Parenthood and the Earnings of Married Men and Women*

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I. Introduction

Household roles, and in particular marital status and parenthood, appear to be of declining significance for the productivity and labor supply decisions of both men and women. Recent evidence suggests that the marital wage premium for men has decreased, and that the marginal effects of children and of husband's earnings on married women's labor supply have fallen. As the relative wages and labor force participation of married women have increased, the time use patterns of husbands and wives have converged. However, the average market hours and wages of women with young children remain substantially lower than those of men and of childless women. A large literature has examined the "family gap" in wages between women with and without children and the extent to which the relationship between motherhood and earnings is causal, but the specific link between fertility and labor market outcomes for women remains unclear. Though it is usually assumed in theoretical work that the labor supply decisions of husbands and wives are made jointly, the effect of parenthood on father's earnings has received little attention empirically.

In this paper, we use longitudinal data from the PSID to examine the relationship between parenthood and labor market outcomes for married men and women. Our focus will be on the association between hours worked and wages and the birth of the first child. Using random-effects models, we trace out the age-wage and age-hours profiles for non-parents and parents from several years before to several years after the birth. We find that parents and non-parents differ even before the first birth: before the birth of their first child, both fathers and mothers earned about 9 percent less than non-parents. We also estimate fixed-effects models, which yield consistent estimates of the *changes* in parental wages and hours caused by the birth without assuming that the individual effect in the outcome equation is uncorrelated with the regressors. We find that the birth of the first child leads to substantial reallocations of time and effort for married couples. On average, the first child is associated with a 5 percent reduction in the mother's wage rate and a 9

percent increase in the father's. Hours worked by mothers decline by 45 percent, but for the sample as a whole, there is no significant change in hours worked by fathers.

We allow for heterogeneity in responses to parenthood by distinguishing households in which the wife participates continuously in the labor market and those in which she does not, and by obtaining estimates by cohort. We find that both sources of heterogeneity are substantively important. In households in which the mother experiences a substantial interruption in labor market activity, maternal wages decline by 23 percent and paternal hours and wages increase following the birth of the first child. In households in which the mother remains continuously attached to the labor force, there is no evidence of wage declines for mothers though wages rise for fathers in these families as well. Hours worked by fathers in families with continuously-employed wives decrease by more than 7 percent with the birth of the first child. Comparing cohorts, we find that the degree to which the mother's and father's wages diverge subsequent to the birth of the first child is substantially larger for earlier birth cohorts. Taken together, the results suggest that rearrangements within the household have important effects on labor market outcomes for some parents, but that it is important to allow for heterogeneity in the effects of children on household behavior.

Several explanations for the source of the negative relationship between motherhood and wages can be re-examined with these estimates. If the "family gap" in women's wages were due solely to heterogeneity, i.e., if women who have children possess unobservable characteristics that are associated with low wages, then the fixed-effect estimate of the child effect on women's wages would have been equal to zero. We find that the relationship between motherhood and wages remains statistically significant under fixed effects—though only for mothers who experienced a substantial interruption in employment. The possible explanations for the wage decline include reductions in mothers' productivity due to the diversion of time and effort away from market work and towards home production, and labor market discrimination against mothers. Reductions in market time and effort may be partially observable in the form of reduced hours,

accumulated experience, and tenure, and partially unobservable, and we leave the decomposition of this component of the child wage effect to future work. However, a reduction in mother's market effort is likely to be one aspect of a general reallocation of the time and energy of both husband and wife. The conventional description of this reallocation is one of increasing specialization within the household; i.e, mothers devote more resources to home production and fathers increase their market work upon the birth of a child. By matching data for husbands and wives we are able to examine the coordination of labor supply decisions by married couples. Increased specialization, in which reduced wages and hours for wives are combined with increases in hours worked and/or hourly wages for their husbands, appears to characterize the behavior of the sample as a whole, but not the subsample with continuously-participating wives. The increase in specialization that follows the birth of the first child also appears to be decreasing among younger cohorts.

Section II of this paper reviews the literature regarding the relationship between household roles, wages and hours. Section III discusses the panel data set used for the econometric analysis. Section IV describes the procedure used to compare age-wage and age-hours profiles for husbands and wives with and without children. The fixed-effects estimates of the effect of the birth of a child on husbands' and wives' earnings are presented in Section V and Section VI concludes.

II. Motherhood, Fatherhood, Wages, and Work Hours

Most of the economics literature on parenthood and labor market outcomes has focused on the effects of motherhood on women's wages. It is well-known, from studies in many developed countries, that the wages of women with children are lower, all else equal, than the wages of women without children. Questions remain, however, about the extent to which this relationship is causal, and about the mechanism by which motherhood affects wages. The presence of young children in the household is associated with lower

participation rates and hours worked for women, so that market productivity may be reduced through a reduction in work experience, loss of specific human capital, atrophy of market skills during a period out of the labor force, and reduced incentive to invest in training whose payoff depends upon future work. Becker [1985] has argued that women's productivity may be reduced by children not solely through this sort of human capital effect, but also through a diversion of effort from market activities to home activities as children increase the relative return to the latter.

Alternatively, the negative relationship between female wages and children may be due not to a child-caused reduction in productivity, but to the selection of lower-productivity women into childbearing. There are two possible sources of this selection: heterogeneity and endogenous fertility. Women may be heterogeneous in an unobserved characteristic such as "career-orientedness" that is both positively correlated with the market wage and negatively correlated with the desire for children. Alternatively, since fertility is a choice and the market wage is one component of the "cost" of children, we would expect women with low (current or expected) market productivity to be more likely to become mothers.

Recent studies have found that lower observed human capital of mothers, as measured by work experience and tenure, can explain only part of the motherhood wage gap.[1] Attempts to control for the selection of low-wage women into motherhood using first-differenced longitudinal data have had mixed results: Korenman and Neumark [1992] find that the apparent direct effect of motherhood on wages disappears with first-differenced estimates,[2] suggesting that women with lower market wages are more likely

[1] A review of empirical studies of the "family gap" in the United States and other countries can be found in Waldfogel [1998]. She emphasizes that the family gap in women's wages has been rising in the U.S. during a period of rising relative female wages.

[2] Although their instrumental variables estimates indicate that children do reduce wages.

to have children. Waldfogel [1997] finds a substantial family gap in women's wages that does not fall significantly in fixed-effect and first-difference models, and is not accounted for by losses in work experience. She suggests that very short intervals (one to two years) in previous first-difference estimates may account for the contrasting results. Using data on sisters to control for unobserved family-specific heterogeneity, Neumark and Korenman [1994] find that motherhood is associated with a significant decline in wages.

