

## Veteran's Benefits (VB) Imputation

Current Population Survey (CPS) provides Veteran's Benefits (VB) micro-data in the March Supplement, such as the total number of VB recipients as well as their overall weighted-sum benefits. However, these numbers are underestimated compared with the reports from US Department of Veterans Affairs (USVA). We augmented the total number of recipients and their dollar amount of benefits from CPS 2014 March Supplement to match the 2014, and some information in 2015, VB reports provided on USVA website.

In addition to match VB number of recipients and total benefits, we tried to maintain CPS original micro-data distribution by utilizing USVA current distribution and VB rules. However, CPS data is insufficient in many ways. In order to augment data reasonably, a number of assumptions are made. This report illustrates details those assumptions and explains imputation procedure.

### CPS micro-data and VB targets

#### CPS data on VB

In the VB section of CPS March Supplement, each respondent reports how much benefit received during previous calendar year. Meanwhile, they also report the type of VB received, within 5 types of categories: Disability compensation, Survivor benefit, Veterans' pension, Education assistance and Other payments. There is no overlap problem for recipients, which means a veteran would only receive one type of payments.

Besides, CPS does not report any Medical care benefits that veterans enjoy.

#### Targets for imputation

The targets for imputation come from USVA official data. In Fiscal Year 2014, an average of 5 million of veterans or veterans' dependents claims roughly 88 billion benefits. The annual average benefits for each recipient is 17 thousand, which varies across state. So, for our imputation, CPS March Supplement data is sub-grouped by state for a better measurement.

The Medical care benefits are 59 billion in total. In order to cover this part of benefits, a simple assumption is made: an evenly distribution on current VB recipients. The average Medical care benefit is also calculated by state.

Here is the summary of dollar benefit targets for each state:

State	CPS total benefits (Annually)	Admin total benefits (Annually)	Medical care benefits (Annually)
Alabama	1047362612	2,100,415,963	1,021,715,496
Alaska	178823523	319,167,679	222,938,068
Arizona	1635036508	2,076,211,334	1,375,088,364
Arkansas	905104453	1,150,998,996	940,245,623
California	5216169010	8,224,416,627	5,584,851,466
Colorado	1366983041	1,826,463,088	931,561,758

<b>Connecticut</b>	493083279	538,980,032	593,311,871
<b>Delaware</b>	204019532	237,857,966	150,788,104
<b>District of Columbia</b>	70810800.5	125,472,016	225,406,129
<b>Florida</b>	4179276737	6,662,401,370	4,662,292,889
<b>Georgia</b>	1926513955	3,533,617,453	1,707,820,976
<b>Hawaii</b>	327430648	555,979,428	254,148,535
<b>Idaho</b>	272603431	459,823,187	351,404,348
<b>Illinois</b>	1660124737	2,029,701,338	2,088,426,338
<b>Indiana</b>	865693775	1,404,980,698	1,186,401,737
<b>Iowa</b>	215665926	671,201,478	638,220,784
<b>Kansas</b>	625016379	746,070,934	569,972,323
<b>Kentucky</b>	759970632	1,411,203,197	945,027,861
<b>Louisiana</b>	529500573	1,358,221,972	875,694,126
<b>Maine</b>	368561732	587,677,853	344,244,221
<b>Maryland</b>	1082698822	1,593,195,764	1,027,396,915
<b>Massachusetts</b>	530277514	1,368,270,349	1,146,154,558
<b>Michigan</b>	1036254445	2,215,964,286	1,420,982,005
<b>Minnesota</b>	908636318	1,297,971,519	1,136,312,754
<b>Mississippi</b>	577560933	877,145,223	698,779,879
<b>Missouri</b>	1252297943	1,861,181,348	1,312,030,967
<b>Montana</b>	265033549	377,258,990	338,208,051
<b>Nebraska</b>	570399358	627,994,356	449,166,839
<b>Nevada</b>	889449339	885,350,225	818,193,335
<b>New Hampshire</b>	231518394	369,414,649	285,915,175
<b>New Jersey</b>	884877166	1,261,165,632	784,095,687
<b>New Mexico</b>	779282838	873,753,666	540,539,838
<b>New York</b>	1913652886	2,945,076,939	2,930,966,285
<b>North Carolina</b>	1920323003	3,807,122,476	1,987,215,553
<b>North Dakota</b>	104471354	196,692,862	155,677,485

