Effects of intermittent labor force attachment on women's earnings

Women who leave the labor market for family reasons often return to wages lower than those of women who did not; they lose seniority, are less likely to receive on-the-job training, their job skills may depreciate, and employers may believe they will again take a leave

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Women who interrupt their careers and leave the labor market for family responsibilities often return to find that their wages lag behind those of women at comparable stages in their careers who did not leave the labor force.

Many reasons account for this lag. First, women who leave the labor force and later reenter do not build up seniority, which, by itself, often leads to higher wages. Second, women who return to the labor force are less likely to receive on-the-job training to increase their productivity and thereby raise their pay. Third, when women are not in the work force, their job skills may depreciate. Finally, employers may view gaps in work history as a signal that women who leave may do so again. Some employers would therefore hire them for less important, lower-paying jobs to limit the impact of a future decision to leave.

But calculating the cost of intermittent labor force attachment is difficult. Typically, these costs are measured in terms of earnings paths; women who leave the labor force have lower earnings paths than those of women who remain.

This article calculates the cost of taking a break from work in terms of the wage difference between women who work continuously and women who take one or more leaves. We attempt to control for observable and unobservable heterogeneity to uncover temporary and lasting effects a gap in labor force attachment can have on wages.

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Previous research

Most researchers would agree that earnings will be less for workers who take a break from work than for those who work continuously. But researchers are generally less likely to agree on the magnitude of this effect. Those who do not leave the work force tend to be younger and better educated than those who do. Therefore, using the group that has worked continuously as the standard for what would have been earned had a worker not taken a break would over-estimate foregone earnings.

In addition, cross-sectional estimates may be biased by cohort effects that obscure the wage changes a woman may experience when she reenters the labor market. Nevertheless, studies that run earnings regressions to correct for observable differences and that include some measurement of effects of gaps in labor force participation reveal that gaps affect earnings.[1] In qualifying these results, researchers have focused on different aspects of the effects of intermittency. One hypothesis is that earnings will rebound soon after women reenter the work force.[2] However, L.S. Stratton suggests that the rebound effect after re-entry doesn't occur.[3] She hypothesizes that women returning to the work force who find their wages lower than they had expected are quite likely to leave again. Thus, Stratton concludes, over time only the relatively high-earning women who have had a break in labor force participation will be left in the work force.

This article tests for the rebound effect by re-

stricting the sample of women with labor force breaks to those women who display continuous labor force attachment for an extended period after a break. By limiting the sample to this subgroup of women, one source of unobservable heterogeneity is eliminated. Furthermore, by holding the sample constant and examining wages at several points in time, we can closely study the effects of increasing time following a work gap.

Our results differ from those of J. Mincer and H. Ofek, and Stratton. We find that when women re-enter the labor market, their earnings are much lower than those of a comparable group of women who did not leave the labor market. Over time, that difference diminishes (due to the rebound effect), but never disappears, even after as long as 20 years.

The data

The data used in this study are from the 1984 panel of the Survey of Income and Program Participation.[4] Each individual in the data set was placed in 1 of 4 rotation groups that were interviewed in successive months, and was interviewed eight times at 4-month intervals. Participants were asked in each interview about their labor force participation in the previous 4 months.

This technique produced data for 32 consecutive months for each individual, with a sample period covering June 1983 to April 1986. In addition, the survey contains detailed work histories of individuals before they entered the sample. These work histories are used to identify gaps that occurred before the sample period began.

How the sample was selected. Only women aged 30 to 64 at the start of the sample are included. The lower age limit allows women sufficient time to have had at least one work interruption. Second, only women who work relatively continuously during the 32 months of the sample are included. To be included in the sample, a woman must report earnings in the 1st, 6th, 12th, 18th, 24th, and 32nd months of the sample.[5] Thus, women are included only if their gaps in the sample period were shorter than 6 months. In this study, we are not interested in modeling earnings effects from short leaves, such as maternity leaves; we are trying to include the majority of women, such as teachers, who have seasonally intermittent work schedules.

