

Homework 2

Exercise 1

1.

After dropping those missing values, wage equals to 0, the correlation between wage and age is approximately 0.1355,

2.

After dropping those missing values, wage equals to 0, and age smaller than 18, the coefficient for intercept is approximately 14642.3256, The coefficient for age is approximately 220.5089. If we add the square of age as an independent variable, The coefficient for intercept is approximately -23406.55010, The coefficient for age is approximately 2170.28853, The coefficient for square of age -22.9425.

3.

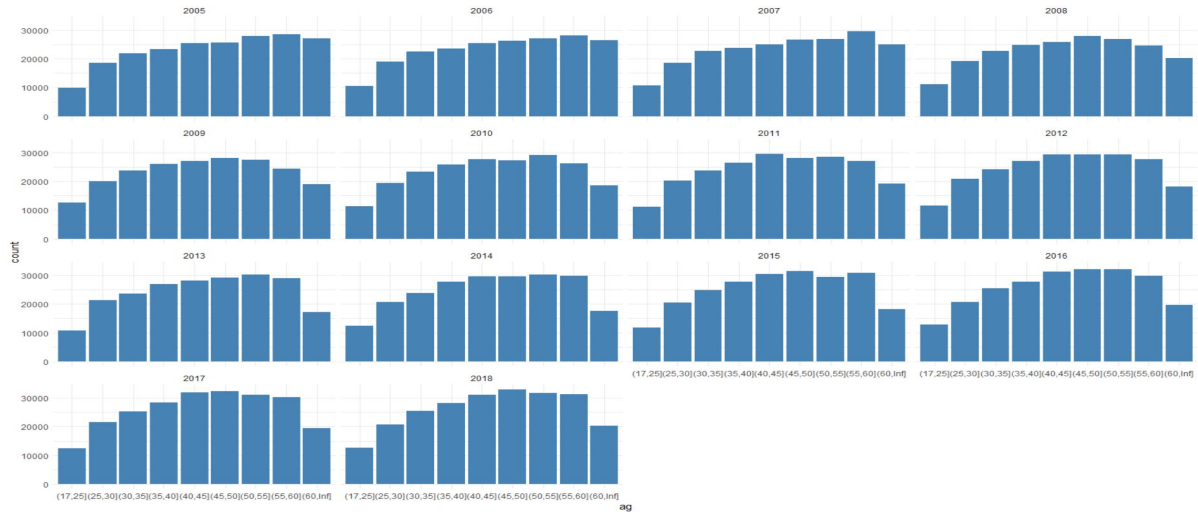
When using standard formula of OLS, the standard error for intercept is approximately 656.876, and the standard error for age is approximately 15.10421. When using bootstrap for 49 replications, the standard error for intercept is approximately 635.62930, and the standard error for age is approximately 16.52311. When using bootstrap for 499 replications, the standard error for intercept is approximately 592.1901, and the standard error for age is approximately 15.8844.

Using formula of OLS is a standard way of computation while bootstrap is more used when the sample size is small and it allows the data to be chosen for more than once.