<b>Ohio</b>	1943219472	2,559,991,647	2,316,111,261
<b>Oklahoma</b>	1092725518	1,979,633,480	808,573,919
<b>Oregon</b>	1189581207	1,424,797,763	1,039,902,679
<b>Pennsylvania</b>	1587947134	2,809,224,066	2,193,636,664
<b>Rhode Island</b>	213687912	273,101,382	225,710,295
<b>South Carolina</b>	573416486	2,136,143,859	1,045,378,196
<b>South Dakota</b>	141577121	269,962,308	328,674,664
<b>Tennessee</b>	1186655405	2,264,376,807	1,393,180,607
<b>Texas</b>	4830668093	8,640,089,190	4,345,103,485
<b>Utah</b>	382765261	553,529,722	405,189,301
<b>Vermont</b>	125840458	156,124,355	130,726,833
<b>Virginia</b>	2279663349	3,661,160,167	1,443,669,250
<b>Washington</b>	1021791092	2,462,388,119	1,202,932,472
<b>West Virginia</b>	405154128	772,741,986	716,201,564
<b>Wisconsin</b>	754692678	1,285,635,125	1,263,430,484
<b>Wyoming</b>	88420962.9	170,004,630	205,409,953

## Imputation Procedure

Except Medical care benefits, we follow a similar two-step procedure like SSI imputation. First, we add up the individual weight in the recipient pool to reach the administrative level for each state. Second, we impute and get the adjust ratio for benefits amount to match the dollar benefit total.

### Step I : impute recipient

A basic linear regression model is built up for analyzing the likelihood of being a recipient. Following VB rules and CPS available information, the independent variables contain age, gender, earned income, whether disabled and whether on active.

According to the eligibility of Disability Compensation, a major type of VB, the degrees of disability will affect the amount of benefits receive. CPS provides 6 kinds of disability information for each individual. In order to detect the level of disability, the 6 types of disability are separately applied as control variables.

Because VB is an exclusive welfare for veterans and relevant dependents, we include whether being an active soldier a dummy variable.

Some of the variables we choose may not be the same as what USVA officially uses, but they are good proxies. For instance, CPS does not cover the sorts of disability such as PTSD. But existing types are fair estimations.

$$VB\ indicator = \alpha + \beta_1 * age + \beta_2 * gender + \beta_3 * income + \beta_4 * disability_1 + \beta_5 * disability_2 + \beta_6 * disability_3 +$$

We run the model on a subset of CPS dataset. Because only previous soldiers and their dependents may be eligible for welfare, we limit our regression model to veterans and their family members.

Then we rank all recipients by their fitted probability. For each state's sub-group, we sum-up their weights until the weights reach administrative level. For the state whose pre-imputation weights are bigger than administrative data, we skip this step and do a direct shrink in following step.

Step II :

For each imputed recipient, we assign the average benefit amount for correspondent state. Then we calculate the total dollar benefits again for each state, and compare the new dollar benefits with VB administrative data. Conditions vary among states, and we can get the adjustment ratios by dividing administrative benefits to imputed benefits. Most adjustment ratios are nearly equal to 1. We use the adjustment ratios to augment or shrink each household's benefits.

For Medical Care imputation, CPS does not contain any relevant information. We follow a simple assumption that makes an evenly distribution of official benefits to current VB recipients. In other words, among each state, a same amount of Medical Care benefits is added to CPS VB welfare.

## Appendix

Table 1: VB recipients' numbers by state

State	CPS total recipients	Administrative total recipients
Alabama	55991.07	119,975
Alaska	11456.25	19,453
Arizona	94511.28	113,899
Arkansas	49003.7	59,772
California	326386.3	428,720
Colorado	93203.3	104,931
Connecticut	34980.16	31,052
Delaware	12847.79	13,969
District of Columbia	4608.61	6,482
Florida	248071.8	385,967
Georgia	141882.9	201,363
Hawaii	19864.18	27,519
Idaho	25523.22	29,919
Illinois	115399.3	113,659
Indiana	77677.16	97,817
Iowa	26687.87	45,598
Kansas	35325.21	43,905
Kentucky	58340.31	78,984
Louisiana	43353.07	75,406
Maine	31164.77	31,021
Maryland	84576.52	88,470
Massachusetts	51510.39	73,297
Michigan	76135.43	123,568
Minnesota	87230.71	102,267
Mississippi	38295.36	52,949
Missouri	82553.9	108,454
Montana	20054.59	24,633