The literature on the effect of children on women's market work is enormous and concludes, in general, that there is a strong negative correlation between presence of young children in the household and measures of mother's labor supply.[3] The negative effect of children, particularly small children, on mother's labor supply has declined since 1970, but remains substantial.[4] As with the child-wage effect, we need to be cautious in interpreting this correlation as evidence that fertility affects labor supply, since fertility is likely to be endogenous with respect to tastes for work, or labor market opportunities. Studies that instrument for fertility usually find sharply reduced or even positive effects of childbearing on labor supply, but valid instruments are difficult to find. A recent study by Angrist and Evans [1996] uses the sex mix of the first two children and twin births as instruments for a third birth, and find reduced but still substantial negative effects of fertility at this particular parity on women's labor supply.

In contrast, little is known about the effects of parenthood on male labor market outcomes. It may be that, since male labor supply has been found to be relatively unresponsive to family variables such as wife's earnings, the household circumstances of men have been assumed to be relatively unimportant determinants of their labor market experiences. Some older studies have found that father's labor supply is higher when children are young,[5] but Angrist and Evans find no significant effect of the birth of a third child on various measures of father's labor supply. The wage premium enjoyed by married men, however, has been well-documented, and is attributed partly to the selection of more

[3] For a review, see Browning [1992].
[4] Leibowitz and Klerman [1995].
[5] For example, see Pencavel [1986].

productive men into marriage and partly to the increased productivity of men whose household responsibilities have been reduced by the presence of a wife.[6]

Despite the fact that changes in observed labor supply and in unobserved effort and time devoted to home production must be viewed as part of a joint household response, empirical work has typically failed to explicitly deal with the interrelationship of husbands' and wives' outcomes. One exception is Lundberg [1988] who finds that the presence of young children in the household changes the apparent relationship between husbands' and wives' work behavior: men and women in households with young children exhibit strong interactions in changes in their work hours which are not apparent in households with no children or with only older children. Another exception is Gray [1997] who finds that the marriage wage premium is smaller for men whose wives work.

In this paper, we use a sample of individuals in intact marriages for the years 1980-1992 from the PSID to provide a comprehensive description of the relationship between parenthood and both hourly wages and annual hours worked. The analysis consists of two parts. First, we use random effects estimates to generate age-earnings and age-hours profiles for parents and non-parents. Second, we use fixed effects to estimate the effect of the birth of the first child on wages and hours worked for parents. We focus on the joint response of household members to the appearance of the child, and allow responses to vary for households in which the wife is a continuous participant in the labor force and those in which her participation is intermittent. The effect of second and subsequent births, and the effect of children on the labor market experiences of single mothers are also of considerable interest, but we defer these topics for future research.[7]

[6] In studies of the marriage premium in male wages, the effects of children are generally not reported (Korenman and Neumark, 1991 and Gray, 1997) or are reported to be insignificant (Loh, 1996).

[7] Waldfogel [1998] reports that the family wage gap for single mothers in the U.S. is larger than that for married mothers, and that it has grown since 1980.

III. Data

The data used for the analysis are from the Panel Study of Income Dynamics (PSID). Individual level data on husbands and wives are matched so that each of the "units" in our panel is a marriage that lasted at least five years within our sample window of 1980 to 1992. The unbalanced panel data set includes data on each couple for all years 1980-1992 in which the marriage was intact, or up to 13 years. We limit our sample to couples in which the husband and wife are between ages 22 and 45, inclusive, and exclude couples for whom the wife's first child was born outside the marriage. The final data set consists of 17744 observations on 2072 couples.[8]

The dependent variables in the analysis are the log of the real hourly wage rate on the main job (in 1985 dollars) and total hours worked during the year.[9] We have used the pay rate available in the PSID for hourly and salary workers only, rather than the wage rate calculated as labor earnings divided by hours worked. This restricts the sample size in the wage equations, but avoids the measurement error inherent in the latter measure. Dummy variables for years of age, education, region and race are included in all equations.

Observations are divided into two subsamples based on the wife's labor supply behavior. The "continuous participant" sample consists of husbands and wives in households in which the wife participates in each year of the window, other than a year in which she gave birth. The husbands and wives in households in which the wife does not participate continuously are in the "non-continuous" subsample. In some analyses we pool the two samples, and interact a dummy variable for "continuous" with key explanatory variables.

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[8] After excluding observations with missing values, 15106 observations for husbands and 11134 observations on wives are used in estimating the wage equations, and 17403 observations for husbands and 17334 observations for wives are used in the hours equations.

[9] Wage data are for the current job, and are available through 1992. Annual hours data are retrospective and are available for up to 1991.

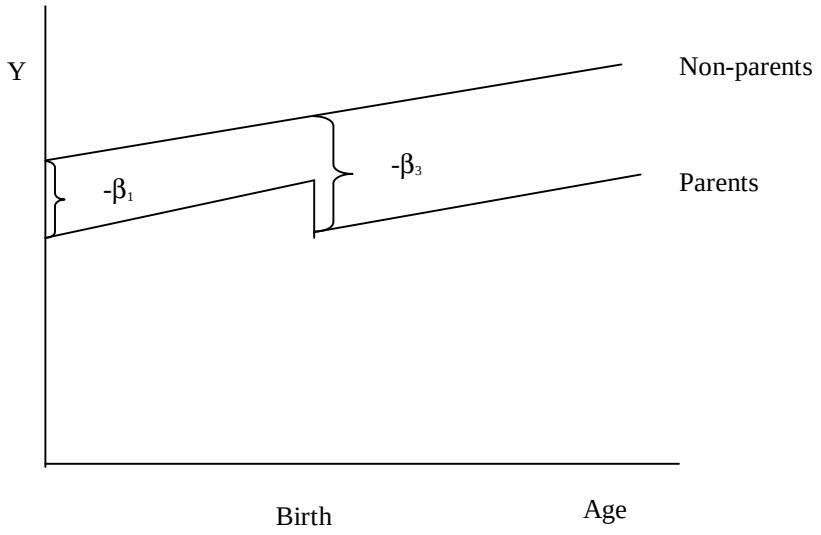
IV. Estimation and Simulation of Age-Wage and Age-Hours Profiles

In the first stage of our analysis we describe the relationship between parenthood and earnings in terms of two models. First, we estimate the following equation with random effects using panel data on husbands and wives for a "window" of up to 13 years of the marriage:

$$Y_{it} = b_0 + b_1 Before_{it} + b_2 Born_{it} + b_3 After_{it} + b_4 Age_{it} + b_5 X_{it} + m_i + h_{it} \quad (1)$$

where Y_{it} represents the outcome of interest -- either hourly wages or annual hours worked for the husband or the wife. $Before_{it}$ indicates that the wife had her first child within the sample window but subsequent to year t, $Born_{it}$ indicates that the wife had the first child in year t, and $After_{it}$ indicates that the woman had her first child prior to year t, and the omitted category is "no child born." Age_{it} is a series of dummy variables corresponding to each year of age for the individual. X_{it} is a set of controls for education, region, and race. Heterogeneity is captured by allowing for different intercepts of the profiles for parents and non-parents through b_1 and the effect of the birth of the first child is captured by the difference between b_3 and b_1.

