Social Security Imputation Report

This part of the Basic Income Project consists of imputing non-recipients from the CPS dataset and assign them benefits to match the total recipients and benefits that were reported from the Social Security Administration. This report will detail the methodology, underlying assumptions, and results of the imputation.

Methodology and Assumptions:

Before we could perform any imputations, we needed to get data from the SSA in order to see how many recipients we needed from each of the U.S. states. We created an excel spreadsheet to summarize recipients and benefits data for each of the 50 states and the District of Columbia from the OASDI Beneficiaries by State and County, 2014 dataset (https://www.ssa.gov/policy/docs/statcomps/oasdi_sc/2014/index.html).

This spreadsheet is called SS_Combined and is included in this folder.

After reading in this data from the Social Security Administration and the CPS, we create new variables for weighted benefit. We also created 3 binary variables based on the 3 criteria for eligibility based on the Social Security program rules to predict if a given individual will receive benefits. See the code for a more detailed description on how these variables were defined.

Once these variables were created, we performed a regression using ordinary least squares to predict which of the non-recipients received Social Security using the following equation:

$$ss_{indicator} = \beta_0 + \beta_1 Aged_{yn} + \beta_2 Disabled_{yn} + \beta_3 Widowed_{yn}$$

where ss_indicator, Aged_yn, Disabled_yn, and Widowed_yn were the four binary variables described in the above paragraph. The results of this model are below:

OLS Regression Results

==

Dep. Variable:	ss_indicator	R-squared:	0.594
Model:	OLS	Adj. R-squared:	0.594
Method:	Least Squares	F-statistic:	6.803e+04
Date:	Mon, 15 Aug 2016	Prob (F-statistic):	0.00
Time:	16:54:18	Log-Likelihood:	16367.
No. Observations:	139415	AIC:	-3.273e+04
Df Residuals:	139411	BIC:	-3.269e+04
Df Model:	3		
Covariance Type:	nonrobust		

==

	coef	std err	t	P>|t|	[95.0% Conf. Int.]	
Intercept	0.0239	0.001	38.178	0.000	0.023	0.025
Aged_yn	0.7076	0.002	361.877	0.000	0.704	0.711
Disabled_yn	0.2689	0.002	117.700	0.000	0.264	0.273
Widowed_yn	0.1085	0.003	33.338	0.000	0.102	0.115

Omnibus:	42500.835	Durbin-Watson:	1.732
Prob(Omnibus):	0.000	Jarque-Bera (JB):	679353.317
Skew:	1.041	Prob(JB):	0.00
Kurtosis:	13.612	Cond. No.	5.92

We take this model and fit it to each weighted non-recipient in the CPS to give them a probability of receiving Social Security benefits. Since the CPS variable for Social Security is given in yearly benefits and the Administration totals are in monthly, we divide the weighted benefits by 12 to correctly compare the totals. Finally, we scale down the Administrative totals to more closely match the average monthly benefits for 2014 since those totals are only reported for December.

Once we can directly compare the recipients and benefits totals for each state, we marginally add a weighted non-recipient to the pool of recipients according to the probability that individual received Social Security until adding one more individual would make the CPS recipients totals higher than the SSA totals. Then each of the imputed individuals are assigned a benefit amount so that the totals for all of the benefits received match exactly the SSA benefits totals.

Results:

Here are the results below. Note that New Mexico was the only state to have over-reporting so no imputed individuals were added to New Mexico's totals.

State	SSA_Recipients	CPS + Imputed Recipients	SSA_Benefit	CPS + Imputed Benefits	Ajusted monthly benefit	Imputed Monthly Benefit
AL	1095925.00	1094542.31	1273651414.65	1273651414.65	1162.17	1353.61