<b>Nebraska</b>	38753.19	46,218
<b>Nevada</b>	53554.38	51,861
<b>New Hampshire</b>	17278.68	21,521
<b>New Jersey</b>	60928.82	66,182
<b>New Mexico</b>	45868.34	43,579
<b>New York</b>	130160.8	157,041
<b>North Carolina</b>	123591.9	207,221
<b>North Dakota</b>	9664.36	14,035
<b>Ohio</b>	130588.3	159,345
<b>Oklahoma</b>	77865.64	105,569
<b>Oregon</b>	68275.77	79,309
<b>Pennsylvania</b>	109361.7	153,418
<b>Rhode Island</b>	16074.2	14,686
<b>South Carolina</b>	56411.19	114,576
<b>South Dakota</b>	8704.99	18,220
<b>Tennessee</b>	97589.5	129,587
<b>Texas</b>	299556.1	467,365
<b>Utah</b>	21753.39	30,436
<b>Vermont</b>	6961.53	8,734
<b>Virginia</b>	145863.9	197,441
<b>Washington</b>	86066.29	144,742
<b>West Virginia</b>	25686.65	40,883
<b>Wisconsin</b>	67107.31	80,774
<b>Wyoming</b>	6366.03	12,073

Table 2: VB average benefits by state, without Medical Care

<b>State</b>	<b>Average annual benefit</b>
<b>Alabama</b>	17,507
<b>Alaska</b>	16,407
<b>Arizona</b>	18,229
<b>Arkansas</b>	19,256
<b>California</b>	19,184

<b>Colorado</b>	17,406
<b>Connecticut</b>	17,357
<b>Delaware</b>	17,028
<b>District of Columbia</b>	19,357
<b>Florida</b>	17,262
<b>Georgia</b>	17,548
<b>Hawaii</b>	20,203
<b>Idaho</b>	15,369
<b>Illinois</b>	17,858
<b>Indiana</b>	14,363
<b>Iowa</b>	14,720
<b>Kansas</b>	16,993
<b>Kentucky</b>	17,867
<b>Louisiana</b>	18,012
<b>Maine</b>	18,945
<b>Maryland</b>	18,008
<b>Massachusetts</b>	18,667
<b>Michigan</b>	17,933
<b>Minnesota</b>	12,692
<b>Mississippi</b>	16,566
<b>Missouri</b>	17,161
<b>Montana</b>	15,315
<b>Nebraska</b>	13,588
<b>Nevada</b>	17,072
<b>New Hampshire</b>	17,165
<b>New Jersey</b>	19,056
<b>New Mexico</b>	20,050
<b>New York</b>	18,754
<b>North Carolina</b>	18,372
<b>North Dakota</b>	14,014
<b>Ohio</b>	16,066
<b>Oklahoma</b>	18,752
<b>Oregon</b>	17,965
<b>Pennsylvania</b>	18,311
<b>Rhode Island</b>	18,596
<b>South Carolina</b>	18,644
<b>South Dakota</b>	14,817
<b>Tennessee</b>	17,474
<b>Texas</b>	18,487
<b>Utah</b>	18,187
<b>Vermont</b>	17,875
<b>Virginia</b>	18,543
<b>Washington</b>	17,012
<b>West Virginia</b>	18,901
<b>Wisconsin</b>	15,916
<b>Wyoming</b>	14,081