Fig. 0



Estimates of Equation (1) for various subsamples and outcomes are reported in Tables 1 and 2. P-values for a series of hypothesis tests are reported in the shaded region. In most of the models estimated, the child effects are assumed to be the same for the entire sample; in others interaction terms allow the coefficients on "Before" and "After" to differ between the continuous and non-continuous samples. For each of the non-interacted specifications (i.e., columns 1, 2, 4 and 5) , the p-value associated with the test of a significant difference in the coefficient on "Before" and "After" for that subsample is reported in the first row of the shaded section. The interpretation of the tests is different for interacted specifications (columns 3 and 6). The p-value in the first row of the shaded region for these specifications is associated with the test that there is a significant difference in the coefficients on "Before" and "After" for the "non-continuous" subsample. The p-value in the second row of the shaded region for columns 3 and 6 are associated with the test for a significant difference between the "continuous" and "non-continuous" samples in the coefficients on "Before" and "After". For the last row of columns 3 and 6 the test is for a significant difference in the "Before" and "After" coefficients for the "continuous" subsample.

Table 1 reports the estimates of Equation (1) for the outcomes wife's wage (columns 1 through 3) and husband's wage (columns 4 through 6). For the entire sample of wives (column 1) there is evidence of negative heterogeneity: women who have children earn 9 percentage points less than non-childbearers even prior to the birth of the child (controlling for age, education, region and race). There is also evidence that earnings fall in response to the birth of the child. The coefficient on "After" is 6 percentage points lower than the coefficient on "Before, and the difference between the two coefficients is statistically significant ($p < .01$). Column (2) reports the same specification estimated for our "continuous" subsample. There is evidence of negative heterogeneity for this subsample as well, but the coefficients on "Before" and "After" are not different, indicating that the birth of the child has not resulted in wage losses for this group of women. In column (3) we report the results for the full sample in a specification which includes interactions of "continuous" with "Before", "Born" and "After". This

allows us to test for a difference in the responses of women's wages to the birth of the child for the "continuous" group and its complement, and find that the difference is statistically significant ($p<.01$).

Results for the same set of specifications are reported for the husbands in columns 4 through 6. According to the random effects estimates of equation (1), which are reported in column (4), men earn 8 percent *more* per hour after the birth of the first child. There is substantial negative heterogeneity in the wages of fathers relative to non-fathers. The "continuous" subsample for husbands consists of the *husbands* of women who participate in every year of the window except the year in which a child was born. The effect of the birth of a child on the wage rates of these "continuous" husbands is somewhat smaller than for the sample of husbands whose wives experience substantial spells of non-employment, but the difference between the effects is not significant.[10]

Table 2 reports the same set of specifications as in Table 1, but the dependent variable is the number of hours worked by wives in columns 1 through 3 and hours worked by husbands in columns 4 through 6. For women, not surprisingly, hours worked are substantially lower after the birth of a child and the difference is smaller for women in the "continuous" subsample. There is also positive heterogeneity: women who have children work more hours prior to the birth of the first child than women who have not had children within the sample.

The results for men are reported in columns (4) through (6). Men work more after the birth of the first child. However, the results reported in the interacted specifications in column (6) indicates that this increase in hours worked occurs only for the "non-

[10] In specifications not reported here, we allowed the age dummies to vary by "continuous" vs. "non-continuous" husbands and wives and for parents vs. non-parents. In every case except one--the effects of having a child on the wages of men who were fathers and those who were not fathers--we rejected the hypothesis of heterogeneity in the effects of the age dummies and the qualitative results were similar (although the magnitudes of the key coefficients were smaller). In the case in which heterogeneity could not be rejected, the qualitative results were similar except that the significance level of the test that difference between b_3 and b_1 is smaller for "continuous" husbands relative to "non-continuous" husbands (for the outcome hourly wages) was .13 (borderline significant).

continuous" husbands. Hours worked by husbands whose wives work continuously are significantly *lower* (p=.03) after the birth of the child relative to before.

To better capture the differences in the profiles for parents and non-parents, we consider a specification in which we break the "Before" and "After" variables into a series of dummy variables corresponding to the number of years before and after the birth; i.e.:

$$Y_{it} = \beta_0 + \beta_{m11}\text{Before11}_{it} + \beta_{m10}\text{Before10}_{it} + \ldots + \beta_{m1}\text{Before1}_{it} + \beta_{m0}\text{Born}_{it} + \beta_{p1}\text{After1}_{it} + \beta_{p2}\text{After2}_{it} + \ldots \beta_{p29}\text{After29}_{it} + \beta_4\text{Age}_{it} + \beta_5 X_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

where Before(s) is a dummy variable corresponding to (s) years before the birth of the first child, and After(s) is a dummy variable corresponding to (s) years subsequent to the birth of the first child.

Simulated age-wage and age-hours profiles for both husbands and wives are presented in Figures 1-8. To obtain these profiles, we estimate Equation (2) for the relevant outcome using random effects, evaluate the variables in *X* at their sample means, and plot two profiles for ages ranging from 24 to 45. The solid line in each figure is the simulated profile when the wife does not have a child prior to the end of the sample period (i.e., when Born_{it} = $\text{Before}(s)_{it}$ = $\text{After}(s)_{it}$ = 0 for all (s)). For wives, the crossed line is the simulated profile for a woman who has her first child at age 30; for husbands the crossed line is the profile for a man whose wife gives birth at age 30.[11]

Figure 1 contrasts the wage profiles for mothers and non-mothers. The crossed line is always below the solid line, suggesting that there is negative selection into motherhood. Mothers earn less than non-mothers even prior to the birth of the first child. The profiles diverge over time: a first birth reduces women's wages still further. Figure 2

[11] The coefficients and t-statistics for the coefficients used to generate these profiles are reported in Appendix 2.

shows the same profiles for the subset of women who work continuously during our sample window with the exception of the year in which a child is born (the "continuous" subsample). There is evidence of selection between mothers and non-mothers in this subsample as well, but there appears to be less divergence between the two profiles after the birth.

