients of the first sector, and ε_1 is the first sector error term, assumed to be distributed normally. W_2, β_2, and ε_2 are the corresponding variables in the second sector. Additionally, a third equation, known as the switching equation, endogenously allocates observations into one of the two sectors and is described by the equation:

$$Y^* = (ln\ W_1 - ln\ W_2)\ \Theta + Z\beta_z + \varepsilon_s \tag{3}$$

where Y^* is a latent variable determining the tendency for first sector employment, and Z is a set of additional explanatory variables that, together with the determinants of wages, affect sector determination. Finally, Θ, β_z and ε_s are the coefficient vectors and error of the switching equation, respectively. Since Y^* is a latent variable, it is not actually observed. However, we assume that if $Y^*>0$, then equation (1) will determine the woman's wage. On the other hand, if $Y^* \leq 0$, equation (2) will determine

the woman's wage. Thus, equation (3) can be thought of as determining which sector best describes each woman as a function of her individual characteristics. We estimate the model by substituting the wage equations (i.e., equations (1) and (2)) into the switching equation such that we estimate

$$Y^* = S\beta_w + \varepsilon_w, \tag{4}$$

where S contains the elements of X and Z.

Equations (1), (2), and (4) are estimated using the maximum likelihood method, assuming that the error terms are distributed jointly.[5] The joint estimation of all three equations illustrates the major benefit of using a switching regression technique as opposed to simple OLS, in which the sectors are determined exogenously. As demonstrated by Dickens and Lang [1993], arbitrary sector assignment may lead to a great deal of misclassification. Additionally, arbitrary allocation into sectors fails to account for the joint determination of a worker's sector and his or her wage within that sector. In the men's labor market, for instance, low wages and low returns to human capital may help to classify workers into what is traditionally called the secondary sector. It is not surprising, then, that the wage equation for the secondary sector exhibits these same characteristics of low wages and low returns to human capital.

The data set used is the National Longitudinal Survey of Youth (NLSY) from 1979 to 1993. We are concerned with the female subsample of the data, consisting of 6283 observations in 1979. This cohort of young women, ranging in age from 14 to 21 at the start of the survey, was interviewed every year with some attrition, yielding 4536 observations in 1992.[6] Of this subsample, we focus on those women who were working in 1992 and for whom all explanatory variables contained non-missing values.[7] This yielded 2445 observations. Since the oldest participants are only 34 years old in 1992, the conclusions we draw are applicable only to relatively younger women.

The vector of explanatory variables in the wage equations, as well as in the switching equation includes three proxies for human capital formation: years of schooling completed, years of work experience, and years of tenure in one job. These proxies capture formal and on-the-job human capital accumulation. Furthermore, a measure of time out of the labor force is included to account for the depreciation of human capital when an individual is neither in the labor force nor at school.[8]

We find the NLSY analytically appealing because, being a panel data set, it allows us to construct a detailed experience variable, accounting for actual weeks worked in each year, a detailed measure of time out of the labor force for various reasons, as well as an accurate measure of a woman's tenure within a particular job. This method of calculating labor market experience is preferable to approximating it as being the time from the end of schooling, since women's work histories tend to be more sporadic and less predictable than those of men. Also Lambert [1993] has demonstrated that misspecification of the experience variable leads to biased coefficient estimates, on both experience and education.

The experience variable is constructed by adding weeks worked in each year as reported by the respondent from the time the respondent was 16 until and including

1992. We convert weeks to years worked which is then used in the regressions. A related variable, time out of the labor force, is created in a similar fashion, where we exclude time out of the labor force due to schooling since such time out of the labor force is expected to appreciate, not depreciate, human capital. A third human capital variable capturing job-specific training, is tenure. The tenure variable is created by calculating the number of continuous years that an employee has worked for her most recent employer, whether or not the employee held the same position during that time period.[9]

