

Department of Statistics

COURSE STATS 330

Assignment 3, 2003

Instructions: Hand in your completed assignment to the Student Resource Centre by 4pm on Thursday 25th September.

Conventional economic wisdom holds that an increase in the minimum wage causes a reduction in employment. On April 1 1992 (April Fool's Day) the state of New Jersey raised its minimum wage from \$4.25 per hour to \$5.05 per hour. This gave researchers an opportunity to examine the effect, if any, of the increase on employment in the state. The neighbouring state of Pennsylvania kept its minimum wage constant at \$4.25, and so serves as a control state. Since minimum wages only apply in low-wage industries, the researchers concentrated on wages in fast-food outlets.

They surveyed employment at 376 fast-food restaurants in New Jersey and Pennsylvania before and after the introduction of the minimum wage in New Jersey, and for each restaurant recorded the following information:

Change in employment = number of employees after – number employees before,
variable **emp.diff**

Gap = the proportional change in wages needed to bring wages up to the new minimum, (this is zero for Pennsylvania stores and those NJ stores that were paying more than \$5.05 before the new minimum wage), variable **gap**

Chain = the restaurant chain, one of Burger King, KFC, Roy Rodgers or Wendy's,
variable **chain**

Chain Owned = indicates if the restaurant is owned by the chain (1) or locally owned (0),
Variable **chain.owned**

The file **employment.txt** contains these data.

Is there any evidence that the change in minimum wage has had an impact on employment?

You are required to write a report of not more than 4 pages addressing this question. Follow the format outlined in Arden Miller's handout "Writing up Assignments" on the course web page.

Data are given overleaf.

	emp.diff	state	gap	chain	chain.owned
1	-26.5	PA	0.00000000	Burger King	0
2	-6.5	PA	0.00000000	KFC	0
3	0.0	PA	0.00000000	KFC	1
4	-20.0	PA	0.00000000	Wendys	1
5	22.0	PA	0.00000000	Wendys	1
6	-35.0	PA	0.00000000	Burger King	0
7	16.0	PA	0.00000000	Burger King	0
8	1.0	PA	0.00000000	KFC	1
9	0.0	PA	0.00000000	KFC	1
10	-1.5	PA	0.00000000	Roy Rogers	1
11	-31.0	PA	0.00000000	Burger King	0
12	-1.0	PA	0.00000000	Burger King	0
13	7.5	PA	0.00000000	Burger King	0
14	-1.0	PA	0.00000000	Burger King	0
15	10.0	PA	0.00000000	KFC	1
16	3.0	PA	0.00000000	KFC	1
17	-4.0	PA	0.00000000	Roy Rogers	1
18	-15.0	PA	0.00000000	Roy Rogers	0
19	-3.0	PA	0.00000000	Roy Rogers	0
20	-8.0	PA	0.00000000	Roy Rogers	1
21	-27.0	PA	0.00000000	Roy Rogers	1
22	4.0	PA	0.00000000	Roy Rogers	0
23	0.0	PA	0.00000000	Roy Rogers	1
24	0.0	PA	0.00000000	Wendys	1
25	2.5	PA	0.00000000	Roy Rogers	1
26	-2.0	PA	0.00000000	Roy Rogers	1
27	-15.0	PA	0.00000000	Burger King	0
28	4.0	PA	0.00000000	Burger King	0
29	-3.0	PA	0.00000000	Burger King	0
30	0.0	PA	0.00000000	Burger King	0
31	-17.0	PA	0.00000000	Burger King	0
32	11.0	PA	0.00000000	Burger King	0
33	-25.0	PA	0.00000000	Burger King	0
34	1.5	PA	0.00000000	Burger King	0
35	-2.0	PA	0.00000000	KFC	0
36	6.0	PA	0.00000000	KFC	0
37	-23.0	PA	0.00000000	Wendys	1
38	-8.0	PA	0.00000000	Wendys	1
39	0.0	PA	0.00000000	Wendys	0
40	0.0	PA	0.00000000	Wendys	0
41	-1.0	PA	0.00000000	KFC	1
42	-20.0	PA	0.00000000	Burger King	0
43	5.0	PA	0.00000000	Burger King	0
44	-10.0	PA	0.00000000	Burger King	0
45	4.0	PA	0.00000000	Burger King	0
46	-1.0	PA	0.00000000	Burger King	0
47	2.0	PA	0.00000000	KFC	0
48	0.0	PA	0.00000000	Wendys	0
49	-30.0	PA	0.00000000	Wendys	0
50	1.0	PA	0.00000000	Wendys	0
51	-2.0	PA	0.00000000	Wendys	0
52	0.0	PA	0.00000000	Burger King	0
53	15.0	PA	0.00000000	Burger King	0
54	25.5	PA	0.00000000	Burger King	0
55	-1.0	PA	0.00000000	KFC	1
56	-5.0	PA	0.00000000	Roy Rogers	1
57	6.0	PA	0.00000000	Wendys	0
58	-13.0	PA	0.00000000	Burger King	0
59	-29.5	PA	0.00000000	Burger King	0
60	21.0	PA	0.00000000	Burger King	0
61	-15.0	PA	0.00000000	Burger King	0
62	-1.0	PA	0.00000000	Burger King	0
63	-2.0	PA	0.00000000	Burger King	0
64	-24.0	PA	0.00000000	Burger King	0
65	3.0	PA	0.00000000	KFC	1
66	-4.0	PA	0.00000000	Roy Rogers	0
67	2.0	PA	0.00000000	Roy Rogers	1
68	1.0	PA	0.00000000	Wendys	1
69	16.0	PA	0.00000000	Burger King	0
70	27.5	PA	0.00000000	Burger King	0
71	-4.5	PA	0.00000000	Roy Rogers	1
72	-1.0	PA	0.00000000	Roy Rogers	1
73	18.0	PA	0.00000000	Roy Rogers	0
74	-4.0	PA	0.00000000	Roy Rogers	1
75	-2.5	PA	0.00000000	Burger King	0
76	1.0	PA	0.00000000	Burger King	0
77	3.0	NJ	0.01000000	Roy Rogers	1
78	-6.0	NJ	0.00000000	KFC	0
79	-20.0	NJ	0.00000000	Burger King	0
80	-4.0	NJ	0.01000000	KFC	1