Figure 3 contains simulated wage profiles for the husbands. Fathers earn less than non-fathers initially, although this relationship reverses at the time the first child is born. Fathers appear to earn more than non-fathers until the child is about 10 years old. For the husbands of wives who work continuously (Figure 4), the fathers earn less than the non-fathers over the entire range. The gap narrows about 4 years after the birth of the first child and then widens. In general, the profiles suggest negative selection into fatherhood, but a positive effect on wages of the birth of the first child.

Hours profiles are reported in Figures 5 through 8. Figure 5 indicates that average hours worked by wives falls from about 1700 to about 1000 per year upon the birth of the first child, and then begin to increase about 5-10 years after the child's birth. The simulation in Figure 6 indicates that hours fall for women who are continuous participants, as well. As expected, the effect of the birth on hours worked by the husbands is less dramatic, but hours worked for the entire sample appear to increase following the birth (Figure 7), while the effect for the husbands of the continuous participants is very small but negative, at least initially (Figure 8).

Examining these profiles is useful for gaining a broad view of the labor market experiences of first-time parents. However, there are some reasons to interpret these profiles with caution. Many of the individual year "Before" and "After" dummies are imprecisely estimated, especially far away from the birth. While random effects estimates are required in order to identify profiles of parents relative to non-parents, the random effects estimates assume that the error term is uncorrelated with the regressors. Estimates of the "effect" of a birth on hours and wages can be consistently estimated under fixed

effects under a less restrictive set of circumstances than estimates obtained under random effects. We therefore turn to these fixed effects estimates in the next section.

V. Fixed Effects Estimates of the Effects of Parenthood on Wage Rates and Hours

In the second stage of this analysis we estimate the effects of the birth of the first child on hourly wages and annual hours of work of wives and husbands using fixed effects on the sample of parents. The model used to generate these estimates is:

$$Y_{it} = \beta_0 + \beta_2 Born_{it} + \beta_3 After_{it} + \beta_4 Age_{it} + \beta_5 X_{it} + \mu_i + \varepsilon_{it} \qquad (3)$$

i.e., model (1) in which $Before_{it}$ is the omitted category.[12] β_3 is the fixed effects estimate of parenthood on Y. The results for these specifications are reported in Tables 3 and 4, for the outcomes hourly wages and annual hours worked, respectively.[13]

The results in this table are qualitatively and quantitatively similar (in fact, nearly identical) to the random effects results reported in Tables 1 and 2, when the effect of parenthood on an outcome under random effects is interpreted as being the difference in the coefficients on "After" and "Before" in the respective equation. For the sample as a whole, motherhood leads to a drop in earnings of 5 percent, although there is no significant effect for women who are continuous participants. Fatherhood leads to a 9 percent increase in wages for men, which is smaller (although not significantly smaller) for men whose wives are continuous participants.

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[12] Because "no child born" is constant for an individual, it is only possible to identify two of the three coefficients ($\beta_1, \beta_2, \beta_3$) under fixed effects.

[13] The specification of the hypothesis tests is different under fixed effects. The test statistic for a significant effect of the birth of the child for the specifications in columns 1, 2, 4 and 5 is the test of the significance of the coefficient on "After". In the interacted specifications in columns 3 and 6 the test of a significant difference in the effects for the two subsamples is the test of significance of the interaction of "After" with "Continuous". The test of a significant effect of the birth for the "non-continuous" subsample is the coefficient on "After", and of a significant effect for the "continuous" subsample is the p-value reported in the shaded area.

Parenthood leads to a substantial and significant decline in hours worked for women, although the effect for men depends on whether their wives are continuous participants or not. The results for the interacted specification in column 6 indicates that the hours worked of men whose wives do not work continuously work *increase* by 118 hours per year in response to the birth of the first child, while the hours worked of men whose wives work continuously *decrease* by 50 hours per year. Both of these effects are statistically significant, and the difference between the effects for the two subsamples is also statistically significant (t=4.1).

The estimates of the effect of parenthood on hours and wages of husbands and wives are summarized in Table 5. The results for the sample as a whole are consistent with a model of household reallocation of time and effort in which husbands' increased specialization in market work and wives' increased specialization in work at home is reflected in hours and in wages. However, disaggregating the sample by whether the wife works continuously is informative. For households in which the wife does not work continuously, women work less and earn less per hour after the first child and men work more and earn more per hour. This is consistent with the standard story of increased specialization associated with the birth of a child.

The results for households in which the wife works continuously stand in contrast to the results for the "non-continuous" couples. Women work less after the birth of the first child, and men earn more per hour; however, there is no change in the wife's wages associated with the birth of the first child and husbands work *fewer* hours. These results are not consistent with increased specialization within the household, although there is evidence of reallocation subsequent to the birth, perhaps in response to a child-induced increase in the relative value of home time. For both husbands and wives, we find that wages and hours do not move in the same direction in response to the birth of a child. For women, hours fall but hourly wages do not; for men, hours fall while wages increase. This

is consistent with an increase in effort that outweighs the fall in market experience due to the fall in labor supply, and/or discrimination in favor of parents vs. non-parents.

To test for changes across birth cohorts in household responses to the first child, we disaggregated the sample based on the age of the wife. Table 6 reports the results for couples in which the wife was born in or before 1955 and Table 7 reports the results for couples in which the wife was born after 1955. The values in the shaded area refer to p-values associated with the hypothesis tests indicated, and the estimated effects of the birth of the first child are reported in the bottom two rows of the table. For the most part, the effects of the birth on a child on hours and wages decreases in absolute value over time (e.g. the wage loss for women in the non-continuous subsample is about 27 percent for the older cohort, but only 20 percent for the younger cohort) indicating less specialization of the husband and wife in response to the appearance of the first child.

VI. Conclusion

In this paper we have described the relationship between the time paths of hourly wages and labor supply for married parents and non-parents. We use fixed- and random-effects models to distinguish between the effects of unobserved differences between men and women in our sample who have children and those who do not, and the true effect of parenthood on mothers' and fathers' wages and hours. These estimates allow us to examine alternative explanations concerning the source of the "family gap" in women's wages.

Our findings indicate that, in households in which the wife is not a continuous participant in the labor force, declines in wages appear to be associated with increased specialization in the household, and reallocation of time by both the husband and wife. For households in which the wife participates continuously, the negative relationship between motherhood and women's wages is due solely to heterogeneity: the estimated

effect of motherhood on wages is zero. Surprisingly, husbands in these households work fewer hours yet earn more per hour after the birth of the first child. There is a reallocation of time and effort in these households, as there is in the households where the wife is not a continuous participant, but it is not consistent with the simple specialization story, nor with a "family gap" in women's wages.