Years of schooling completed are obtained from the highest grade reported as completed by the respondent in 1992.[10] To control for racial differences in wages due to discrimination or unobservable characteristics, we include a dummy variable which takes the value of 1 if the respondent is black and non-hispanic and 0 otherwise. Lastly, we construct a dummy variable which equals 1 if the respondent reported living in an urban area and 0 otherwise to control for differences in the cost of living, among other things. Prior estimations revealed significant racial differences in wage setting and sectoral allocations. In order to better understand whether this reflects different rewards to education by race, we included a race-education interaction term.[11]

We include two fertility variables as additional regressors in the switching equation. We did consider whether inclusion of fertility as an explanatory variable in the wage equation would introduce the problem of endogeneity that is well-known in the literature [Rindfuss et.al., 1980; Marini, 1984; Olsen and Farkas, 1989; Moore et.al., 1993; Geronimus and Korenman, 1992; Grogger and Bronars, 1993; Blackburn et al., 1993; Ribar, 1994; Hotz et al, 1997]. Various methods, such as instrumental variables, family fixed-effects models, the use of natural control groups such as the comparison of twin and single first births, have been used to identify the effects of fertility on labor market variables. Most of the recent results have found small or insignificant effects of teenage pregnancy on wages. (One exception is Klepinger et.al. [1999]). Therefore, fertility was not included in the wage equation as the potential gain was little, whereas the introduction of an endogenous variable into the wage equation would introduce bias.

RESULTS

Two separate results are reported in Table 1: the OLS regression and the switching regressions. The OLS regression treats the labor market as being homogeneous, whereas the switching regression endogenously sorts women into two sectors. These separate estimates allow us to conduct a likelihood ratio test[12] that confirms the hypothesis that two wage equations explain the women's wage setting mechanism better than does one equation. As we describe in detail later, the sectors are different even though the differences do not fit the traditional dual sector model. Since one attribute in particular, namely the mean wage, differs dramatically between the two sectors, we use the terms "high-wage sector" and "low-wage sector" to differentiate between them.

TABLE 1
Estimation Results, OLS and Switching Regression

Dependent Variable is the log of the wage
Standard errors are in parentheses.

		Switching Model		
Independent Variables	**OLS**	**High-Wage**	**Low-Wage**	**Switch**
Constant	0.660	0.630	0.461	0.895
	(0.097) **	(0.097) **	(0.522)	(0.342) **
Years of School	0.082	0.091	0.049	0.000
	(0.006) **	(0.006) **	(0.030)	(0.023)
Years of School x Black	0.037	-0.001	0.204	-0.024
	(0.012) **	(0.011)	(0.057) **	(0.033)
Experience	0.026	0.022	0.032	0.009
	(0.005) **	(0.004) **	(0.025)	(0.013)
Tenure	0.027	0.020	0.056	0.015
	(0.004) **	(0.004) **	(0.021) **	(0.012)
Time out of the labor force	-0.052	-0.049	-0.035	-0.034
	(0.007) **	(0.007) **	(0.031)	(0.019) *
Black	-0.648	-0.110	-2.941	0.273
	(0.166) **	(0.147)	(0.779) **	(0.436)
Urban	0.193	0.198	0.149	0.038
	(0.031) **	(0.029) **	(0.148)	(0.093)
Kids under 5				-0.116
				(0.063)*
Total number of children				-0.027
				(0.033)
Standard Error	0.583	0.401	0.932	1[a]
Covariance with Switching Error		0.621	0.003	
Log Likelihood	-2143.2		-1633.4	

a The standard error of the switching regression was normalized to one in the estimation.
* Significant at the 10 percent level.
** Significant at the 5 percent level

OLS

In the OLS equation, all three human capital variables: years of school, experience and tenure are significant positive influences on the wage, with one year of additional schooling contributing more to income than an additional year of experience or tenure. Time out of the labor force, a measure of human capital depreciation, significantly decreases a woman's wages. Being black is associated with lower wages. However, black women receive higher rewards to education than do white women. Urban residence, on the other hand, positively affects wages of women.

