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Abstract

We use the UK Labor Force survey to investigate whether the socio-economic outcomes of people born on the 13th day of the month, and of those born on Friday the 13th, differ from the outcomes of people born on more auspicious days. In many European countries, including the UK, such days are considered unlucky. We consider outcomes that are unlikely to be affected by behavioral adjustments yet which are of considerable importance to one's quality of life: employment, earnings and marriage. We find no evidence that people born on the 13th or those born on Friday the 13th suffer any penalty that can be attributable to the inauspicious circumstances of their birth.

JEL-Code: J110, J210, J310.

Keywords: superstition, employment, labor market, marriage.

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1 Introduction

Irrational beliefs and superstitions can have significant effect on people's behavior. Many of those brought up in the European culture believe that bad luck can be attributed to things as trivial as walking under a ladder, having a black cat cross one path, opening an umbrella indoors, spilling salt or breaking a mirror. Numbers and days are believed to play important roles too. Astrology, for instance, is based on the belief that one's date of birth has powerful and lasting effect on one's personal traits, success at work, love life and much more. Similarly, the number 13 is considered unlucky, Friday is an unlucky day, and a combination of the two, Friday the 13th, is particularly inauspicious.[2]

People can go to great lengths in shaping their behavior in response to such beliefs. People often consult horoscopes when making important decisions. Seeing to avoid the number 13 is very common. Hotels often not to have the 13th floor or rooms with 13 in the room number, some airlines do not to have row number 13 or 13 in the flight number, and many airports do not have gate 13. In the UK, it is estimated that 28 percent of all streets do not have a number 13, and houses with that number sell for £6,500 less on average than similar houses in the same street.[3] Fortin, Hill and Huang (2014), similarly, find that Chinese superstitions have a similar effect on the American housing market: in areas with a large share of immigrants, houses with the number ending in 4 (unlucky number for the Chinese) sell for 2.2 percent less while those with numbers ending in 8 (lucky number) garner a 2.5 percent price premium. People also adjust their behavior in line with superstitions. Many refuse to start new projects or undertakings, or make major purchases or decisions on a Friday the 13th, with some even refusing to leave their house: one estimate puts the loss of business on Friday the 13th as nearly $1 billion in the US.[4] A recent report, similarly, found that flights on Friday the 13th June 2014 were on considerably cheaper than flights on other days in that month in the Austria, France, UK and Sweden.[5]

Some research seems to find support for the belief that one's date of birth has certain lasting effects. Mandel et al. (2008), for example, finds that people born in the summer (in Israel) are more likely to be myopic as adults, which they attribute to the exposure to bright light in early infancy. A number of studies find that the quarter of birth has important effects for educational and labor-market outcomes: see, for example, Plug (2001) and Kawaguchi (2011). Rather than give credence to astrology, these effects reflect the fact that school intake usually takes place once per year, so that pupils starting school together may differ by up to one year in age from each other.

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2 The origins of these superstitions are unclear. One explanation is that 13 distorts the perceived completeness of 12: there are 12 months in a year, 12 Zodiac signs, 12 hours on the clock, there were 12 tribes of Israel, 12 deities of Olympus, 12 Apostles of Jesus, and 12 successors of Muhammad. In Norse mythology, Loki was a 13th guest at a dinner and caused great mischief. Similarly, Jesus was crucified after the last supper with 13 dinner guests, and the day of his crucifixion was a Friday. Other numbers and days are unlucky in other cultures: 17 in Italy, and 4 in China and East Asia. Friday the 17th is an unlucky day in Italy, while Tuesday the 13th is unlucky in Greece, Spain and Romania.

3 See "Live at Number 13? Unlucky for you: Your house is worth £6,500 less than your neighbour's," http://www.dailymail.co.uk/news/article-2061317/Live-Number-13-Unlucky-Your-house-worth-6-500-neighbours.html.

4 See "Friday the 13th Phobia Rooted in Ancient History," available at http://news.nationalgeographic.com/news/2004/02/0212_040212_friday13.html.

