

1.(a) Several answers possible: Uncertainty, and especially large losses are possible. Purchase is often through insurance that lowers the price to consumer. Information asymmetries. Externalities are important (infectious diseases). Government has a large role (even in U.S.).

(b) Research provides information that may resolve positive issues but not normative issues. E.g. An expensive drug saves lives. A normative issue still left is should the government or health insurance cover the cost of an expensive drug.

(c) Several answers possible: Private sector has a bigger role in the U.S. U.S. spends much more as a fraction of GDP than health care in other countries. U.S. is the world leader in medical research.

(d) Life expectancy is lower and infant mortality is higher in the U.S. than in other similarly rich nations.

2. Martha pays the deductible plus coinsurance rate times excess above the deductible.

Martha pays $\$2,000 + 0.1 \times (\$3,000 - \$2,000) = \$2,100$.

3.(a) Cost of Blue Bronze 60 PPO is \$261.06 per month. The government subsidy is \$415.09 per month.

(b) Maximum amount is \$11,982.72 (Insurance $12 \times 261.06 = 3,132.72$ + Max out of pocket 8,850 if in network).

(c) This is tricky. The total cost $\$5,000 + \800 is below the maximum out-of-pocket. The \$5,000 medical is below the \$5,800 yearly deductible. The \$800 for drugs exceeds the \$450 yearly deductible by \$250. For medical you may pay less than \$5,000 as some things are provided free (e.g. Preventative care, screening, and immunization). For drugs it depends on what the copays are for the \$250 above the \$450 maximum.

(d) The Kaiser Permanente Bronze 60 HMO plan has the same standard benefits for in-network care, but the insurance costs are \$247.51 less per month ($\$261.06 - \13.55). This may be big enough per year ($\$2,970.12$) to choose Kaiser HMO, though Kaiser HMO and Blue Cross PPO have different providers and Blue Cross partly reimburses out-of-network care. Kaiser has a five-star rating versus three-star for Blue Cross. More research may be required at this stage.

(e) The Silver 73 PPO Plan costs \$144.27 more ($\$405.33 - \261.06) per month or \$1,731.24 per year. In return the annual deductibles are \$6,250 less ($\$5,800 - \$0 + \text{pharmaceuticals } \$450 - \$0 = \450) and the copays and coinsurance are lower for doctor visits, tests, drugs, hospital, The maximum amount of out of pocket is \$2,750 less ($\$6,100 - \$6,850$). Unless you predict very little care, Silver is a much better deal. This may seem surprising. The reason is that each plan is priced separately to be actuarially fair (after deducting reasonable costs) and apparent anomalies in pricing can happen. Healthier people must be picking the Silver plan.

(f) Click on Details for the plan and then click on Doctors and Provider List.

(g) The Affordable Care Act at least reduced to Bronze, Silver, Gold and Platinum plans with standardized benefits. But then there are HMO's, PPO's, minimum coverage, HSA's, etc., and terms like coinsurance, deductible, etc. Plus does the insurance plan include my doctor(s)?

To me it would be complicated even for a well-informed consumer.

(U.C. Davis gives employees a choice between five plans – a closed HMO (Kaiser), an open HMO, a PPO, a high deductible PPO and a high deductible PPO paired with a health savings account.)

Econ 132 – Ass 1 Solutions

4.(a),(b) Hopefully straightforward.

(c) Variables seem to be in the right range but some data are missing on age and bad health.

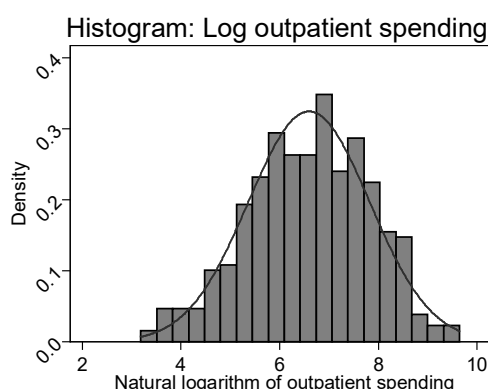
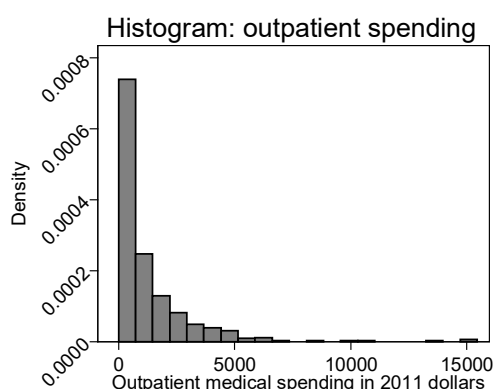
Variable	Obs	Mean	Std. dev.	Min	Max
outpatient	449	1281.076	1871.146	0	15445.81
age	384	39.78906	10.41839	25	59
bad_health	379	.1424802	.350004	0	1
coins95	449	.3719376	.483861	0	1

Age is 25 years and over. The (0,1) variables are between 0 and 1 (a better check is e.g. **tabulate coins95**). Outpatient spending is ≥ 0 .