The Switching Model

The switching model results throw into sharp relief two factors that characterize the sectors: first, the creation and depreciation of human capital and second, race.

With regard to the human capital variables, the results for the high-wage sector are very similar to the OLS regression results as seen in Table 1. This is not surprising since the model sorts most of the sample into the high-wage sector. For the women that

are endogenously sorted into the low-wage sector, the results do look quite different. Years of schooling (for white women) and labor market experience are insignificant in the wage equation for the low-wage sector. Uninterrupted job tenure, however, is significant in this sector. The switching regression indicates that the time out of the labor force, presumably a proxy for the depreciation of human capital, is a significant predictor of being in the low-wage market. Finally, having small children under 5 years of age is a significant predictor of a woman's presence in the low-wage sector.

Comparing the two sectors, a seemingly surprising result that emerges is that the reward to tenure is higher in the low-wage sector. This counter-intuitive result may reflect an observation by Mincer and Ofek [1982] on the depreciation and restoration of human capital. They noticed that women who had re-entered the labor force experienced a rapid growth in wages. They explained this phenomenon as exhibiting a possible restoration of human capital depreciated while they were out of the labor force.

The general picture that seems to emerge is that the jobs in the two sectors reward different types of skills.[13] In the high wage sector a woman gets rewarded for the acquisition of general skills, reflected in positive returns to education and experience, as well as for the development of skills specific to her current job, as reflected in the coefficient on tenure. She is also penalized for time out of the labor force indicating rapid depreciation of her skills. In contrast, the white woman in the low-wage sector is rewarded only for specific training, as seen in the significant rewards to tenure and insignificant rewards to other forms of human capital formation. Her skills, however, once acquired do not seem to depreciate rapidly, as evidenced by a lack of penalty for dropping out of the labor force. This difference in the pattern of rewards to different types of human capital accumulation in the two sectors is also consistent with the significant influence of young children on a woman's labor market sector. Women with young children are more likely to be out of the labor market for longer periods of time than their counterparts who are either without children or whose children are older. Therefore, it is reasonable to expect women with young kids to be attracted to jobs that do not penalize them for intermittent labor force activity.

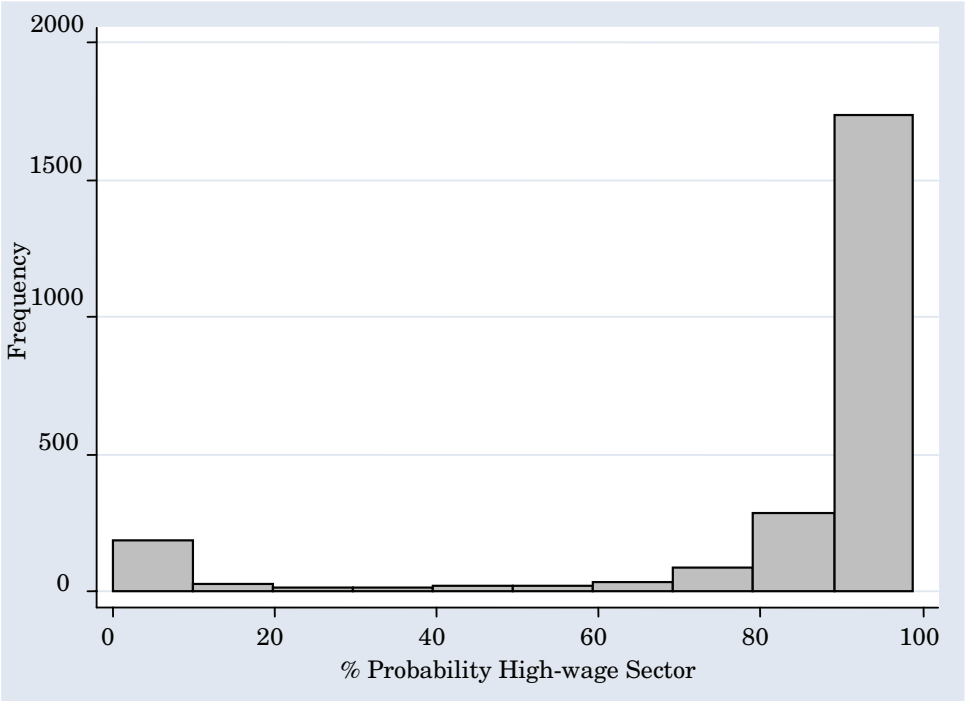
In addition to human capital differences, the two sectors also display a different pattern of rewards by race. OLS results indicate that while the return to a year of education for a non-black woman at the mean wage is $0.82, the return is $1.19 for a black woman. The switching model serves to further highlight racial differences in education rewards. In the high wage sector, returns to education are identical across race. However, within the low-wage sector, black women again see a substantially higher return to education than do their non-black counterparts (0.253 versus 0.049, based on point estimates[14]). This indicates that while blacks suffer a large wage penalty in this sector, this can be overcome with education. For instance, a white woman with 10 years of education (living in an urban area with mean values for all other variables) is predicted to earn an hourly wage of $3.95 while with 16 years of education she would earn $5.30 per hour. An equivalent black woman with 10 years of education, however, is predicted to earn a wage of $1.61; with 16 years of education, that figure jumps to $7.33. The results point to the possibility that at higher