5 The price difference was reported to range from £24 in Austria to £89 in Sweden. See "The cheapest day for flights? Today! Passengers told to ignore their Friday the 13th superstition to get the best travel deals," http://www.dailymail.co.uk/travel/article-2656020/The-cheapest-day-flights-Today-Passengers-told-ignore-Friday-13th-superstition-best-travel-KAYAK-data-shows-deal.html.

In this paper, we investigate whether unlucky days have an effect on one's fortunes. For this, we need actions that cannot be affected (easily) by behavioral adjustments. Starting journeys or making investment decision on the 13th, or on a Friday the 13th, does not meet this requirement: because of superstition, people can be more careful when driving or choosing investments on a supposedly unlucky day.[6] We therefore consider the effect of being born on an unlucky day, as the precise date of one's birth is, in most cases, as good as random. Using the UK Labor Force Survey, with information on the precise date of birth, we consider whether those born on the 13th, and on Friday the 13th, are more or less likely to be employed, whether they have higher or lower wages, and whether they are more or less likely to remain single.

In principle, there are several channels how being born on an inauspicious day can affect one's life-time outcomes. First, it may indeed be the case that some higher force or another mysterious mechanism endows those born on an unlucky day with more or less luck. Second, even when superstitions are entirely unjustified and irrational, believing in them can affect one's behavior and their confidence sufficiently to leave a lasting effect on their outcomes. Finally, one's date of birth is often known to others – friends, family, potential employers or potential spouses – who may adjust their behavior and discriminate, whether positively or negatively. In the second and third case, whatever effect we might observe, it would be driven mainly by psychology. In this, the effect of being born on a particular day might be similar to the effect of having a particular name: some people believe strongly that having the right name is an important determinant of one's fortunes.[7]

2 Data

We investigate the issue at hand using the UK Labour Force Survey (LFS), a quarterly nationally-representative survey of households across the UK. Each quarter, the Office for National Statistics (ONS) interviews approximately 60 thousand households and over 100 thousand individuals aged 16 and above. The survey contains detailed demographic and socio-economic information on the respondents, including their labor-market outcomes, marital status, and the date of birth.[8] We use data from 1999 to 2011, which gives us around 3.9 million observations. We identify those individuals born on the 13th, and compare their outcomes with the rest of the data set. As robustness checks, we also perform falsification tests, whereby we consider those born on the 12th and 14th. The individuals born on these three consecutive days should be very similar to each other. Indeed, for natural births, which of those three days one is born should be essentially random. We also similarly identify those individuals who were born on a Friday the 13th and consider their outcomes as well.

Given the large number of observations, we have rather a lot of *treated* individuals: 122,883 were born on the 13th. This is slightly lower than the number of those born either on the 12th and 14th: 125,476 and 123,206, respectively. The fact that fewer people in our data set were born on the 13th is not too surprising: some births – caesarian sections and induced

6 Indeed, one study finds that there are fewer accidents on a Friday the 13th as people tend to drive more carefully, see "Friday 13th not more unlucky, Dutch study shows," http://uk.reuters.com/article/2008/06/13/us-luck-idUKL1268660720080613.

7 Some of well-known examples include two brothers called Winner and Loser Lane, and Marijuana Pepsi Sawyer. Loser Lane and Marijuana Pepsi Sawyer did quite good in life while Winner Lane ended up as a career criminal. On the other hand, Bertrand and Mullainathan (2004) show that names can facilitate discrimination in the labor market by giving away hints about one's race and/or socio-economic background.

8 The date of birth is not available in the publicly released LFS datasets. We are grateful to the Office for National Statistics for giving us access to the restricted release of the LFS.

deliveries – are scheduled and superstitious parents and/or obstetricians may prefer not to have them scheduled on an inauspicious day. Nevertheless, the number of people born on the 13th is not out of line with the distribution of births across all days of the month, as Figure 1 demonstrates.[9] In fact, there are several other days (such as 8th and 9th) with fewer births than the 13th. Finally, we also observe 18,032 individuals born on Friday the 13th.