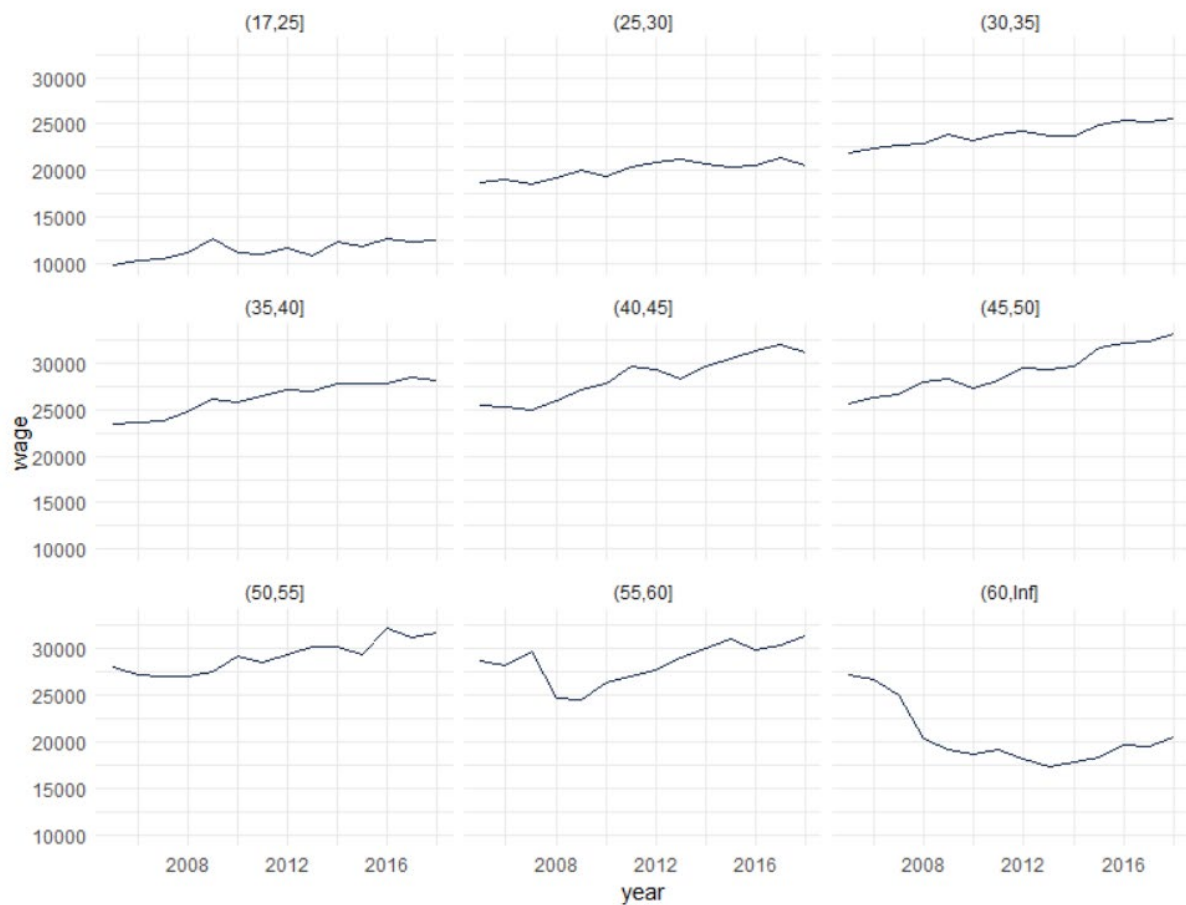
Exercise 2

2.

In any given year, the wage increases until reaches the group between 45 to 50 years old and then decreases.



For time trend, the average wage is generally increasing for every wage group except for people between 55 and 60 and people who are 60 years or older. For people between 55 and 60 years old, their average wage decreases first and then increases after year 2008. For people who are 60 years or older, their wage underwent steady decrease and only underwent minor increase in recent years.



3.

The coefficients are as follows. I add agesq since the trend observed in the previous problem. The magnitude of coefficients of age and agesq becomes smaller, meaning that part of wage difference is explained by time fixed effects.

	V1
age	1134.23517
agesq	-13.84557
year_2006	-6079.03166
year_2007	-5760.73165
year_2008	-4558.32253
year_2009	-4231.96479
year_2010	-4072.22535
year_2011	-3811.94323
year_2012	-3297.41217
year_2013	-3396.61549
year_2014	-3099.24893
year_2015	-2706.42774
year_2016	-2437.90760
year_2017	-2287.06303
year_2018	-2099.96167

4.

The same model cannot be estimated when including wages as a determinant of labor market participation. By theory, when one has wage, he must be in the labor market.

Exercise 4

2.

For Probit Models, the coefficients are as follows.

Intercept	double [1]	0.9042004
Age	double [1]	0.01632997
year_2006	double [1]	0.05592872
year_2007	double [1]	0.06369198
year_2008	double [1]	0.01128376
year_2009	double [1]	-0.08172939
year_2010	double [1]	-0.1156742
year_2011	double [1]	-0.06414044
year_2012	double [1]	-0.1292308
year_2013	double [1]	-0.1759959
year_2014	double [1]	-0.157027
year_2015	double [1]	-0.1623189

For Logit Models, the coefficients are as follows.

l1ist	list [12]	List of length 12
Intercept	double [1]	1.370666
Age	double [1]	0.0349897
year_2006	double [1]	0.1155625
year_2007	double [1]	0.1374409
year_2008	double [1]	0.0258518
year_2009	double [1]	-0.1677206
year_2010	double [1]	-0.2383161
year_2011	double [1]	-0.135431
year_2012	double [1]	-0.2673563
year_2013	double [1]	-0.3634179
year_2014	double [1]	-0.3232439
year_2015	double [1]	-0.3388168

For Linear Probability Models, the coefficients are as follows.