levels of education, race may be acting as a proxy for certain positive unobservable influences on a woman's wage such as motivation, family support or role models. This is plausible if a black woman, by virtue of her race, has had more disadvantages to overcome than has a white woman with the same education.[15]

Characterizing the sectors

The next step is to examine what our switching results tell us about the characteristics of women in the two sectors. Figure 1 shows the distribution of the women by the probability of being in the high-wage sector.[16] The resulting histogram shows a clear bimodal distribution with some workers not clearly sorted into either sector. We consider a worker to be in the high-wage sector if her probability of being in the high-wage sector is between 0.7 and 1.0. On the other hand, if her probability of being in the high-wage sector is between 0 and 0.3, we consider that she is in the low wage sector. Those workers for whom the probability of being in the high-wage sector is between 0.3 and 0.7 are not clearly identifiable as being in either sector. This is consistent with the cutoffs used in the literature by Dickens and Lang [1985].[17] When we apply these cutoffs, 86.2 percent of the women are classified in the high-wage sector and 9.4 percent in the low-wage sector.[18]

FIGURE 1
Histogram of Predicted Probability of Being a High-Wage Worker



Once we classify women into different sectors, we look at the means of the variables used in our various regressions (see Table 2). The average woman in the high-wage sector has had 0.5 additional years of schooling, 1.6 extra years of experience, and 1.6 additional years of tenure as compared to the average woman in the low-wage sector.[19] Additionally, the average woman in the low-wage sector has spent more time out of the labor force than the average woman in the high-wage sector. There is no clear sectoral trend with respect to race or to urban residence.

TABLE 2
Means of Variables Included in Regressions, by Employment Sector

	High-Wage	Unknown	Low-Wage	All Workers
Number of Observations	2099	109	228	2436
Log wage	2.25	1.86	0.85	2.11
	(0.47)	(0.76)	(1.00)	(0.69)
Wage	10.6	9.01	4.39	9.95
	(5.05)	(8.91)	(8.28)	(5.93)
Years of School	13.42	13.25	12.92	13.36
	(2.29)	(2.54)	(2.56)	(2.33)
Experience	9.26	8.74	7.63	9.09
	(3.05)	(3.43)	(3.35)	(3.14)
Tenure	4.17	3.47	2.55	3.98
	(3.19)	(3.13)	(2.45)	(3.16)
Time out of the labor force	1.97	2.64	3.43	2.14
	(2.03)	(2.62)	(2.69)	(2.17)
Black	0.29	0.26	0.32	0.29
	(0.45)	(0.44)	(0.47)	(0.45)
Urban	0.82	0.79	0.81	0.82
	(0.38)	(0.41)	(0.40)	(0.38)