Table 3: Adjustment ratios by state

State	Imputed benefits	Admin benefits	Adjust ratio
Alabama	1,685,142,531	2,100,415,963	1.2464
Alaska	323,631,614	319,167,679	0.9862
Arizona	1,904,945,143	2,076,211,334	1.0899
Arkansas	789,660,212	1,150,998,996	1.4576
California	6,934,947,044	8,224,416,627	1.1859
Colorado	1,896,712,618	1,826,463,088	0.9630
Connecticut	507,944,055	538,980,032	1.0611
Delaware	179,561,037	237,857,966	1.3247
District of Columbia	91,325,767	125,472,016	1.3739
Florida	4,858,138,050	6,662,401,370	1.3714
Georgia	3,632,774,576	3,533,617,453	0.9727
Hawaii	505,648,849	555,979,428	1.0995
Idaho	475,288,090	459,823,187	0.9675
Illinois	2,222,394,376	2,029,701,338	0.9133
Indiana	1,328,684,387	1,404,980,698	1.0574
Iowa	366,045,671	671,201,478	1.8337
Kansas	886,304,155	746,070,934	0.8418
Kentucky	1,285,697,182	1,411,203,197	1.0976
Louisiana	979,708,438	1,358,221,972	1.3864
Maine	439,246,001	587,677,853	1.3379
Maryland	1,290,116,365	1,593,195,764	1.2349
Massachusetts	1,041,016,241	1,368,270,349	1.3144
Michigan	2,174,073,847	2,215,964,286	1.0193
Minnesota	1,111,068,626	1,297,971,519	1.1682
Mississippi	862,758,460	877,145,223	1.0167
Missouri	1,435,953,663	1,861,181,348	1.2961
Montana	395,759,177	377,258,990	0.9533
Nebraska	626,830,186	627,994,356	1.0019
Nevada	833,876,609	885,350,225	1.0617
New Hampshire	185,517,590	369,414,649	1.9913
New Jersey	790,801,958	1,261,165,632	1.5948
New Mexico	735,415,613	873,753,666	1.1881
New York	3,221,039,933	2,945,076,939	0.9143
North Carolina	3,341,572,594	3,807,122,476	1.1393
North Dakota	135,687,417	196,692,862	1.4496
Ohio	2,755,925,908	2,559,991,647	0.9289
Oklahoma	1,961,306,675	1,979,633,480	1.0093
Oregon	1,199,360,106	1,424,797,763	1.1880
Pennsylvania	2,374,934,556	2,809,224,066	1.1829
Rhode Island	241,694,453	273,101,382	1.1299
South Carolina	2,333,033,917	2,136,143,859	0.9156
South Dakota	224,602,013	269,962,308	1.2020
Tennessee	1,962,490,353	2,264,376,807	1.1538



<b>Texas</b>	7,472,462,315	8,640,089,190	1.1563
<b>Utah</b>	505,809,254	553,529,722	1.0943
<b>Vermont</b>	164,145,807	156,124,355	0.9511
<b>Virginia</b>	3,589,625,360	3,661,160,167	1.0199
<b>Washington</b>	1,948,805,663	2,462,388,119	1.2635
<b>West Virginia</b>	632,083,267	772,741,986	1.2225
<b>Wisconsin</b>	1,061,960,989	1,285,635,125	1.2106
<b>Wyoming</b>	146,209,355	170,004,630	1.1627

Table 4: Medical Care Amount for each recipient

<b>State</b>	<b>Medical care average</b>
<b>Alabama</b>	14,789.70
<b>Alaska</b>	16,110.27
<b>Arizona</b>	21,494.38
<b>Arkansas</b>	20,473.26
<b>California</b>	18,559.36
<b>Colorado</b>	20,332.14
<b>Connecticut</b>	28,618.24
<b>Delaware</b>	13,629.73
<b>District of Columbia</b>	56,043.71
<b>Florida</b>	16,401.24
<b>Georgia</b>	9,931.47
<b>Hawaii</b>	14,094.28
<b>Idaho</b>	21,486.14
<b>Illinois</b>	24,099.30
<b>Indiana</b>	18,325.78
<b>Iowa</b>	16,586.96
<b>Kansas</b>	25,448.91
<b>Kentucky</b>	17,056.87
<b>Louisiana</b>	25,736.58
<b>Maine</b>	13,203.31
<b>Maryland</b>	20,240.13
<b>Massachusetts</b>	32,606.93
<b>Michigan</b>	12,207.89
<b>Minnesota</b>	16,344.01
<b>Mississippi</b>	23,152.38
<b>Missouri</b>	20,727.10
<b>Montana</b>	18,199.76
<b>Nebraska</b>	11,578.58
<b>Nevada</b>	20,959.78
<b>New Hampshire</b>	15,494.59
<b>New Jersey</b>	15,746.39
<b>New Mexico</b>	14,537.07
<b>New York</b>	15,312.71
<b>North Carolina</b>	15,787.14
<b>North Dakota</b>	17,131.87

<b>Ohio</b>	25,036.62
<b>Oklahoma</b>	14,194.35
<b>Oregon</b>	12,617.73
<b>Pennsylvania</b>	30,746.64
<b>Rhode Island</b>	13,399.56
<b>South Carolina</b>	19,694.50
<b>South Dakota</b>	28,090.05
<b>Tennessee</b>	15,204.81
<b>Texas</b>	11,421.42
<b>Utah</b>	23,600.41
<b>Vermont</b>	18,629.06
<b>Virginia</b>	11,931.65
<b>Washington</b>	8,352.67
<b>West Virginia</b>	34,358.57
<b>Wisconsin</b>	24,421.17
<b>Wyoming</b>	18,091.08