To be included among the sample of women with labor force breaks, a woman must have taken at least one break from work of 6 months or longer between the year she received her last educational degree[6] and the beginning of the survey.[7] This includes women who worked before taking a break, and women who had an initial gap between the year of their last degree and the year in which they started working.[8]

The unadjusted geometric mean wage ratio of those who left the work force and those who did not is 1.33 at the start of the sample and falls to 1.30 after 32 months.[9] (See table 1.) Women who did not leave the work force are significantly younger and have more education on average than

Table 1. Sample means for women who remained in the labor force (no gaps) and women who left the labor force (1 or more gaps) in the first month of the sample

Item	Women who remained in the work force (no gaps)	Women who left the work force (1 or more gaps)
Number of people	696	1,730
Wage (T=1)	8.83	6.61
(T=18)	9.72	7.23
(T=32)	9.76	7.49
Log wage (T=1)	2.07	1.78
(T=18)	2.16	1.87
(T=32)	2.17	1.91
Years of education	14	12
Percent without high school diploma	6	21
Percent with high school diploma	33	47
Percent with some college	27	19
Percent with college degree	15	7
Percent with graduate work	19	6
Age distribution	39	45
Percent part-time	12	24
Total years worked	17	17
Occupational group:		
Percent professional/executive	38	21
Percent service occupations	10	17
Percent craft occupations	2	3
Percent pink collar/blue collar	50	59
Residence in South	20	16
Residence outside Metropolitan Statistical Areas	24	25
Race/ethnicity:		
White (non-Hispanic)	81	82
Black (non-Hispanic)	13	11
Hispanic	3	3
Other	3	4
Marital status:		
Married	58	70
Widowed	3	5
Divorced	21	21
Never married	18	4
Number of children ever born:		
None	39	9
1	18	14
2	24	33
3 or more	19	44
Years since last gap (at T=1):		
0 to 1 year	–	6
2 years	–	5
3 to 5 years	–	14
6 to 10 years	–	24
11 to 20 years	–	33
More than 20 years	–	18

NOTE: Dash indicates data are not applicable.

those who did leave. Total work experience is the same for the two groups, which reflects the higher age and lower educational attainment of the women who left the work force. These women are much more likely to be working part-time and are more heavily represented in the service occupations and the lesser-skilled occupations, both blue-collar and "pink-collar" (such as administrative support occupations, medical technicians, and machine operators).

Women who leave the work force are more likely to be married and to have children than are their counterparts who remain in the work force. For the women who leave work, the average length of time since their last gap was 13 years.[10] This last gap lasted an average of 7.5 years, although the median, at 4.5 years, was shorter. Of the women who answered the question, "What was the reason for the last gap?," 85 percent responded that this leave from the labor force was for family reasons. Other possible reasons included poor health and inability to find a job; leaving work to attend school is not counted as a gap.

The unadjusted data show an average annual rate of wage growth of 3.9 percent for women who don't leave the labor force and 4.7 percent for women who have left the labor force. However, over the last 14 months of the sample, the annual rate of wage growth is 0.6 percent for women who haven't left work, compared with 3.1 percent for those who have.

The observed differences between the two groups in education and occupational distribution, and in marital status and number of children, are significant, and lead to our use of multiple regression analysis below. We do not attempt to address the issue of whether women plan their human capital investments in anticipation of future gaps, nor do we attempt to differentiate between people who did or did not intend to leave the labor force. However, anticipation of leaving the labor force can lead to lower earnings over a woman's worklife if she invests in less human capital, or in human capital that yields lower returns, but depreciates at a slower rate during periods when a woman has left the work force.[11] These investment effects on earnings are not measured here.

One argument that could be made is that women who leave the labor force earn less money to begin with than do their counterparts who remain at work. According to this argument, their lower wage upon reentry does not indicate a significant loss relative to their earning power before exiting employment. To address that question, we looked at the subset of this group (25 percent of women who leave the labor force) who reported the wage they were receiving at the time they began their last separation from work.