Standard deviations are in parentheses

In addition to assigning women to a sector based on the probability of high-wage sector attachment, we can also calculate the mean of the high-wage sector probability. Table 3 shows such a mean by selected occupations and industries. This helps us appreciate better the characteristics of the two sectors and to see how well our switching regression results match conventional notions of high and low-wage jobs. The numbers speak for themselves, but we highlight certain results that show the largest differences.

With regard to occupations, Table 3 shows that several occupations, such as accountants and economists, are very highly concentrated in the high-wage sector. Other occupations, such as secretaries, nurses, and managers and administrators, have a higher concentration of high-wage workers than does the economy overall. On the other hand, the mean of the high-wage probability variable for cashiers and child care workers is substantially below that of the economy as a whole. When industries are compared, we note that insurance, public administration, hospitals, banking firms, physicians' offices and real estate firms all have a larger concentration of high-wage

workers than does the economy as a whole. On the other hand, hotels and motels, grocery stores and private households employ a higher concentration of low-wage workers.

TABLE 3
Mean of High-Wage Sector Probability, by Selected Occupations and Industries

Occupation	Mean of High-Wage Sector Probability
Economists[a]	0.94
Accountants	0.93
Secretaries	0.88
Registered nurses	0.86
Managers and administrators	0.85
Elementary school teachers	0.85
All workers	0.82
Salesmen and sales clerks	0.74
Waiters	0.68
Cashiers	0.63
Child care workers	0.57
Industry	
Insurance	0.90
Federal public administration	0.88
Banking	0.88
Offices of physicians	0.87
Hospitals	0.86
Real estate	0.85
Legal services	0.85
All workers	0.82
Department and mail order establishments	0.81
Elementary and secondary schools	0.80
Eating and drinking places	0.73
Hotels and motels	0.71
Grocery stores	0.71
Private households	0.52

a There were only 6 economists in the survey.

Next, we use the segmentation results generated by the switching model to ask two important questions about the women in the two sectors. Do women seem to choose the labor-market sector that offers them the highest wages? And, are the wage differences that we observe between the two sectors compensating high-wage women for lower fringe benefits?

First, we focus on whether women are likely to be found in the sector where their expected wages are the highest. A finding that women are, in fact, not in the sector that offers them the highest wages, can be consistent with two possible explanations. One explanation is that women are being rationed into the low-wage sector. A woman is said to be rationed if, given her current characteristics including her actual education, experience, tenure and time spent out of the labor force, she would be earning a higher wage in the other sector. Rationing could imply that a woman is in the low-wage sector, not by choice, but because she faces discrimination in the high wage sector. Another possible explanation is that low-wage sector women are not facing a rationing situation, but are, instead, choosing to be in the low-wage sec-

tor due to certain job attributes unobservable to the analyst, but not to the woman who is choosing a job. [20]

TABLE 4
Estimation Results, Sector Prediction

Dependent Variable is the logistic transformation of the predicted probability of being in the high wage sector. Standard errors are in parentheses.

Independent Variables	
Constant	2.863
	(0.453) **
Predicted wage differential (i.e., predicted wage in high wage sector minus predicted wage in low wage sector)	-2.028
	(0.710) **
Kids under 5	-0.024
	(0.396)
Total number of children	-0.846
	(0.158) **