3 Born (Un)Lucky?

We start by considering those born on the 13th. The results for the probability of employment (we do not distinguish between full-time and part-time employment) are summarized in Table 1. We present only the coefficient estimates for the birth-day dummy, although the regressions control for standard socio-economic controls: highest attained qualification, being an apprentice, occupation, regional dummies, ethnicity, and dummies for the quarter of birth. As is standard in analyses of labor-market outcomes, we run separate regressions for males and females (when we do not, we include a gender dummy in the regression). The results indicate that among those born on the 13th, males are somewhat more likely to be employed. On the other hand, we find a negative effect for females born on the 14th. We are reluctant to assign much weight to either of these results, as the estimated effects are rather small (and it is easy to obtain small but significant coefficients with a large number of observations, as in our case). Nevertheless, it is reassuring that, if any, the effect of being born on the 13th is positive.

Next, we consider the effect on wages. The regression results are summarized in Table 2. These regressions are estimated by OLS and again include a wide range of controls. None of the estimated effects for those born on the 13th is significantly different from zero. Table 3 repeats the exercise, this time distinguishing between white-collar and blue-collar occupations. Again, none of the coefficients for those born on the 13th is significant. In contrast, we do find significant positive effect for those born on the 12th: for men and for blue-collar workers: men and blue-collar workers born on the 12th earn £0.50 and 1.40 more per hour than others, on average. Given that the minimum wage in 2005-06, the midpoint of the period we consider, was £5.05, effects are not negligible.[10]

As a final test of being born on the 13th, we consider marital outcomes. Table 4 reports the results of probit regressions of the probability of being single (again, accounting for standard controls, including age, which is likely to be particularly important in this case). A number of coefficients are now negative and significant: for males born on the 13th, but also for both genders together born on the 12th (although the effect is only marginally significant) and for females born on the 14th. Given that we seem to obtain similar results for the treatment effect and for (some of) the falsification tests, we are again reluctant to assign much weight to this result.

Next, we consider the much smaller number of individuals born on Friday the 13. Such unlucky days occur relatively frequently: each calendar year has at least one and it is quite common for two such days to fall within one calendar year. Table 5 shows that being born on Friday the 13th has no impact on the probability of employment. In Table 6, we see being born on Friday the 13th has no effect on hourly wage. Finally, Table 7 shows that, unlike when born on the 13th, there might be a small positive effect of being born on Friday the 13th on the probability of remaining single. This time, the effect appears for both genders when analyzed

9 We have no explanation for the higher numbers of respondents born on the 1st and 15th day of the month. Most likely, this is due to misreporting by the respondents.

10 Note that our wage data are not adjusted for inflation but all regressions include time dummies.

together, and for females when the two genders are considered separately. Again, the effect is ery small: women born on this unlucky day are approximately 1 percent more likely to remain single than other women.

Finally, as an additional robustness test we consider the matching estimator developed in Abadie and Imbens (2006), including their bias-corrected matching estimator. To explain this procedure, let's denote by $Y_i(1)$ and $Y_i(0)$ a given outcome, i.e. salary, employment or remaining single, for an individual i born on the treatment day and on any other day respectively. If both $Y_i(1)$ and $Y_i(0)$ were observable, the effect of the treatment would be directly observable as $Y_i(1) - Y_i(0)$ and we could use this to estimate the causal effect of being born on the 13th or Friday the 13th.

However, for people born on the 13th, only $Y_i(1)$ is observable while only $Y_i(0)$ is observable for everyone else. Hence, in order to estimate the average treatment effect, we need to estimate the unobserved potential outcome for each person born the 13th (or Friday the 13th). Since one's birth date is essentially random, we can use the average outcome of some similar individual born any other day to estimate the untreated outcome. Therefore, the matching estimator imputes the missing outcome by finding similar individuals, based on the covariates, who were born on the treatment day.

As it is typical in this context, we assume the strong ignorability condition to ensure that the matching estimators identify and consistently estimate the treatment effect of interest. In particular, we assume that assigment to treatment is independent of the outcomes conditional on the covariates and the probability of assignment is bounded away from zero and one. In order words, this amounts to saying that the assigment of the birth rate is "purely random" for similar individuals and that we can identify the effect of being born on the treatment day for each individual.