Intercept	double [1]	0.8471669
Age	double [1]	0.002257668
year_2006	double [1]	0.006177894
year_2007	double [1]	0.007259974
year_2008	double [1]	0.001223218
year_2009	double [1]	-0.01059907
year_2010	double [1]	-0.0154155
year_2011	double [1]	-0.008689459
year_2012	double [1]	-0.01747347
year_2013	double [1]	-0.02429008
year_2014	double [1]	-0.02125015
year_2015	double [1]	-0.0223657

3.

The full information of each model is shown as follows. The significance level can be interpreted through column “pvalue”.

Results for the Probit Model

	var	resp.par	prop_sigma_p	zvalue	pvalue
1	Intercept	0.90420042	0.0282499174	32.0071881	0.0000000000000000
2	Age	0.01632997	0.0005045777	32.3636368	0.0000000000000000
3	year_2006	0.05592872	0.0297368209	1.8807902	0.0600004691516873
4	year_2007	0.06369198	0.0293624325	2.1691657	0.0300701061601598
5	year_2008	0.01128376	0.0286324673	0.3940898	0.6935147513212609
6	year_2009	-0.08172939	0.0279559495	-2.9235062	0.0034611331999843
7	year_2010	-0.11567416	0.0275208948	-4.2031397	0.0000263238049980
8	year_2011	-0.06414044	0.0278335215	-2.3044315	0.0211984329367403
9	year_2012	-0.12923084	0.0270274229	-4.7814709	0.0000017401721054
10	year_2013	-0.17599591	0.0273072463	-6.4450259	0.0000000001155807
11	year_2014	-0.15702701	0.0274428058	-5.7219736	0.0000000105293694
12	year_2015	-0.16231893	0.0275050507	-5.9014227	0.0000000036038036

Results for the Logit Model

	var	resl.par	prop_sigma_l	zvalue1	pvalue1
1	Intercept	1.37057394	0.058396663	23.4700728	0.0000000000000000
2	Age	0.03498855	0.001062737	32.9230586	0.0000000000000000
3	year_2006	0.11600283	0.062715997	1.8496530	0.06436357352831679
4	year_2007	0.13766807	0.062031950	2.2193091	0.02646570539337545
5	year_2008	0.02595599	0.059987950	0.4326868	0.66524233616660866
6	year_2009	-0.16766564	0.057902242	-2.8956675	0.00378353066048132
7	year_2010	-0.23827723	0.056795974	-4.1953190	0.00002724877876770
8	year_2011	-0.13531758	0.057778582	-2.3420025	0.01918058636341069
9	year_2012	-0.26712606	0.055758567	-4.7907627	0.00000166148563030
10	year_2013	-0.36331219	0.056037791	-6.4833426	0.00000000008971246
11	year_2014	-0.32305292	0.056501918	-5.7175567	0.00000001080666401
12	year_2015	-0.33892677	0.056558295	-5.9925210	0.00000000206612716

Results for the Linear Probability Model

	var	reso.par	osd	tvalue3	pvalue3
inter	Intercept	0.847166917	0.00378794976	223.647876	0.0000000000000000
age	Age	0.002257668	0.00006749252	33.450642	0.0000000000000000
year_2006	year_2006	0.006177894	0.00370924655	1.665539	0.09580804980281465
year_2007	year_2007	0.007259974	0.00365797290	1.984699	0.04718039346946057
year_2008	year_2008	0.001223218	0.00362660698	0.337290	0.73589894384436927
year_2009	year_2009	-0.010599072	0.00362797856	-2.921481	0.00348439284873225
year_2010	year_2010	-0.015415504	0.00359743930	-4.285133	0.00001827793168585
year_2011	year_2011	-0.008689459	0.00358668679	-2.422698	0.01540727272661413
year_2012	year_2012	-0.017473469	0.00353364502	-4.944885	0.00000076296490592
year_2013	year_2013	-0.024290083	0.00361146021	-6.725834	0.00000000001754064
year_2014	year_2014	-0.021250145	0.00360627229	-5.892551	0.00000000381338516
year_2015	year_2015	-0.022365697	0.00361638060	-6.184553	0.00000000062488537

Exercise 5

1.