81	-2.0	NJ	0.01000000	KFC	0
82	2.0	NJ	0.00000000	KFC	0
83	-6.0	NJ	0.01000000	Roy Rogers	0
84	2.0	NJ	0.00000000	Wendys	0
85	-2.0	NJ	0.01000000	Roy Rogers	0
86	-3.0	NJ	0.01000000	Roy Rogers	1
87	-25.0	NJ	0.01000000	Wendys	0
88	17.0	NJ	0.01000000	Wendys	0
89	-7.0	NJ	0.00000000	Burger King	0
90	-4.0	NJ	0.01000000	Burger King	1
91	2.0	NJ	0.01000000	KFC	0
92	1.0	NJ	0.01000000	Wendys	0
93	-3.5	NJ	0.01000000	KFC	1
94	-13.0	NJ	0.00000000	Roy Rogers	0
95	-7.0	NJ	0.00000000	Roy Rogers	0
96	-6.0	NJ	0.00000000	Wendys	0
97	5.0	NJ	0.01000000	Burger King	0
98	-2.5	NJ	0.00000000	Burger King	0
99	3.0	NJ	0.00000000	Burger King	0
100	-1.0	NJ	0.01000000	Burger King	0
101	-23.0	NJ	0.00000000	Burger King	0
102	2.0	NJ	0.01000000	KFC	0
103	18.0	NJ	0.01000000	Roy Rogers	1
104	-10.5	NJ	0.01000000	Roy Rogers	1
105	1.0	NJ	0.01000000	Roy Rogers	1
106	-10.0	NJ	0.01000000	Wendys	0
107	8.0	NJ	0.01000000	Burger King	1
108	10.0	NJ	0.01000000	Burger King	1
109	1.0	NJ	0.00000000	Roy Rogers	0
110	2.0	NJ	0.01000000	Roy Rogers	1
111	-8.0	NJ	0.01000000	Wendys	1
112	-18.0	NJ	0.01000000	Burger King	0
113	10.0	NJ	0.01000000	Burger King	0
114	0.0	NJ	0.00000000	Roy Rogers	1
115	0.0	NJ	0.01000000	Roy Rogers	0
116	-13.0	NJ	0.00000000	Roy Rogers	1
117	-7.0	NJ	0.00000000	Roy Rogers	0
118	2.0	NJ	0.01000000	Burger King	0
119	-10.0	NJ	0.01000000	Burger King	1
120	0.0	NJ	0.01000000	KFC	1
121	-2.0	NJ	0.00000000	KFC	1
122	3.0	NJ	0.00000000	KFC	1
123	0.0	NJ	0.01000000	KFC	1
124	-1.0	NJ	0.00000000	Burger King	1
125	3.0	NJ	0.01000000	KFC	1
126	-6.0	NJ	0.01000000	KFC	1
127	-1.0	NJ	0.01000000	KFC	0
128	1.0	NJ	0.01000000	KFC	0
129	2.0	NJ	0.00000000	Roy Rogers	0
130	-18.0	NJ	0.00000000	Roy Rogers	1
131	-1.0	NJ	0.00000000	Wendys	0
132	-10.0	NJ	0.01000000	Burger King	0
133	-2.5	NJ	0.01000000	Roy Rogers	1
134	-5.0	NJ	0.00000000	Wendys	0
135	-11.5	NJ	0.00000000	Wendys	0
136	16.5	NJ	0.01000000	Wendys	0
137	-1.0	NJ	0.01000000	Burger King	0
138	4.0	NJ	0.01000000	Burger King	1
139	-25.0	NJ	0.00000000	Burger King	0
140	10.0	NJ	0.01000000	Burger King	1
141	5.0	NJ	0.01000000	Burger King	0
142	-2.0	NJ	0.00000000	Roy Rogers	1
143	5.0	NJ	0.01000000	Wendys	1
144	3.0	NJ	0.00000000	Wendys	1
145	-3.0	NJ	0.01000000	Burger King	0
146	4.0	NJ	0.12222222	Burger King	0
147	-2.5	NJ	0.06315789	Burger King	0
148	-2.0	NJ	0.18823529	KFC	0
149	-5.0	NJ	0.06315789	Roy Rogers	0
150	5.0	NJ	0.12222222	Roy Rogers	0
151	-12.0	NJ	0.15560641	Burger King	0
152	0.0	NJ	0.18823529	Burger King	0
153	2.0	NJ	0.18823529	Burger King	0
154	8.5	NJ	0.15560641	Burger King	0
155	2.0	NJ	0.12222222	KFC	0
156	2.0	NJ	0.09782609	Roy Rogers	0
157	1.0	NJ	0.12222222	Roy Rogers	0
158	4.0	NJ	0.15560641	Roy Rogers	0
159	-7.0	NJ	0.18823529	Roy Rogers	0
160	2.0	NJ	0.18823529	Burger King	0
161	-5.0	NJ	0.13483146	KFC	0