* Significant at the 10 percent level. ** Significant at the 5 percent level

To examine this we employed a simple test[21] in which we predicted, for each woman, her labor market sector, as well as the wage she would expect to earn in each of the two sectors. We then analyzed a regression model in which a logistic transformation of the expected probability of being in the high wage sector was modeled as a linear function of the difference in wages between the high and low wage sectors. The regression equation also included, as regressors, the presence of children under the age of five and the total number of children in the household. We found a negative and significant effect of the wage differential (defined as expected high-wage sector wage minus expected low-wage sector wage) and the presence of an additional child on the probability of being in the high-wage sector (see Table 4). As discussed, this could be consistent with women being rationed into the low-wage sector.[22] We cannot, however, rule out the possibility of women choosing to be in the low-wage sector because of non-pecuniary benefits, such as the ability to be home at guaranteed times. These non-pecuniary benefits may be increasingly valuable as the number of children in the household increase. They may also choose to work in the low-wage sector if they have intermittent labor force participation since their skills will not depreciate during their time out of the labor force. The coefficient on the number of children indicates that one additional child will reduce the probability of primary sector employment for the mean woman from 0.81 to 0.66.

Second, we examine whether the difference in wages between the sectors is actually a compensating differential, caused by higher fringe benefits in the low-wage sector. Table 5 takes a closer look at the pattern of benefits characterizing the two sectors. Women in the high-wage sector are approximately twice as likely as women in the low-wage sector to obtain medical, dental and life insurance, as well as retirement benefits. A similar disparity exists in the availability of profit sharing and of training/educational opportunities. Even in the case of maternity leave 80 percent of high-wage sector women benefit as against 44 percent in the low-wage sector. It is in the matter of flexibility of work schedules and the availability of subsidized childcare that the two sectors approach some semblance of parity. This provides additional,

circumstantial evidence that the low-wage sector is comprised mainly of women whose labor force participation was not continuous, most likely due to the presence of children in the home.

TABLE 5
Percentage of women receiving selected benefits in the high-wage and low-wage sectors

	High-wage	Unknown	Low-wage
BENEFITS:			
Medical Insurance from employer	82%	64%	48%
Life insurance from employer	72%	55%	37%
Dental insurance from employer	64%	47%	31%
Maternity leave from employer	80%	68%	49%
Retirement benefits	67%	48%	35%
Flexible work schedule available	53%	44%	54%
Profit sharing available	33%	19%	15%
Training/education opportunities	59%	41%	29%
Subsidized child-care by employer	11%	11%	12%

CONCLUSION

A previous attempt to test the dual labor market theory using a pooled sample of men and women from 1976 to 1984 [Friedberg, Dickens and Lang, 1988] did not yield evidence of segmentation for the women's labor market. Using a switching model with unknown regimes, but with a more recent data set and also accounting for the unique characteristics of women's labor force behavior, we examine whether the women's labor market can be described by a single wage setting mechanism, or whether it is better described by two sectors.

Our paper builds on previous work in several ways. First, our data set, which is a subset of the National Longitudinal Survey of Youth (NLSY) in 1992, only includes women, since it is likely that the rewards to human capital are different between the two sexes. Second, in order to take into account the more intermittent nature of women's labor force participation, we have refined the measures of human capital appreciation (experience and tenure) by excluding periods in which the woman reported that she was not working. We have also constructed a proxy of human capital depreciation (time out of the labor force except for schooling).

Even though a likelihood ratio test indicates that two sectors explain the wage setting mechanisms in the women's labor market significantly better than one, the differences between the sectors do not completely fit into the dual theory framework. In particular, the low-wage sector does show significantly positive returns to some aspects of human capital formation and we find this is consistent with the significant influence of young children on a woman's labor market sector. Furthermore, given that we find that women do not always react to higher wages by switching to the high wage sector, the presence of rationing cannot be ruled out. The significant influence, however, of young children on a woman's labor market sector, cautions us that we cannot rule out the possibility that women may, in fact, be making a deliberate choice in choosing jobs that do not penalize them for intermittent labor force activity. Since

we find that the women's labor market does not, therefore, exhibit the traditional dual labor market segmentation observed in the men's labor market, we do not feel that it is appropriate to use the terms "primary" and "secondary sector" to describe our results. Since our analysis reveals that one of the significant differences between the sectors is the mean wage, we term the sectors "high wage" and "low wage" to differentiate them.