AK	89047.00	88994.91	102925187.33	102925187.33	1155.85	1405.83
AZ	1207102.00	1204926.26	1514539046.80	1514539046.80	1254.69	1532.90
AR	673193.00	672272.42	759502514.84	759502514.84	1128.21	1358.57
CA	5538810.00	5537735.55	6687524451.57	6687524451.57	1207.39	1196.18
CO	794937.00	794258.54	975831732.03	975831732.03	1227.56	1404.90
CT	654533.00	652534.81	884197747.03	884197747.03	1350.88	2292.05
DE	192187.00	191796.13	253861437.19	253861437.19	1320.91	1716.89
DC	79716.00	79514.74	89805676.48	89805676.48	1126.57	621.37
FL	4223274.00	4221983.09	5180485262.07	5180485262.07	1226.65	1348.27
GA	1676778.00	1676418.52	2002042745.00	2002042745.00	1193.98	1186.18
HI	251591.00	251375.23	310206672.48	310206672.48	1232.98	1510.23
ID	306264.00	306137.42	364522006.27	364522006.27	1190.22	1396.82
IL	2155290.00	2154043.44	2701661169.73	2701661169.73	1253.50	1585.66
IN	1286099.00	1283978.03	1623550944.66	1623550944.66	1262.38	1627.86
IA	616301.00	615317.47	756641291.84	756641291.84	1227.71	1783.42
KS	521955.00	521744.87	652252060.51	652252060.51	1249.63	1824.62
KY	954284.00	950169.09	1079462494.76	1079462494.76	1131.18	1289.35
LA	854211.00	852932.75	942620787.10	942620787.10	1103.50	1358.80
ME	325496.00	325267.20	367939106.92	367939106.92	1130.40	1011.93
MD	936372.00	933680.76	1200681745.18	1200681745.18	1282.27	2819.48
MA	1224469.00	1224010.52	1514327473.98	1514327473.98	1236.72	1493.59
MI	2121776.00	2119191.94	2730998934.87	2730998934.87	1287.13	1472.18
MN	965018.00	964287.20	1218341089.81	1218341089.81	1262.51	1674.73
MS	640772.00	640510.89	713521353.81	713521353.81	1113.53	826.70
MO	1246269.00	1243745.75	1484512672.01	1484512672.01	1191.17	883.94
MT	212535.00	210927.33	248163940.80	248163940.80	1167.64	1381.52
NE	326078.00	325928.03	397045339.54	397045339.54	1217.64	1492.83
NV	475811.00	475730.61	587132541.07	587132541.07	1233.96	1610.27
NH	283983.00	283909.73	362608869.02	362608869.02	1276.87	1579.48
NJ	1568016.00	1563591.01	2130505370.58	2130505370.58	1358.73	2243.67
NM	399987.00	397911.43	452568235.19	452568235.19	1131.46	NA
NY	3482978.00	3480695.99	4412947969.97	4412947969.97	1267.00	1707.66
NC	1948531.00	1945857.93	2370962871.19	2370962871.19	1216.80	2010.97
ND	124372.00	123814.31	144436373.53	144436373.53	1161.33	1571.78
OH	2267508.00	2267023.61	2720426281.75	2720426281.75	1199.74	1990.83
OK	749794.00	747127.45	875754793.90	875754793.90	1167.99	1314.28
OR	798156.00	797559.20	988564024.70	988564024.70	1238.56	1665.73
PA	2722892.00	2720595.48	3425841003.38	3425841003.38	1258.16	1991.53
RI	216029.00	215945.61	266003920.72	266003920.72	1231.33	1587.80
SC	1040971.00	1039710.13	1269952882.23	1269952882.23	1219.97	1854.21
SD	165499.00	165265.96	191852637.00	191852637.00	1159.24	1093.20
TN	1371562.00	1370863.61	1630198522.76	1630198522.76	1188.57	1288.82
TX	3842249.00	3841340.35	4493571186.44	4493571186.44	1169.52	1473.67

UT	365730.00	363908.08	448996446.86	448996446.86	1227.67	1788.10
VT	140634.00	140464.49	170518711.59	170518711.59	1212.50	2225.79
VA	1415661.00	1415409.22	1755251033.58	1755251033.58	1239.88	1891.12
WA	1230039.00	1228114.34	1569155772.06	1569155772.06	1275.70	1925.61
WV	464823.00	464007.70	543511614.57	543511614.57	1169.29	1253.52
WI	1153149.00	1150451.39	1451635054.06	1451635054.06	1258.84	1600.46
WY	101296.00	100992.01	125805989.49	125805989.49	1241.96	1369.61