This subsample is slightly younger than women in general who have left work (43 instead of 45 on average); the length of time they have been out of work is skewed toward shorter lengths (54 percent have been working 5 or fewer years since ending their last period away from work;[12] and their wage in the first month of the sample is lower ($5.93 instead of $6.61).[13] We expressed their previous wage in 1984 dollars to correct for the rate of price change, as measured by the Consumer Price Index.

Because the CPI generally increased by less than the rate of growth of nominal wages, we are biasing against a finding that would support our work, which is that wages depreciate significantly during a gap. Yet we find that the wage earned by sample members before beginning their last gap had a mean of $7.76, which is more than 30 percent higher than their wage in the first month of the SIPP sample. This implies that because the majority of women who left the work force had been working for several years when they entered the survey, their wage upon reentry to employment was even lower.

This is a substantially different result than was found in the work of Corcoran and Stratton, who also use U.S. data, but from the Panel Study of Income Dynamics and the National Longitudinal Survey of Young Women. Their studies find little depreciation when comparing the wage before leaving work with the wage earned upon returning to work. Our data are telling a different story about wage changes due to gaps in work.

Empirical results

The next step in our analysis was to estimate regressions whose dependent variable was the natural logarithm of the hourly wage. A regression equation will show the direct effects on wages of gaps occurring at different times in the past, and will allow for calculation of wage ratios that control for differences in age, education, work experience, and other factors between those who have left the work force and those who remained at work. (See table 2.) The regression equation is estimated at three different points in the sample: the 1st, 18th, and 32nd month of the sample period.[14] The independent variables are divided into two types. The first includes variables that control for individual characteristics including age, geographic location, occupation class, and human capital.

The second type of variables is a set of dummy variables for number of years since a worker ended her last absence from the labor force, measured from the beginning of the survey; for any observation, the values of these dummy variables are the same in all three equations. For example, a woman who concluded a work gap in the year before the survey began will be assigned the dummy variable for a 1-year absence for all 3 years; as a result, for her the coefficient on the dummy will stand for the effect of one year since the absence ended in the first equation, two years since the

Table 2. Regressions on log wage, at three points during the sample period

Item	T=1	T=18	T=32
Time since gap (at T=1):			
0 to 1 year	-0.33	-0.29	-0.20
	(7.51)	(6.85)	(4.61)
2 years	-.27	-.27	-.24
	(5.58)	(5.99)	(5.13)
3 to 5 years	-.20	-.14	-.16
	(6.26)	(4.76)	(5.30)
6 to 10 years	-.12	-.10	-.07
	(4.73)	(4.23)	(2.64)
11 to 20 years	-.10	-.07	-.06
	(4.08)	(3.17)	(2.61)
More than 20 years	-.07	-.08	-.05
	(2.11)	(2.77)	(1.76)
Total years worked	.003	.004	.003
	(2.67)	(3.64)	(2.89)
Hours and weeks less than 35 (1=yes)	-.13	-.15	-.15
	(6.28)	(7.67)	(7.17)
South (1=yes)	-.07	-.07	-.08
	(2.90)	(3.49)	(3.45)
Rural (1=yes)	-.15	-.15	-.16
	(7.91)	(8.15)	(8.59)
Age	.02	.01	.01
	(2.06)	(1.24)	(1.43)
Age ² 1,000	-.24	-.16	-.18
	(2.24)	(1.60)	(1.74)
Education level (no high school diploma is omitted class):			
High school diploma	.13	.11	.10
	(5.11)	(4.59)	(4.20)
Some college	.27	.25	.25
	(9.28)	(8.81)	(8.70)
Bachelor's degree	.32	.32	.30
	(8.62)	(8.95)	(8.29)
Graduate work	.41	.44	.43
	(10.35)	(11.70)	(11.19)
Occupation (pink collar/blue collar omitted class):			
Professional	.20	.21	.17
	(8.54)	(9.57)	(7.79)
Service	-.25	-.29	-.28
	(10.16)	(12.37)	(11.25)
Craft	.14	.10	.06
	(2.85)	(2.25)	(1.21)
Intercept	1.39	1.67	1.63
	(6.69)	(7.91)	(7.21)
Log wage (dependent variable mean)	1.86	1.96	1.98
Adjusted R^2	.35	.40	.36