Data are not available for all observations for age and bad_health ($n < 1370$).

(d) Spending appears to be heavily right-skewed and not normally distributed.

(e) Log spending (for those with spending > 0) appears to be normally distributed.



5.(a) From **summarize** $\bar{x} \pm 1.96 \times s/\sqrt{n} = 1281.076 \pm 1.96 \times 1871.146/\sqrt{449} = 1281.076 \pm 1.96 \times 88.305 = (1107.99, 1454.15)$.

(b) The answer is close to (a) with difference due to 1.96 not quite exactly $t_{0.025,448} = 1.9652733$.

. mean outpatient

	Mean	Std. err.	[95% conf. interval]	
outpatient	1281.076	88.30485	1107.533	1454.62

(c) Same results as part (b). Conclude that OLS regression on an intercept only estimates the mean with the standard error s/\sqrt{n} and the same 95% confidence interval.

. regress outpatient					
Source	SS	df	MS	Number of obs	= 449
Model	0	0	.	F(0, 448)	= 0.00
Residual	1.5685e+09	448	3501188.43	Prob > F	= .
Total	1.5685e+09	448	3501188.43	R-squared	= 0.0000
				Adj R-squared	= 0.0000
				Root MSE	= 1871.1

outpatient	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
_cons	1281.076	88.30485	14.51	0.000	1107.533	1454.62

(d) Same result with **vce(robust)**. This is a special result for regression on an intercept only. Then heteroskedastic-robust standard errors equal default standard errors. Otherwise they will differ.

Econ 132 – Ass 1 Solutions

6.(a) Difference is $1453.527 - 989.872 = 463.655$.

```
. bysort coins95: sum outpatient
-> coins95 = 0
  Variable |          Obs          Mean      Std. dev.        Min        Max
-----+-----
  outpatient |          282      1453.527      1868.42           0     15038.36
-----+-----
-> coins95 = 1
  Variable |          Obs          Mean      Std. dev.        Min        Max
-----+-----
  outpatient |          167      989.8721     1844.913           0     15445.81
```

(b) Standard error of difference = $\sqrt{1868.42^2/282 + 1844.913^2/167} = 180.999$.

(c) We obtain

```
. ttest outpatient, by(coins95) unequal
  Group |          Obs          Mean      Std. err.      Std. dev.      [95% conf. interval]
-----+-----
      0 |          282      1453.527      111.2628      1868.42      1234.513      1672.542
      1 |          167      989.8721      142.7637      1844.913      708.0055      1271.739
-----+-----
Combined |          449      1281.076       88.30485      1871.146      1107.533      1454.62
-----+-----
      diff |              463.6551      180.9997              107.6788      819.6313
-----+-----
      diff = mean(0) - mean(1)                                t =      2.5616
H0: diff = 0                                Satterthwaite's degrees of freedom = 352.147
      Ha: diff < 0                                Ha: diff != 0                                Ha: diff > 0
Pr(T < t) = 0.9946                Pr(|T| > |t|) = 0.0108                Pr(T > t) = 0.0054
```

Note this gives same difference of 463.65.

The test has $p = 0.0108 < 0.05$ so reject H_0 : equal population means at level 0.05.

Alternatively, t-statistic = 2.5616 is much greater than 5% critical value of approximately 1.96.

(d) The standard errors of the difference are exactly the same: 180.999.

(e) We obtain

```
. regress outpatient coins95, vce(robust)
Linear regression                                Number of obs      =          449
                                                F(1, 447)          =           6.57
                                                Prob > F            =          0.0107
                                                R-squared           =          0.0144
                                                Root MSE           =         1859.7
```

```
-----+-----
      outpatient |          Robust
      Coefficient std. err.      t      P>|t|      [95% conf. interval]
-----+-----
      coins95 | -463.6551      180.9441     -2.56   0.011     -819.2619     -108.0482
      _cons | 1453.527      111.3135     13.06   0.000      1234.764      1672.29
-----+-----
```

- same estimated difference in means of 463.65 (aside from sign change)
- slightly different standard error (now 180.944 versus 180.999 in (b) and (c)) due to slightly different degrees of freedom adjustment
- essentially same t-statistic of 2.56 (will differ slightly with more significant digits)
- essentially same p-value of 0.011 (will differ slightly with more significant digits)

(f) Higher coinsurance rates lead to lower (here substantially lower) use of health services.