Econ 753 HW2

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Part 1 - Berndt Exercises

In part 1, we analyze a hedonic price model constructed by Gregory Chow in the rental market for computers. Chow constructs a quality-controlled model of price indices using memory time, multiplication time, and access time as the set of qualitative characteristics. We are asked to replicate Chow's results and perform further analysis.

Question 3a

In question 3a, we construct a correlation matrix for the regession variables, both for the 1954-1959 and 1960-1965 time periods.

Table 1: Correlation Matrix for 1954-1959

	lnrent	lnmult	lnaccess	lnadd	lnmem
lnrent	1.0000000	-0.8673364	-0.8450792	-0.8397468	0.8756174
lnmult	-0.8673364	1.0000000	0.8626912	0.9771873	-0.7371050
lnaccess	-0.8450792	0.8626912	1.0000000	0.8457563	-0.6129908
lnadd	-0.8397468	0.9771873	0.8457563	1.0000000	-0.7295567
lnmem	0.8756174	-0.7371050	-0.6129908	-0.7295567	1.0000000

Table 2: Correlation Matrix for 1960-1965

	lnrent	lnmult	lnaccess	lnadd	lnmem
lnrent	1.0000000	-0.6331708	-0.5849575	-0.6316314	0.8825522
lnmult	-0.6331708	1.0000000	0.7739316	0.9405762	-0.5707293
lnaccess	-0.5849575	0.7739316	1.0000000	0.8064029	-0.4648790
lnadd	-0.6316314	0.9405762	0.8064029	1.0000000	-0.5633702
lnmem	0.8825522	-0.5707293	-0.4648790	-0.5633702	1.0000000

We can see that the variables are all highly correlated with each other, with many of the correlation coefficients coming close to 1. This indicates that Chow's concern over collinearity was a valid concern, as several of the independent variables maintained high correlation coefficients (e.g. the correlation between lnmult and lnaccess is 0.863 in the 1954-1959 range and 0.774 in the 1960-1965 range).

The correlation coefficients maintained the same signs throughout the two periods, but changed somewhat significantly in values, with the change in magnitudes of some of the correlation coefficients changing by as much as 30%. Therefore, it was correct for Chow to perform separate regressions for the two time periods,

as the relation between qualitative characteristics changed somewhat significantly between the two price periods.

Question 3b

In part b, we run a regression for the years 1960-1965 of lnrent on lnmult, lnmem, lnaccess, and a list of dummy variables indicating if the observation takes place in a particular year (excluding the year 1960).

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-0.1045	0.3149	-0.3317	0.7411
d61	-0.1398	0.1665	-0.8398	0.4038
d62	-0.4891	0.1738	-2.815	0.006272
d63	-0.5938	0.1661	-3.575	0.000625
d64	-0.9248	0.1663	-5.561	4.169e-07
d65	-1.163	0.1661	-7.003	1.03e-09
lnmult	-0.06537	0.02841	-2.301	0.02427
lnmem	0.5793	0.03539	16.37	3.868e-26
lnaccess	-0.1406	0.02933	-4.794	8.376e-06

Table 4: Quality-Controlled Regression of lnrent on Quality-Variables

Observations	Residual Std. Error	R^2	Adjusted R^2
82	0.3842	0.9084	0.8984

Year	Estimated_Coefficient	Price_Index
1960	-0.1044553	1.0000000
1961	-0.1397971	0.8695346
1962	-0.4891062	0.6131742
1963	-0.5938483	0.5521982
1964	-0.9248183	0.3966035
1965	-1.1631690	0.3124943

Part 3 - Replication Paper Topic

Clark LP, Millet DB, Marshall JD (2014). National Patterns in Environmental Injustice and Inequality: Outdoor NO_2 Air Pollution in the United States. PLoS ONE 9(4): e94431. doi:10.1371/journal.pone.0094431

For my replication paper, I will replicate the paper titled "National Patterns in Environmental Injustice and Inequality: Outdoor NO_2 Air Pollution in the United States" by Clark et al. The paper describes spatial patterns in environmental injustice and inequality for nitrogen dioxide (NO_2) concentrations in the United States. It uses Census demographic data and a recently published dataset of outdoor (NO_2) concentrations. It compares (NO_2) concentrations in populations of different demographics and in different locations (e.g. urban vs rural).

There are three tables and two figures. Table 1 provides data on (NO_2) concentration for different populations. Table 2 offers comparisons of specific populations. Table 3 provides "environmental justice" and

"environmental inequality" indices for different areas. Figure 1 plots a regression of (NO_2) concentration on household income for different regions. Figure 2 projects the environmental justice and inequality indices onto a map of the United states. I am interested in replicating all tables and figures, although I will likely be unable to replicate the figure of the US map. Finally, I am interested in taking a deeper look at the data and offer any other revelations I come across.