The evidence in support of the specialization hypothesis of wage losses in the non-continuous subsample is further strengthened by comparing the effect of motherhood on women's earnings by cohort. The effect of a child is on wages is lower for the later cohort of women. This is consistent with other results suggesting that the extent of specialization in U.S. households is declining, such as Gray's [1997] finding that the wage premium for married men is falling over time and Blau's [1998] report that time use patterns for husbands and wives are converging.

In addition, our results comparing birth cohorts suggest that changes in the selection of women into motherhood must be considered when estimating the effect of motherhood on earnings. For instance, Waldfogel [1998] concludes that that the family gap in women's wages has increased over time in the U.S. However, we find that, while negative selection into motherhood appears to be higher in younger cohorts, the *effect* of the birth of a child (gross of human capital variables such as experience and tenure which may be endogenous with respect to fertility) on women's wages is falling.

Other studies have shown that household roles and labor market outcomes are related for women and, to a lesser extent, for men; our parallel analysis of the relationship between parenthood and hours and wages for husbands and wives indicates that the decisions and outcomes of husbands and wives are intertwined. We also find that heterogeneity among households is important, and that the relationship between household and labor market activity is markedly different for families in which the mother interrupts her career for child-rearing and those in which she does not. Taken with other results in the literature, we can conclude that household specialization in general, and the increase in

specialization associated with parenthood in particular, is declining, If this trend continues, it should contribute to a continued narrowing in the gender gap in earnings and other outcomes.

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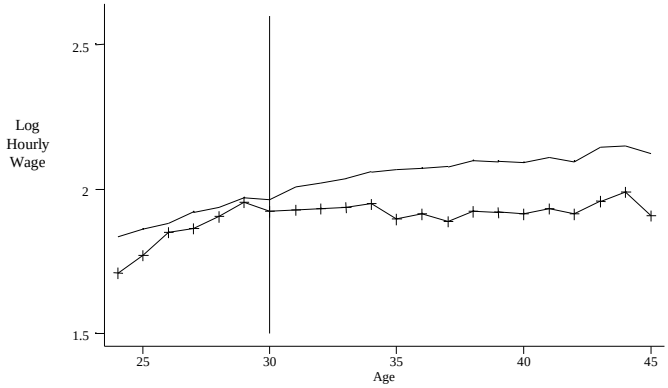
Fig, 1