Two factors, namely race and human capital formation, differ in their effects on wages in the two sectors. In the high-wage sector women, regardless of race, experience significant returns to general and firm-specific human capital formation. These skills, however, depreciate rapidly if the woman leaves the labor force. In contrast, in the low wage sector, time out of the labor force does not seem to indicate a depreciation of human capital for women of either race. Racial differences do show up however, in the low wage sector in rewards to general training. Race is a disadvantage for the black woman in this sector, but she can overcome this disadvantage through education and uninterrupted job tenure. On the other hand, her white counterpart only receives returns to job-specific skills. Our interpretation of the results indicate that one sector is primarily composed of white women who tend not to have labor force interruptions, while the other sector is mainly comprised of women who tend to move in and out of the labor force more frequently.

Taking into account the intermittent nature of the labor force is important, since women who do take time out of the labor force are more likely to be in the low wage sector. Our results are consistent with the prediction of Mincer and Ofek [1982] that women on their return to the labor force would 'catch up' with their contemporaries by getting a relatively high reward to human capital. Specifically, the reward to tenure, which reflects human capital acquired "on-the-job", is higher in the low-wage sector. In contrast, the penalty for time spent out of the labor force, which reflects depreciation of human capital, is higher in the high-wage sector. Not surprisingly therefore, time out of the labor force is a significant predictor of being in the low-wage sector.

Our results indicate that, even in the absence of traditional segmentation, aggregating women into one labor market sector tends to obscure significant differences in rewards to human capital between women. Additionally, our work shows that accounting for the intermittent nature of women's labor force participation is essential in analyzing the wage setting mechanism in the women's labor market.

One policy implication of these results is that women will benefit if programs are put into place that allow them, if they choose, to remain in the labor force continuously. Continuous labor force participation gives women a higher probability of being employed in the high-wage sector and gives then a higher wage within that sector. If programs such as child care subsidies and high-quality day care are available to women, then women who want to remain in the labor force will be able to do so and earn the higher wages which result.

NOTES

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1. It has been estimated by Blau and Kahn [1997] that these changes in the overall wage structure were responsible for retarding by about one-third to two-fifths the potential gain in the relative wages of women.
2. For a discussion of the importance of taking actual experience as opposed to potential or predicted experience see Filer [1993]. For a spectrum of different work history variables, see Wellington [1993]. Hotchkiss and Pitts (2003) have created an intermittency index that takes into account both frequency of intermittent spells and the duration.
3. For example, the switching regression model has been employed to determine the appropriate distinction between full-time and part-time workers [Hotchkiss, 1991] and to estimate the wage determinants of public and private sector workers [Van der Gaag and Vijverberg, 1988].
4. Dickens and Lang [1985] were the first to use this technique in the economics literature to test for segmentation in the men's labor market.
5. The log-likelihood function is

$$\sum_{i=1}^{n} \ln\{[1-\Phi(\frac{-X\beta_w-\frac{\sigma_{1w}}{\sigma_{11}}\varepsilon_{1i}}{(1-\frac{\sigma_{1w}^2}{\sigma_{11}})^{.5}})]\phi(\varepsilon_{1i},\sigma_{11})+\Phi(\frac{-X\beta_w-\frac{\sigma_{2w}}{\sigma_{22}}\varepsilon_{2i}}{(1-\frac{\sigma_{2w}^2}{\sigma_{22}})^{.5}})\phi(\varepsilon_{2i},\sigma_{22})\},$$