NOTE: Coefficients significant at the .05 level. t-statistics in parenthesis.

absence in the second equation and three years since the absence in the third. Measuring the dummy variables this way allows us to examine if the wages of the same group of women change as the amount of time lengthens over the duration of the survey since the end of their last period out of the labor force.

A lasting negative effect and a gradual rebound effect resulted from the period out of the labor force. (See table 2). The coefficients on the dummy variables that control for the number of years since the last period out of the work force clearly show that the large initial negative effect of the work gap decreases as the gap recedes into the past. In addition, examining the 3-year pattern of the dummy coefficients provides strong evidence that the decline in the negative effect of a gap is not due solely to women with low wages leaving the labor market.

For every period out of the labor force, the value of the dummy coefficient is largest in the first period and smallest in the last, implying that for any particular length of time out of the labor force, 2-1/2 years of continuous labor force attachment will, on average, diminish the difference in wages between those who have left the work force and those who remained. For example, in the initial period, women whose gaps ended less than 1 year ago had wages that were 33 percent lower than those of women who did not leave the labor force. By the third year (when they would have returned to the work force more than 3 years ago) these women's wages were only 20 percent lower than those of women who remained in the labor force. This coefficient is the same as the coefficient on the dummy variable that women whose last gap was between 3 years and 5 years ago received in the regression for the first period.

The results reported above held, regardless of changes to the equations described below.[15] Initially, different equations were used for those who left and those who remained in the labor force. The two groups were combined and an F-test [16] of whether the two groups could be pooled was conducted; the test did not reject the hypothesis that the two groups could be pooled. Therefore, only the pooled results are shown. Alternative specifications included three possibilities:

- including a variable for the total length of the last period out of work, or including a set of variables for length of this period interacted with the dummies modeling time since the end of this period;
- marital status, either as a dummy variable for whether or not the woman was currently married, or as a dummy variable for whether or not the woman had ever been married;
- either a dummy variable noting whether the woman had ever had children, or a continuous variable for the number of children ever born.

These alternative specifications did not substantively change the results, although the above variables had a very small (but statistically significant) negative effect. However, the dummy variable that indicated currently married was statistically insignificant.

Another alternative specification included a set of variables using a dummy indicating whether the length of time out of the labor force was more than 4 years (the median gap length), which was interacted with the dummies modeling elapsed time since the gap. This set of additional variables did not pass an F-test for significance of their inclusion. A variable indicating whether the person had numerous periods out of the labor force was not significant; neither was a

quadratic term in experience, nor a variable indicating whether the employee generally worked full-time or part-time throughout her worklife.[17]

Including local labor market features, such as monthly unemployment rates by State, also was not significant.[18] Finally, including a dummy signifying nonwhite or Hispanic status was not significant, and a pooling test for whites and nonwhites did not reject the hypothesis that the two groups could be pooled.

Although there is strong evidence for a partial rebound effect, the wages of women who have taken a leave from the labor market never catch up to the wages of women who never left. Even women whose labor force gap occurred more than 20 years ago still earn between 5 percent and 7 percent less than women who never left the labor force and have comparable levels of experience; in the last year, however, this difference is significant only at the 10-percent significance level.

One possible interpretation is that even after many years, employers view work gaps as a signal that the individual is not as dedicated a worker as a woman who did not leave the work force. This view may be reflected in reduced promotion possibilities, different job assignments, and other actions by employers that reduce wages.