162	0.0	NJ	0.16091954	Roy Rogers	0
163	14.0	NJ	0.12222222	Burger King	0
164	0.0	NJ	0.06315789	Burger King	0
165	6.0	NJ	0.12222222	KFC	0
166	0.0	NJ	0.12222222	KFC	0
167	-8.0	NJ	0.12222222	Roy Rogers	0
168	6.0	NJ	0.02020202	Roy Rogers	1
169	-12.0	NJ	0.12222222	Wendys	0
170	-5.0	NJ	0.18823529	Burger King	0
171	-11.0	NJ	0.18823529	Burger King	1
172	-7.0	NJ	0.12222222	Burger King	0
173	11.0	NJ	0.18823529	Burger King	0
174	-1.0	NJ	0.12222222	Burger King	0
175	-17.0	NJ	0.18823529	Burger King	0
176	0.0	NJ	0.18823529	Burger King	0
177	-25.0	NJ	0.12222222	Burger King	0
178	29.0	NJ	0.06315789	Burger King	0
179	14.0	NJ	0.18823529	KFC	0
180	1.0	NJ	0.18823529	KFC	0
181	17.0	NJ	0.18823529	Roy Rogers	1
182	2.0	NJ	0.12222222	Roy Rogers	1
183	6.5	NJ	0.18823529	Wendys	0
184	8.0	NJ	0.12222222	Burger King	0
185	-2.0	NJ	0.18823529	Burger King	0
186	0.0	NJ	0.12222222	Burger King	0
187	1.0	NJ	0.18823529	Burger King	0
188	-8.0	NJ	0.18823529	Burger King	1
189	10.0	NJ	0.18823529	Burger King	1
190	2.5	NJ	0.18823529	Burger King	1
191	-18.0	NJ	0.18823529	KFC	0
192	0.0	NJ	0.18823529	KFC	0
193	2.5	NJ	0.18823529	KFC	0
194	3.0	NJ	0.18823529	KFC	0
195	-30.0	NJ	0.06315789	Roy Rogers	1
196	5.5	NJ	0.06315789	Roy Rogers	0
197	-12.0	NJ	0.14772727	Roy Rogers	0
198	-29.0	NJ	0.09307359	Wendys	0
199	0.0	NJ	0.18823529	Burger King	0
200	2.0	NJ	0.18823529	Burger King	0
201	7.5	NJ	0.18823529	Burger King	1
202	-2.5	NJ	0.18823529	Burger King	0
203	3.0	NJ	0.18823529	Roy Rogers	0
204	20.0	NJ	0.06315789	Burger King	0
205	-14.0	NJ	0.06315789	Burger King	0
206	18.0	NJ	0.18823529	Burger King	0
207	8.0	NJ	0.18823529	Burger King	0
208	6.0	NJ	0.06315789	Burger King	0
209	0.0	NJ	0.12222222	Burger King	1
210	9.0	NJ	0.18823529	Burger King	0
211	13.0	NJ	0.18823529	Burger King	0
212	-15.0	NJ	0.12222222	KFC	0
213	-5.0	NJ	0.12222222	Roy Rogers	1
214	-5.0	NJ	0.12222222	Roy Rogers	1
215	-3.0	NJ	0.06315789	Roy Rogers	1
216	0.5	NJ	0.09307359	Roy Rogers	0
217	-3.0	NJ	0.18823529	Roy Rogers	1
218	5.0	NJ	0.12222222	Wendys	0
219	0.0	NJ	0.06315789	Wendys	0
220	25.0	NJ	0.18823529	Wendys	0
221	-8.0	NJ	0.05208333	Burger King	0
222	8.0	NJ	0.12222222	Burger King	0
223	12.0	NJ	0.08137045	Burger King	0
224	-6.0	NJ	0.03696099	Burger King	0
225	1.0	NJ	0.12222222	KFC	0
226	4.0	NJ	0.12222222	KFC	0
227	3.0	NJ	0.06315789	Roy Rogers	1
228	-8.0	NJ	0.06315789	Wendys	0
229	-5.0	NJ	0.18823529	Burger King	0
230	8.0	NJ	0.18823529	Burger King	1
231	7.0	NJ	0.06315789	Burger King	0
232	5.0	NJ	0.04123711	Burger King	0
233	9.0	NJ	0.06315789	Burger King	0
234	5.0	NJ	0.09307359	Burger King	0
235	-12.0	NJ	0.18823529	KFC	1
236	0.0	NJ	0.18823529	KFC	0
237	-8.0	NJ	0.12222222	KFC	0
238	-3.0	NJ	0.12222222	KFC	0
239	3.0	NJ	0.09307359	KFC	0
240	0.0	NJ	0.12222222	KFC	0
241	2.0	NJ	0.06315789	Roy Rogers	0
242	-4.0	NJ	0.06315789	Roy Rogers	0