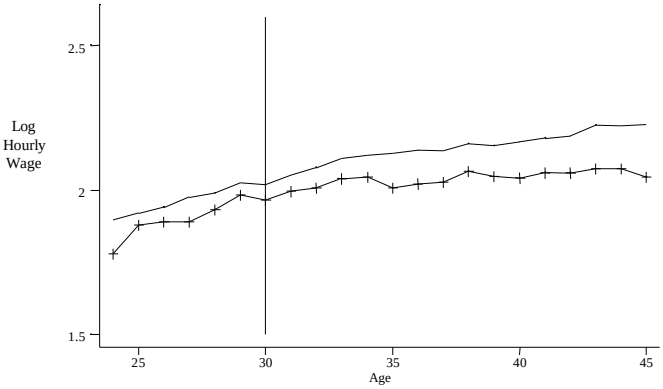


Simulated Wage of Wife - All Working Wives

Random Effects

++++ child born at wife's age 30 ------- no child born

Fig. 2

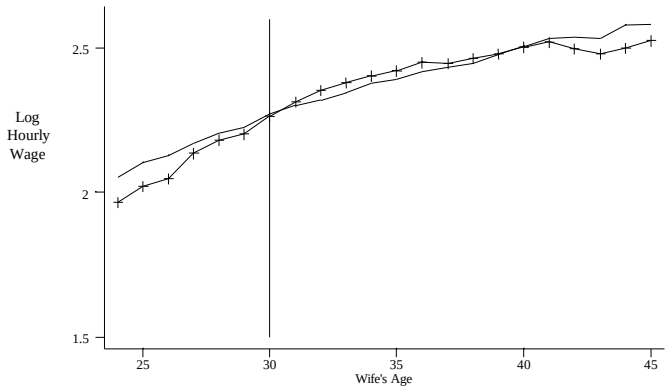


Simulated Wage of Wife - Wives Who Participate Every Year

Random Effects

++++ child born at wife's age 30 ------- no child born

Fig, 3

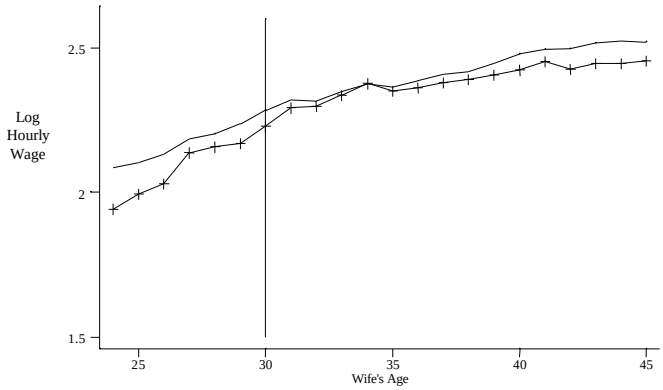


Simulated Wage of Husband - All Working Husbands

Random Effects

++++ child born at wife's age 30 ------- no child born

Fig. 4

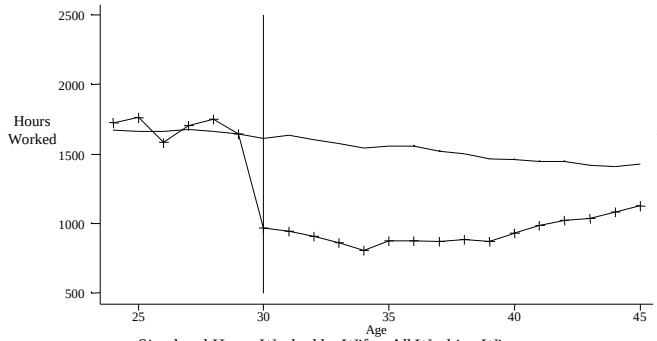


Simulated Wage of Husband - Whose Wives Participate Every Year

Random Effects

++++ child born at wife's age 30 ------- no child born

Fig. 5

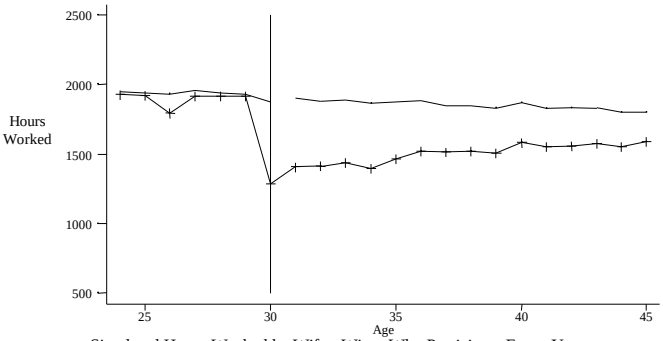


Simulated Hours Worked by Wife - All Working Wives

Random Effects

++++ child born at wife's age 30 ------- no child born

Fig. 6

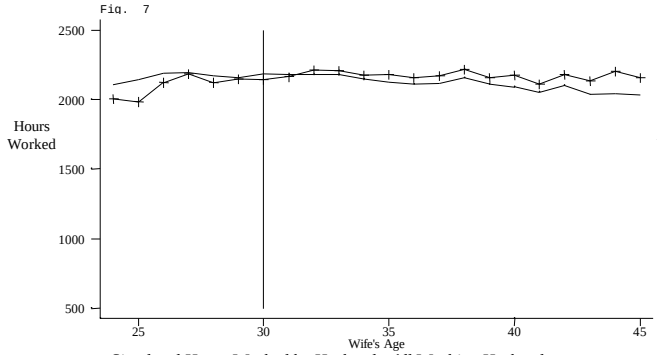


Simulated Hours Worked by Wife - Wives Who Participate Every Year

Random Effects

++++ child born at wife's age 30 ------- no child born

Fig. 7

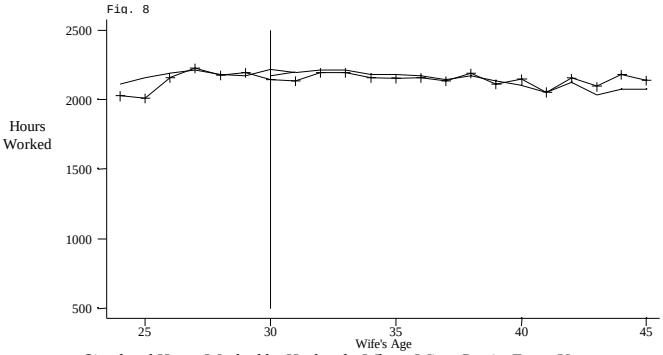


Simulated Hours Worked by Husband - All Working Husbands

Random Effects

++++ child born at wife's age 30 ------- no child born

Fig. 8



Simulated Hours Worked by Husband - Whose Wives Partic. Every Year

Random Effects

++++ child born at wife's age 30 ------- no child born

Table 1: Dependent Variable: Log of Real Wage Rate
Random Effects Estimates
(P-values for Hypothesis Tests in Shaded Region)

	(1) Wives	(2) Wives	(3) Wives	(4) Husbands	(5) Husbands	(6) Husbands
Sample	All 11134	Contin 8058	All 11134	All 15106	Contin. 7777	All 15106
Before	-.09 (2.8)	-.10 (3.0)	-.06 (1.7)	-.09 (3.1)	-.10 (3.0)	-.07 (2.0)
After	-.15 (5.1)	-.10 (3.3)	-.32 (10.4)	-.01 (0.3)	-.03 (1.1)	.02 (0.7)
C*Before			.02 (0.6)			-.05 (1.8)
C*After			.28 (13.1)			-.06 (3.2)
p($b_{Before} = b_{After}$)	[.00]	[.99]	[.00]	[.00]	[.00]	[.00]
p($b_{C*Before} = b_{C*After}$)			[.00]			[.61]
p($b_{Before} + b_{C*Before} = b_{After} + b_{C*After}$)			[.83]			[.00]

Table 2: Dependent Variable: Hours Worked
Random Effects Estimates
(P-values for Hypothesis Tests in Shaded Region)

	(1) Wives	(2) Wives	(3) Wives	(4) Husbands	(5) Husbands	(6) Husbands
Sample	All 17334	Contin. 8814	All 17334	All 17403	Contin. 8840	All 17403
Before	243 (4.7)	104 (2.4)	80 (1.6)	41 (1.0)	71 (1.5)	-38 (0.8)
After	-577 (12.4)	-367 (9.9)	-1073 (28.3)	66 (1.8)	13 (0.3)	87 (2.2)
C*Before			345 (7.3)			122 (2.7)
C*After			991 (39.2)			-45 (1.7)
p($b_{Before} = b_{After}$)	[.00]	[.00]	[.00]	[.24]	[.03]	[.00]
p($b_{C*Before} = b_{C*After}$)			[.00]			[.00]
p($b_{Before} + b_{C*Before} = b_{After} + b_{C*After}$)			[.00]			[.12]

Table 3: Dependent Variable: Log of Real Wage Rate
Fixed Effects Estimates
(P-values for Hypothesis Tests in Shaded Region)

	(1) Wives	(2) Wives	(3) Wives	(4) Husbands	(5) Husbands	(6) Husbands
Sample	All 11134	Contin 8058	All 11134	All 15106	Contin. 7777	All 15106
After	-.05 (3.2)	.01 (0.4)	-.25 (8.7)	.09 (7.7)	.07 (5.2)	.10 (5.3)
C*After			.26 (8.2)			-.01 (0.3)
p($b_{Before} + b_{C*Before} = b_{After} + b_{C*After}$)			[.68]			[.00]

Table 4: Dependent Variable: Hours Worked
Fixed Effects Estimates
(P-values for Hypothesis Tests in Shaded Region)

	(1) Wives	(2) Wives	(3) Wives	(4) Husbands	(5) Husbands	(6) Husbands
Sample	All 17334	Contin. 8814	All 17334	All 17403	Contin. 8840	All 17403
After	-840 (32.9)	-511 (18.5)	-1229 (32.7)	18 (0.8)	-73 (2.5)	118 (3.5)
C*After			654 (14.2)			-168 (4.1)
p($b_{Before} + b_{C*Before} = b_{After} + b_{C*After}$)			[.00]			[.08]

Table 6: Dependent Variables:
Log of Real Wage Rate (Col 1-4); Hours Worked (Col 5-8)
Wife Born In or Before 1955 [a]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Wife - R.E. 6195	Wife - F.E. 6195	Husb - R.E. 8229	Husb - F.E. 8229	Wife - R.E. 9908	Wife - F.E. 9908	Husb - R.E. 9927	Husb - F.E. 9927
Before	-.02 (0.3)	Base	-.15 (2.8)	Base	291 (3.6)	Base	-00 (0.0)	Base
After	-.33 (6.8)	-.31 (6.8)	-.02 (0.5)	.14 (4.0)	-924 (17.1)	-1271 (19.8)	109 (1.9)	114 (1.9)
C*Before	-.02 (0.4)	Base	-.09 (1.8)	Base	363 (4.2)	Base	121 (1.5)	Base
C*After	.30 (9.7)	.32 (6.1)	-.10 (3.7)	.00 (0.5)	1045 (31.8)	682 (8.0)	-43 (1.2)	-187 (2.3)
Before=After	[.00]		[.00]		[.00]		[.06]	
C*Before=C*After	[.00]		[.82]		[.00]		[.04]	
Before + C*Before = After + C*After	[.84]	[.64]	[.00]	[.00]	[.00]	[.00]	[.31]	[.00]
Before + C*Before=0	[.52]		[.00]		[.00]		[.13]	
After - Before	-.31	-.31	.13	.14	-1215	-1271	109	114
After + C*After - Before + C*Before	.01	.01	.12	.14	-533	-589	-55	-73