To illustrate the cost of taking an employment gap for a particular case, assume a woman with the following characteristics: graduates college at age 21, immediately begins full-time work (40 hours a week, 50 weeks a year) in a pink-collar occupation, lives in a city outside the South. She leaves work when she is 25 years old for 7 years and re-enters full-time work in 1984 at age 32. We assume a real interest rate equal to the rate of real wage growth and use the growth rates calculated from the regression for time t=1. In this case, the present (1984) value of the difference between her earnings for the 20 years after she re-enters and what they would have been had she remained constantly employed is $52,000. Part of this is caused by her fewer years of experience; part is due to her decision to leave the labor force. This amount is equal to 15 percent of her prospective earnings had she worked constantly, or approximately 3 years of wages—a considerable difference. Thus, the cost of taking a 7-year gap is 10 years of earnings.

Unadjusted geometric mean wage ratios and adjusted geometric mean wage ratios that are calculated using the regressions reported are listed in the following tabulation. The adjusted geometric mean wage that is calculated using the regressions illustrates how much of a wage differential remains between the groups of women who did not leave the work force and those who did, even after controlling for differences in mean values between the two groups:

	Unadjusted	*Adjusted*
t=1	1.33	1.14
t=18	1.34	1.12
t=32	1.30	1.10

The first column displays the unadjusted ratios of wages of women who did not leave the work force to those who did at the three points in time of the sample. The second column holds differences in mean values for age, education, total years experience, and so on, constant for the two groups. It is calculated by taking the antilog of the negative of the summation of each gap dummy coefficient multiplied by the proportion of the women who left work experiencing the length of the gap in labor force participation. This has the effect of reducing the wage differential at each point in time, but does not eradicate it, indicating that a work gap is important in explaining differences in earnings between the two groups.

Additionally, the pattern of a rebound effect is demonstrated more clearly by holding constant other factors affecting the wage. After 32 months, the adjusted ratio has dropped from 1.14 to 1.10, indicating that women who remained at work still receive a wage 10 percent higher than their counterparts who left the labor force.

In sum, optimists and pessimists can take some solace from our results. On the optimistic side, wages that drop because of a break from the work force rise over time. On the pessimistic side, however, the negative effects of a break in earnings are quite persistent; they remain discernible even 20 years after the last break has ended.

In addition, the effect of a gap on a woman's lifetime earnings is significantly larger than just her foregone wages during the time away from work. This last finding has significant implications for the way in which compensation between husband and wife is calculated in divorce proceedings.

One obvious extension of this work is to discuss the male-female wage ratio and the contribution that gaps in work make toward explaining the gender pay gap. Another extension is to develop a model that simultaneously predicts who will take a leave from work with what womens wages will be in various life situations. This will allow our analysis to be extended to all women rather than just the specific subset we analyze in this article. The narrower focus of this article, however, has allowed for discussion of the rebound effect, and has provided a clearer idea of how sustained gaps in employment can influence female earnings. □

Footnotes

Acknowledgment: The data used in this paper were made available by the Inter-university Consortium for Political and Social Research. The data for Survey of Income and Program Participation, 1984 panel, were collected by the U.S. Bureau of the Census. Neither the collectors of the original data nor the Consortium bears any responsibility for the analyses or interpretations presented here.

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[1] M.B. Stewart and C.A. Greenhalgh, "Work History Patterns and the Occupational Attainment of Women," *Economic Journal*, September 1984, pp. 493-519, using British data; M.E. Corcoran, "Work Experience, Labor Force Withdrawals, and Women's Wages: Empirical Results Using the 1976 Panel of Income Dynamics" in C.B. Lloyd, E.S. Andrews, and C.L. Gilroy, eds., *Women in the Labor Market* (New York, Columbia University Press), 1977, using U.S. data.

[2] Jacob Mincer and Haim Ofek, "Interrupted Work Careers: Depreciation and Restoration of Human Capital," *Journal of Human Resources*, Winter 1982, pp. 3–24.