For the Probit Model, the marginal effects at the mean are as follows.

Age	double [1]	0.002100004
year_2006	double [1]	0.007192332
year_2007	double [1]	0.008190674
year_2008	double [1]	0.001451072
year_2009	double [1]	-0.01051025
year_2010	double [1]	-0.01487549
year_2011	double [1]	-0.008248345
year_2012	double [1]	-0.01661885
year_2013	double [1]	-0.02263276
year_2014	double [1]	-0.02019339
year_2015	double [1]	-0.02087392

For the Logit Model, the marginal effects at the mean are as follows.

Age	double [1]	0.002428224
year_2006	double [1]	0.008316457
year_2007	double [1]	0.009470834
year_2008	double [1]	0.001677867
year_2009	double [1]	-0.01215295
year_2010	double [1]	-0.01720045
year_2011	double [1]	-0.009537519
year_2012	double [1]	-0.01921629
year_2013	double [1]	-0.02617014
year_2014	double [1]	-0.02334951
year_2015	double [1]	-0.02413641

For the Linear Probability Model, the marginal effects are the same as their coefficients.

Intercept	double [1]	0.8471669
Age	double [1]	0.002257668
year_2006	double [1]	0.006177894
year_2007	double [1]	0.007259974
year_2008	double [1]	0.001223218
year_2009	double [1]	-0.01059907
year_2010	double [1]	-0.0154155
year_2011	double [1]	-0.008689459
year_2012	double [1]	-0.01747347
year_2013	double [1]	-0.02429008
year_2014	double [1]	-0.02125015
year_2015	double [1]	-0.0223657

2.

For Probit Models,

	var	sder1
1	Intercept	0.0636568598
2	Age	0.0011509821
3	year_2006	0.0039385861
4	year_2007	0.0044976177
5	year_2008	0.0007677797
6	year_2009	0.0057400898
7	year_2010	0.0081571426
8	year_2011	0.0045370098
9	year_2012	0.0091012193
10	year_2013	0.0123676013
11	year_2014	0.0110318557
12	year_2015	0.0114287365

For Logit Model

	var	sder2
1	Intercept	0.0373468964
2	Age	0.0009534603
3	year_2006	0.0031569392
4	year_2007	0.0037491405
5	year_2008	0.0007046811
6	year_2009	0.0045668067
7	year_2010	0.0064962108
8	year_2011	0.0036865366
9	year_2012	0.0072948576
10	year_2013	0.0098970166
11	year_2014	0.0087932072
12	year_2015	0.0092369993

For the Linear Probability Model, the standard errors of the marginal effects are the same as those of coefficients, which is shown by “osd”.

	var	reso.par	osd	tvalue3	pvalue3
inter	Intercept	0.847166917	0.00378794976	223.647876	0.000000000000000000
age	Age	0.002257668	0.00006749252	33.450642	0.000000000000000000
year_2006	year_2006	0.006177894	0.00370924655	1.665539	0.09580804980281465
year_2007	year_2007	0.007259974	0.00365797290	1.984699	0.04718039346946057
year_2008	year_2008	0.001223218	0.00362660698	0.337290	0.73589894384436927
year_2009	year_2009	-0.010599072	0.00362797856	-2.921481	0.00348439284873225
year_2010	year_2010	-0.015415504	0.00359743930	-4.285133	0.00001827793168585
year_2011	year_2011	-0.008689459	0.00358668679	-2.422698	0.01540727272661413
year_2012	year_2012	-0.017473469	0.00353364502	-4.944885	0.00000076296490592
year_2013	year_2013	-0.024290083	0.00361146021	-6.725834	0.00000000001754064
year_2014	year_2014	-0.021250145	0.00360627229	-5.892551	0.00000000381338516
year_2015	year_2015	-0.022365697	0.00361638060	-6.184553	0.00000000062488537