Table 7: Dependent Variables:
Log of Real Wage Rate (Col 1-4); Hours Worked (Col 5-8)
Wife Born After 1955 [a]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Wife - R.E. 4939	Wife - F.E. 4939	Husb - R.E. 6877	Husb - F.E. 6877	Wife - R.E. 7426	Wife - F.E. 7426	Husb - R.E. 7476	Husb - F.E. 7476
Before	-.10 (2.1)	Base	-.03 (0.6)	Base	-81 (1.2)	Base	-45 (0.7)	Base
After	-.32 (7.8)	-.20 (5.2)	.04 (1.1)	.08 (3.6)	-1194 (22.4)	-1208 (25.2)	74 (1.4)	110 (2.7)
C*Before	.04 (0.9)	Base	-.02 (0.5)	Base	-314 (5.2)	Base	101 (1.8)	Base
C*After	.26 (8.6)	.20 (5.1)	-.02 (0.7)	-.00 (0.1)	927 (23.8)	642 (11.2)	-61 (1.6)	-150 (3.0)
Before=After	[.00]		[.00]		[.00]		[.00]	
C*Before=C*After	[.00]		[.96]		[.00]		[.00]	
Before + C*Before = After + C*After	[.68]	[.69]	[.00]	[.00]	[.00]	[.00]	[.17]	[.24]
Before + C*Before=0	[.14]		[.36]		[.00]		[.34]	
After - Before	-.22	-.20	.07	..08	-1113	-1208	119	110
After + C*After - Before + C*Before	.00	.00	.07	..08	128	-566	-43	-40

[a] Random Effects regressions include dummy variables for age, year, years of education, region, and white. Fixed Effects regressions include dummy variables for age, year, years of education, and region. P-values for hypothesis tests in shaded region.

Table A.1
Means and Standard Deviations, and Sample Statistics

	Full Sample	Sample With Children	Sample w/o Children	Sample Wives Do Not Always Contin.	Sample Wives Always Contin.	Sample Wives Born Before 1955	Sample Wives Born Aft 1955
Variable	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)
Log Real Wage Rate - Husband [# obs missing]	2.35 (.50) [3597]	2.34 (.50) [3233]	2.38 (.51) [364]	2.39 (.54) [1839]	2.30 (.46) [1758]	2.43 (.51) [2212]	2.22 (.47) [1385]
Log Real Wage Rate - Wife [# obs missing]	1.93 (.51) [7242]	1.91 (.51) [6764]	2.07 (.50) [478]	1.74 (.56) [5766]	2.00 (.47) [1476]	1.99 (.52) [4163]	1.85 (.49) [3079]
Hours Worked - Husband	2198 (705)	2203 (708)	2155 (672)	2217 (750)	2179 (657)	2210 (700)	2181 (710)
Hours Worked - Wife	1152 (888)	1100 (880)	1613 (828)	633 (815)	1655 (630)	1119 (870)	1197 (910)
Age - Husband	34 (5.7)	34 (5.7)	34 (5.8)	34 (5.7)	34 (5.7)	36 (4.9)	30 (4.3)
Age - Wife	32 (5.6)	32 (5.6)	31 (5.5)	31 (5.6)	32 (5.5)	35 (4.6)	27 (3.3)
Years of Ed - Husband	13 (2.3)	13 (2.3)	14 (2.3)	13 (2.4)	13 (2.2)	14 (2.5)	13 (2.1)
Years of Ed - Wife	13 (2.1)	13 (2.1)	14 (2.1)	13 (2.1)	14 (2.1)	13 (2.2)	13 (1.9)
Race - Husband (% White)	78 (.41)	78 (.41)	79 (.41)	81 (.39)	76 (.43)	80 (.40)	76 (.42)
Race - Wife (% White)	78 (.41)	78 (.41)	78 (.41)	81 (.39)	75 (.43)	79 (.41)	77 (.42)
Child Born Before (%)	6.5 (.25)	7.2 (.26)	NA	4.6 (.21)	8.4 (.28)	2.4 (.15)	11.9 (.32)
Child Born Year Zero (%)	3.3 (.18)	3.7 (.19)	NA	2.7 (.16)	3.9 (.19)	1.5 (.12)	5.9 (.24)
Child Born After (%)	79.8 (.40)	89.0 (.31)	NA	86.7 (.34)	73.2 (.44)	87.1 (.33)	70.2 (.46)
# Obs Husband	17403	15610	1793	8563	8840	9927	7476
# Obs Wife	17334	15556	1778	8520	8814	9908	7426
# Husbands	2066	1810	256	977	1089	1085	981
# Wives	2065	1809	256	976	1089	1083	982
Years Worked - Husband	8.26 (3.39)	8.48 (3.37)	6.83 (3.15)	8.54 (3.49)	8.01 (3.29)	8.99 (3.48)	7.46 (3.09)
Years Worked - Wife	6.53 (3.71)	6.57 (3.77)	6.24 (3.24)	4.79 (3.38)	8.09 (3.28)	7.06 (4.02)	5.96 (3.25)
# Couples	2062	1807	255	976	1086	1083	979
Couples with Children (%)	88 (.33)	NA	NA	93 (.25)	83 (.38)	90 (.30)	85 (.35)
Couples with Child Born in Sample Period (%)	28 (.45)	32 (.47)	NA	24 (.43)	32 (.47)	13 (.34)	45 (.50)
Median # of Yrs in Sample	9	9	7	10	8	11	8

Appendix 2
Coefficients and T-statistics from Specifications Used to Generate Figures 1-8