[3] "The Effect Interruptions in Work Experience Have on Wages," *Southern Economic Journal*, April 1995, pp. 955–70. Stratton acknowledges that the direction of causality can go both ways—from low wages to labor force experience or from planned experience to low wages.

[4] Later panels of the SIPP do not contain equally detailed data concerning work gaps. The extracted data and the programs used to create and analyze the data set are available upon request from the researchers.

[5] This corresponds to data from the 1st, 2nd, 3rd, 5th, 6th, and 8th waves of the panel.

[6] Seven percent of the women counted as those who did not leave the work force reported a gap, but continued their formal education during that period.

[7] Gaps shorter than 6 months are not coded in the data, so the minimum gap length was determined by data availability.

[8] Of the women who are counted as those who left the labor force, 15.8 percent did not report a gap since beginning work; for these people, the existence and timing of a gap since completing their formal education was calculated in one or both of two ways: by determining if subtracting the total number of years they reported working continuously left time unaccounted for between then and when they finished school; or by determining if the year that they first reported having a job was more than 1 year after they reported finishing school. Exclusion of these women does not substantially change the numbers reported in tables 1 and 2.

[9] The reported normal hourly wage rate is used when available; when not reported, a measure of average hourly earnings was constructed to proxy for the wage rate. This measure was constructed as monthly earnings divided by monthly hours worked. This measure was used for 42 percent of the sample in the 1st month, 45 percent in the 18th month, and 43 percent in the 32nd month.

[10] Only 7 percent of the women who left work reported more than one gap of 6 months or longer.

[11] Unlike Stratton, our focus in this article is not on a woman's earnings upon reentry relative to what she made before leaving the work force, but rather on her earnings relative to what she would be making had she been working continuously. We are unable to address the first issue because we do not have observations that would apply to more than a small percentage of the women of each woman's wage before she left the work force. However, these are different questions, and the rebound effect can be measured in either case (although relative to a different base) over the period of work following work force reentry.

[12] This skewing toward shorter lengths is caused by the availability of the data on previous wage. Women were not asked in the SIPP what their wage was before their last gap; they were asked what their wage was on their previous job. Women who have been working for longer periods since their last period out of the work force have had more opportunity to switch jobs. As the SIPP also contained data on years in which the previous job had ended and how much time had elapsed before the current job began, we could determine which reportings of previous wage corresponded to a wage earned before a period out of the work force.

[13] Of these women reporting their previous wage, 58 percent reported their hourly wage, 17 percent their weekly wage, 15 percent their monthly wage, and 10 percent their annual wage. All wages were translated into hourly wage rates using the additional reported variable of usual hours worked per week on previous jobs; for monthly and yearly wages, the hours variable was multiplied by 4.3 or 50 to estimate total monthly and total yearly hours.

[14] This corresponds to data from the first, fifth, and eighth waves of the SIPP panel.

[15] All of these alternative regressions are available from the authors upon request. The sample size is reduced to 1,823 women, 523 of whom worked continuously, upon inclusion of information about the presence of children.

[16] This test, often referred to as the Chow test, consists of estimating the regression equation for the two groups separately and then together, and calculating the statistic:

$$F = \frac{(RRSS - URSS)/(k+1)}{URSS/(n_1 + n_2 - 2k - 2)}$$

where $RRSS$ = the sum of the residual sum of squares from the separate equations, $URSS$ = the residual sum of squares from the pooled equation, k = the number of independent variables n_1 and n_2 = number of observations the two groups respectively. Then the statistic has an F distribution with degrees of freedom $(k+1)$, $(n_1 + n_2 - 2k - 2)$. If it is not sufficiently greater than zero, then the hypothesis that the equation structure and the two groups are not different cannot be rejected.

[17] Seventeen percent of women who left work and 9 percent of women who worked continuously reported they generally worked part-time.

[18] Thanks to Jean Kimmel for providing these data.