The results of this robustness check are reported in Table 8, again for the probability of being employed, hourly wage, and the probability of remaining single. We only report the results for those born on the 13th and Friday the 13th and not for other dates (falsification tests). Note also that we do not report separate estimates for males and females, as gender is part of the matching process. Importantly, and in line with our previous findings, neither being born on the 13th not being born on Friday the 13th has any significant effect on any of the outcomes considered.

4 Conclusions

In this paper, we take superstitions seriously. Some actions bring about bad luck, such as walking under a ladder, can be easily avoided by superstitious people, while others can be reversed relatively easily (for example, spilling salt is thought to bring bad luck, but this can be undone by throwing a pinch of salt over one's left shoulder). Therefore, we consider the effect of two occurrences that, in most cases, come about from a random draw: being born on an unlucky day, namely on the 13th and on Friday the 13th. We analyze the effect of birth on an inauspicious day on three outcomes that are of considerable impact for one's wellbeing: the probability of being employed, the wage one earns, and the probability that he/she remains single.

We find little evidence that being born on either the 13th or on Friday the 13th is associated with dramatically worse outcomes in the labor or marriage markets. Our results indicate small increases in the probability that men born on the 13th are employed and also a fall in the probability that they remain single. However, our regression estimates also suggest that women born on the 14th (included in our falsification tests) are less likely to be employed and

less likely to remain single. Furthermore, we no significant effect of being born on a Friday the 13th on any of the outcomes we consider. These findings are obtained by standard regression analysis and confirmed by a matching model.

Overall, these results suggest that those born on the 13th, or on a Friday the 13th, need not lose much sleep over the inauspicious circumstances of their birth. We find evidence of both positive and negative effects (we leave it up to the reader to decide whether staying single is good or bad luck). We also find similar effects of being born on the 12th or 14th, our falsification tests, although neither of these dates is believed to be particularly auspicious or inauspicious. All of these effects are very small, surely not life-changing. Most likely, the significant coefficients are attributable to the large number of observations included in our analysis, which makes it easy to get precisely estimated coefficients. Furthermore, the LFS is designed to be nationally representative but is not necessarily representative of the various cohorts distinguished by their day of birth. Therefore, if you, or your child (the latter being the case of the first author of this article) were born on Friday the 13th, you can remain content in knowledge that this will have little practical effect on your or your child's quality of life.

References

Abadie, A., and G.W. Imbens (2006). "Large Sample Properties of Matching Estimators for Average Treatment Effects," *Econometrica* 74(1), 235-267.

Bertrand, M., and S. Mullainathan (2004). "Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination." *American Economic Review* 94(4), 992-1011.

Fortin, N., A.J. Hill, and J. Huang (2014). "Superstition in the Housing Market." *Economic Inquiry* 52(3), 974-993.

Kawaguchi, D. (2011). "Actual Age at School Entry, Educational Outcomes, and Earnings." Journal of Japanese and International Economies 25(2), 64-80.

Mandel, Y., I. Grotto, R. El-Yaniv, M. Belkin, E. Israeli, U. Polat and E. Bartov (2008). "Season of Birth, Natural Light, and Myopia." *Ophthalmology* 115(4), 686-692.

Plug, E (2001). "Season of birth, schooling and earnings." Journal of Economic Psychology 22(5), 641-660.