   where $\phi(.)$ and $\Phi(.)$ are the normal density function and the cumulative distribution function. Furthermore, σ_{ab} is the covariance of ε_{ai} and ε_{bi} and σ_{ww} is normalized and set equal to one.
6. We do not pool observations of women across time since this would most probably lead to heteroscedasticity and autocorrelation which we are not able to correct in this switching regression framework.
7. Additionally, we restricted our analysis to women who worked at least 400 hours during 1992 (more than 10 full-time weeks). Other authors have restricted the sample to full-time, year-round workers. Because of the transitory nature of the labor force participation of many women, we felt that this would omit an important group of female labor force participants. Our sample has the advantage of including an expanded pool of women, namely those who worked at least 400 hours during the year. Obviously, the choice of 400 hours is arbitrary. However, the results are robust to the exact cut-off point used.
8. Polachek [1981] as well as Mincer and Ofek [1982] find that, in certain occupations, skills atrophy during periods of non-employment.
9. We also examined specifications that included squared terms on education, experience, tenure, and time out of the labor force. None of these variables were significant in our sample. The reported results do not include these variables since the inclusion of too many covariates leads to the non-convergence of the maximum likelihood algorithm.
10. An alternative specification would have been to include separate dummy variables for different levels of education completed. This, however, would have restricted the degrees of freedom available and made estimation of the switching model impossible due to non-convergence. We therefore decided to use a linear education variable to ensure convergence.
11. We have included an interaction term between black and education, since preliminary estimates indicate a counterintuitive result: namely, that a likelihood ratio test fails to reject the hypothesis that the two coefficients of education are the same in both sectors. It should first be noted that, for both the OLS and the switching specifications, inclusion of the interaction term results in a significantly better specification. Additionally, other coefficients are robust to this specification change. Naturally, we would expect variations in rewards by race due to differences in experience and tenure. However, inclusion of these interaction terms resulted in coefficients insignificantly different from zero.
12. The likelihood ratio test compares twice the difference between the log likelihood values (1020) with the 1 percent critical value for the chi-squared distribution with 17 degrees of freedom (33). Please note that, although asymptotically the test statistic may not be distributed as chi-squared, Goldfeld

and Quandt [1976] suggest that a conservative test using the chi-squared distribution sets the degrees of freedom equal to the number of constraints plus the number of unidentified parameters in the restricted (OLS) model.

13. Years of schooling and tenure are marginally significantly different in the two sectors (p-values of 0.16 and 0.12 respectively for a two-sided test), while experience and time out of the labor force are not.
14. In fact, the return to education for white women is insignificantly different from zero in the low-wage sector, with a p-value of 0.108.
15. Ashenfelter and Zimmerman [1997] confirm an upward bias in the returns to schooling due to omitted variables including unobserved family background variables as well as motivation and ability.
16. The probability that a given worker is in the high-wage sector, conditional on her personal attributes and her wage is given by

$$\frac{\Pr(\varepsilon_{w1i} > -X_i\beta_w | X_i, \varepsilon_{1i}) * f(\varepsilon_{1i})}{\Pr(\varepsilon_{w1i} > -X_i\beta_w | X_i, \varepsilon_{1i}) * f(\varepsilon_{1i}) + \Pr(\varepsilon_{w1i} \leq -X_i\beta_w | X_i, \varepsilon_{2i}) * f(\varepsilon_{2i})}$$

17. Our results are robust with regard to the exact cut-off values used.
18. As a basis of comparison, in Dickens and Lang's [1985] study of the men's labor market, 12.4 percent of the sample was sorted into the secondary sector.
19. The sectoral means are significantly different for all variables except for race and urban residence.
20. A word of caution: even if no evidence of rationing is found, we cannot rule out "pre-market rationing", that is, women being rationed into certain levels of education, which then affect their earnings in the labor market. Pitts [2003] categorizes women into female and non-female dominated occupations. Taking selection bias into account, her research mitigates support for the occupational crowding model.
21. This test was suggested by an anonymous referee.
22. Dickens and Lang [1985] in their study of the men's labor market do find evidence of rationing. Specifically, they conclude that black men face discrimination when seeking employment in the primary sector.

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