

## B203 Exercise Sheet 3

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1. Check that the OLS estimator for the slope ( $b$ ) and the intercept ( $a$ ) can both be written as weighted sums of the dependent variable (linear estimators). Write down the weights and show that for the estimator of the slope coefficient we have

$$\sum_{i=1}^N w_i^b = 0 \text{ and } \sum_{i=1}^N w_i^b X_i = 1.$$

For the estimator of the intercept show that the

weights are such that  $\sum_{i=1}^N w_i^a = 1$  and  $\sum_{i=1}^N w_i^a X_i = 0$

2. Show that the Wald estimator (introduced in the previous exercise sheet) is linear and derive the weights. Show that they satisfy the conditions mentioned in question 1.
3. In what way is the OLS estimator superior to the Wald estimator? How do we know this?
4. Using the dataset from the previous exercise sheet (pssobh.dta) find the median age for men and women in the US PSID (data==1). Then find the average age and the average log wage for those above and those below the median age (one of the groups will include the median) for each gender separately. Join these two averages to find the Wald estimator for the impact of age on wages for each gender. Compare the results with OLS on the same data.