Figure 1 Distribution of dates of birth by day

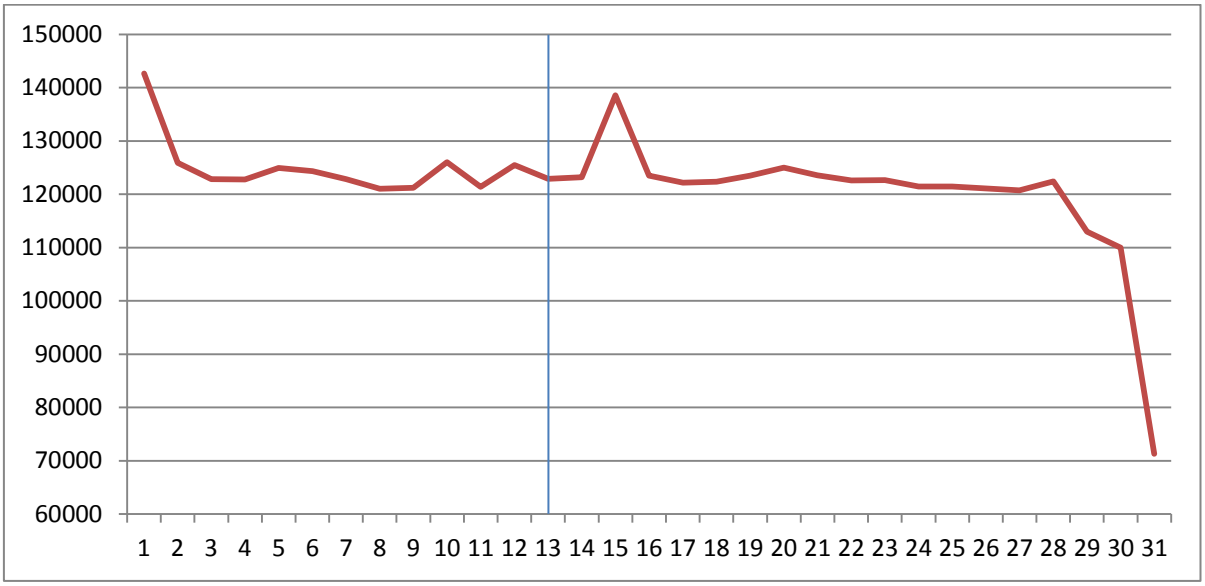

Table 1 Born on the 13th: Probability of employment

	Birth on the 13th			Birth on the 12th			Birth on the 14th		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Birth day effect	.0009421	.002016**	-.000352	-.0004388	-.0013152	.0007877	-.00122948	.0001402	-.0029067**
	(.00072)	(.00094)	(.00099)	(.00072)	(.00096)	(.00097)	(.00074)	(.00096)	(.00101)
	[1.30]	[2.15]	[-0.35]	[-0.61]	[-1.38]	[0.81]	[-1.67]	[0.15]	[-2.87]
Number of obs	2,952,022	1,537,869	1,398,711	2,952,022	1,537,869	1,398,711	2,952,022	1,537,869	1,398,711
Pseudo R2	0.1908	0.0821	0.2081	0.1908	0.0821	0.2081	0.1908	0.0821	0.2081
LR Chi2	267398.72	57143.33	128839.84	267397.42	57140.75	128840.36	267399.87	57138.84	128848.30
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Marginal effects, estimated by probit. Standard errors in parentheses; t-statistics in brackets. Significance levels: * 10%, ** 5%, ***1%.

Table 2 Born on the 13th: Wage (by gender)

	Birth on the 13th			Birth on the 12th			Birth on the 14th		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Birth day effect	-.143	.0473	-.2595	.1845	.5263**	-.0731	.1612	.0016	.2896*
	(.1492)	(.2639)	(.1736)	(.1496)	(.2613)	(.1755)	(.1503)	(.2667)	(.1746)
	[-0.96]	[0.18]	[-1.49]	[1.23]	[2.01]	[-0.42]	[1.07]	[0.01]	[1.66]
Number of obs	257122	106560	150562	257122	106560	150562	257122	106560	150562
Adj R2	0.0226	0.0210	0.0267	0.0226	0.0210	0.0267	0.0226	0.0210	0.0267
F	120.02	48.59	85.44	120.03	48.67	85.40	120.02	48.59	85.45
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; t-statistics in brackets. Significance levels: * 10%, ** 5%, ***1%.

Table 3 Born on the 13th: Wage (by occupation)

	Birth on the 13th			Birth on the 12th			Birth on the 14th		
	Total	Blue collar	White collar	Total	Blue collar worker	White collar	Total	Blue collar worker	White collar
Birth on the 13th	-.143	-.3572	-.3432	.1845	1.3971***	-.2469	.1612	-.1934	-.2248
	(.1492)	(.4685)	(.6105)	(.1496)	(.4634)	(.60513)	(.1503)	(.4601)	(.6268)
	[-0.96]	[-0.76]	[-0.56]	[1.23]	[3.01]	[-0.41]	[1.07]	[-0.42]	[-0.36]
Number of obs	257122	33982	16213	257122	33982	16213	257122	33982	16213
Adj R2	0.0226	0.0370	0.0274	0.0226	0.0372	0.0274	0.0226	0.0370	0.0274
F	120.02	29.37	11.87	120.03	29.56	11.87	120.02	29.36	11.87
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; t-statistics in brackets. Significance levels: * 10%, ** 5%, ***1%.