Year Relative to One First Child Is Born In	WAGES -All Wives (Coef)	t-stat	WAGES -Wives Who Always Work (Coef.)	t-stat	WAGES - All Hus-bands (Coef)	t-stat	WAGE-Hus-bands Whose Wives Always Work (Coef)	t-stat	HOURS - All Wives (Coef)	t-stat	HOURS - Wives Who Always Work (Coef.)	t-stat	HOUR-All Hus-bands (Coef)	t-stat	HOURS - Hus-bands Whose Wives Always Work (Coef)	t-stat
-11	0.16	0.57	0.14	0.55	-0.05	0.29	-0.09	0.53	449	1.10	282	0.85	-157	0.43	-112	0.32
-10	0.22	1.27	0.21	1.38	-0.31	2.05	-0.34	2.41	257	0.77	45	0.16	-74	0.25	-26	0.09
-9	-0.19	1.28	-0.19	1.47	-0.12	1.07	-0.15	1.44	-156	0.69	-292	1.58	-245	1.21	-220	1.12
-8	0.16	1.76	0.16	1.94	0.03	0.33	-0.02	0.19	43	0.27	-199	1.42	48	0.33	77	0.52
-7	-0.04	0.49	-0.06	0.81	-0.12	1.61	-0.19	2.56	-151	1.10	-157	1.30	133	1.10	116	0.90
-6	-0.13	1.77	-0.12	1.63	-0.09	1.51	-0.14	2.20	50	0.44	-22	0.21	-99	0.99	-82	0.74
-5	-0.09	1.59	-0.04	0.70	-0.08	1.54	-0.11	1.86	101	1.01	-17	0.18	-161	1.87	-148	1.52
-4	-0.03	0.63	-0.05	1.00	-0.08	1.80	-0.10	2.08	-77	0.96	-137	1.88	-69	1.00	-35	0.44
-3	-0.06	1.32	-0.08	1.97	-0.03	0.85	-0.05	1.09	24	0.34	-41	0.67	-13	0.23	18	0.27
-2	-0.03	0.87	-0.06	1.47	-0.02	0.68	-0.04	1.08	91	1.44	-21	0.38	-45	0.86	-6	0.09
-1	-0.02	0.45	-0.04	1.07	-0.02	0.69	-0.07	1.81	2	0.04	-11	0.22	-11	0.22	26	0.48
year born	-0.04	1.18	-0.05	1.41	-0.01	0.29	-0.05	1.53	-647	11.7	-593	12.7	-39	0.84	-73	1.40
1	-0.08	2.29	-0.05	1.51	0.01	0.33	-0.03	0.83	-685	12.8	-491	10.9	-17	0.37	-64	1.27
2	-0.09	2.71	-0.07	1.99	0.04	1.17	-0.02	0.52	-696	13.4	-467	10.7	33	0.77	-15	0.31
3	-0.10	2.99	-0.07	2.02	0.03	1.15	-0.01	0.37	-716	14.0	-449	10.4	24	0.57	-14	0.29
4	-0.11	3.40	-0.08	2.28	0.03	0.84	0.00	0.09	-735	14.6	-465	10.8	24	0.57	-22	0.46
5	-0.17	5.36	-0.12	3.48	0.03	0.90	-0.01	0.40	-679	13.6	-409	9.45	54	1.30	-26	0.54
6	-0.16	4.90	-0.12	3.40	0.03	1.11	-0.02	0.70	-678	13.8	-367	8.45	43	1.06	-16	0.33
7	-0.19	5.89	-0.11	3.16	0.02	0.52	-0.03	0.84	-651	13.2	-333	7.56	57	1.39	-8	0.16
8	-0.18	5.52	-0.09	2.78	0.02	0.54	-0.03	0.74	-613	12.4	-325	7.37	64	1.55	21	0.44
9	-0.18	5.47	-0.11	3.07	0.01	0.17	-0.04	1.22	-594	11.9	-326	7.31	48	1.16	-20	0.40
10	-0.18	5.45	-0.13	3.60	0.00	0.14	-0.05	1.56	-530	10.5	-285	6.28	85	2.04	45	0.90
11	-0.18	5.48	-0.12	3.39	-0.01	0.40	-0.04	1.14	-458	8.90	-279	6.03	59	1.39	2	0.04
12	-0.18	5.39	-0.13	3.56	-0.04	1.34	-0.07	2.00	-418	7.96	-275	5.80	78	1.80	32	0.62
13	-0.18	5.39	-0.15	4.02	-0.05	1.72	-0.07	1.89	-379	7.03	-253	5.16	98	2.21	62	1.17
14	-0.16	4.56	-0.15	4.02	-0.08	2.49	-0.08	2.08	-328	5.94	-251	4.98	158	3.50	106	1.95
15	-0.22	6.01	-0.18	4.67	-0.06	1.73	-0.06	1.68	-302	5.31	-212	4.06	127	2.74	63	1.13
16	-0.18	4.87	-0.14	3.52	-0.10	3.00	-0.08	2.12	-252	4.29	-137	2.52	154	3.21	139	2.40
17	-0.21	5.32	-0.17	4.18	-0.09	2.73	-0.08	2.06	-242	3.97	-145	2.59	142	2.87	91	1.52
18	-0.16	4.01	-0.13	3.13	-0.08	2.30	-0.06	1.46	-223	3.52	-147	2.50	149	2.89	123	1.97
19	-0.17	3.90	-0.13	2.94	-0.09	2.50	-0.07	1.74	-194	2.92	-116	1.88	180	3.33	145	2.24
20	-0.18	3.99	-0.15	3.30	-0.13	3.54	-0.12	2.75	-165	2.37	-67	1.02	191	3.39	193	2.83
21	-0.17	3.49	-0.14	2.81	-0.13	3.30	-0.08	1.78	-176	2.39	-62	0.88	219	3.67	208	2.86
22	-0.16	3.16	-0.13	2.54	-0.13	3.11	-0.08	1.56	-117	1.50	-46	0.61	218	3.43	124	1.58
23	-0.14	2.61	-0.15	2.65	-0.12	2.72	-0.08	1.41	-250	2.97	-114	1.38	207	3.01	166	1.96
24	-0.21	3.29	-0.20	3.15	-0.16	3.30	-0.09	1.45	-233	2.46	-116	1.17	114	1.45	56	0.54
25	-0.25	3.51	-0.16	2.25	-0.23	3.98	-0.13	1.83	-201	1.84	-69	0.61	155	1.69	50	0.43
26	-0.15	1.60	-0.16	1.71	-0.21	2.95	-0.06	0.66	-323	2.37	-79	0.53	300	2.58	223	1.43
27	-0.20	1.25	-0.27	1.24	-0.23	1.89	-0.21	0.63	174	0.75	-201	0.59	200	0.99	365	0.99
28	-0.29	1.53	-0.34	1.58	-0.30	1.66	-0.24	0.98	178	0.51	-60	0.18	267	0.87	418	1.13
29	-0.28	1.08	-0.37	1.43	-0.40	1.33	-0.34	1.00	302	0.62	-69	0.17	186	0.43	245	0.56