Table 4 Born on the 13th: Probability of being single

	Birth on the 13th			Birth on the 12th			Birth on the 14th		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Birth day effect	-.0024872	-.0067148**	.0010283	-.0030067*	-.003505	-.0022733	-.0035679**	-.0020213	-.0045031**
	(.00162)	(.0024)	(.00217)	(.0016)	(.00239)	(.00214)	(.00162)	(.00243)	(.00214)
	[-1.54]	[-2.80]	[0.47]	[-1.88]	[-1.47]	[-1.06]	[-2.21]	[-0.83]	[-2.10]
Number of obs	3,802,201	1,867,180	1,935,020	3,802,201	1,867,180	1,935,020	3,802,201	1,867,180	1,935,020
Pseudo R2	0.3934	0.3976	0.3994	0.3934	0.3976	0.3994	0.3934	0.3976	0.3994
LR chi2	1893916.39	960861.69	954631.51	1893917.55	960856.05	954632.41	1893918.87	960854.59	954635.66
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			

Notes: Marginal effects, estimated by probit. Standard errors in parentheses; t-statistics in brackets. Significance levels: * 10%, ** 5%, ***1%.

Table 5 Born on Friday the 13th: Probability of employment

	Birth on Friday the 13th		
	Total	Men	Women
Birth day effect	-.00090	-.0000888	-.0015747
	(.00189)	(.00246)	(.00257)
	[-0.48]	[-0.04]	[-0.61]
Number of obs	2,952,022	1,537,869	1,398,711
Pseudo R2	0.1908	0.0821	0.2081
LR Chi2	267397.28	57138.82	128840.10
Prob>chi2	0.0000	0.0000	0.0000

Notes: Marginal effects, estimated by probit. Standard errors in parentheses; t-statistics in brackets. Significance levels: * 10%, ** 5%, ***1%.

Table 6 Born on Friday the 13th: Wage

	Birth on Friday the 13th				
	Total	Men	Women	Blue collar	White collar
Birth day effect	-.3770	-.6131	-.1471	-.5704	-.7150
	(.3917)	(.7145)	(.4466)	(1.2012)	(1.530)
	[-0.96]	[-0.86]	[-0.33]	[-0.47]	[-0.47]
Number of obs	257122	106560	150562	33982	16213
Adj R2	0.0226	0.0210	0.0267	0.0370	0.0274
F	120.02	48.60	85.40	29.36	11.87
Prob>F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; t-statistics in brackets. Significance levels: * 10%, ** 5%, ***1%.

Table 7 Born on Friday the 13th: Probability of being single

	Birth on Friday the 13th		
	Total	Men	Women
Birth day effect	.0082634**	.00801	.0092068*
	(.00421)	(.00627)	(.00564)
	[1.96]	[1.28]	[1.63]
Number of obs	3,802,201	1,867,180	1,935,020
Pseudo R2	0.3934	0.3976	0.3994
LR chi2	1893917.92	960855.55	954633.98
Prob>F	0.0000	0.0000	0.0000

Notes: Marginal effects, estimated by probit. Standard errors in parentheses; t-statistics in brackets. Significance levels: * 10%, ** 5%, ***1%.

Table 8 Born on the 13th and on Friday the 13th: Matching approach

Birth day effect on	Birth on the 13th	Birth on Friday the 13th
Employment	.001784503	.000569111
	(.002969413)	(.003053289)
	[0.60]	[0.19]
Number of obs	2,952,022	2,952,012
Hourly wage	.014812172	-.121767635
	(.178562015)	(.145375928)
	[0.08]	[-0.84]
Number of obs	258,117	257,974
Being single	.002247008	.006989903
	(.004667413)	(.005125805)
	[0.48]	[1.36]
Number of obs	3,802,201	3,802,155

Notes: Standard errors in parentheses; t-statistics in brackets. Significance levels: * 10%, ** 5%, ***1%.