243	-15.5	NJ	0.03696099	Wendys	0
244	3.0	NJ	0.12222222	Wendys	0
245	8.0	NJ	0.18823529	Wendys	0
246	11.0	NJ	0.16091954	KFC	0
247	5.0	NJ	0.18823529	Burger King	0
248	16.0	NJ	0.12222222	Burger King	0
249	-17.0	NJ	0.18823529	Burger King	0
250	-5.0	NJ	0.18823529	Burger King	0
251	2.0	NJ	0.18823529	Burger King	0
252	0.5	NJ	0.06315789	KFC	1
253	-7.0	NJ	0.09307359	Roy Rogers	1
254	2.0	NJ	0.18823529	Roy Rogers	1
255	0.0	NJ	0.12222222	Wendys	1
256	-1.0	NJ	0.12222222	Burger King	0
257	9.0	NJ	0.12222222	Burger King	0
258	7.5	NJ	0.10989011	Burger King	1
259	-2.0	NJ	0.09307359	Burger King	0
260	10.0	NJ	0.12222222	Burger King	0
261	0.0	NJ	0.18823529	KFC	0
262	-2.0	NJ	0.18823529	KFC	1
263	-2.0	NJ	0.16091954	KFC	1
264	6.0	NJ	0.18823529	KFC	1
265	0.0	NJ	0.18823529	KFC	0
266	0.0	NJ	0.09782609	KFC	0
267	0.0	NJ	0.18823529	Roy Rogers	1
268	0.0	NJ	0.06315789	Roy Rogers	1
269	9.0	NJ	0.06315789	Roy Rogers	1
270	0.0	NJ	0.18823529	Wendys	0
271	8.0	NJ	0.12222222	Wendys	0
272	19.0	NJ	0.12222222	Burger King	0
273	15.0	NJ	0.18823529	Burger King	0
274	0.0	NJ	0.06315789	Burger King	0
275	-4.0	NJ	0.08602151	Burger King	0
276	-3.0	NJ	0.18823529	Burger King	0
277	25.0	NJ	0.06315789	KFC	1
278	-15.0	NJ	0.18823529	KFC	0
279	0.0	NJ	0.12222222	Roy Rogers	1
280	4.0	NJ	0.18823529	Roy Rogers	1
281	0.0	NJ	0.12222222	Wendys	0
282	2.0	NJ	0.06315789	Wendys	0
283	4.0	NJ	0.15560641	Burger King	0
284	1.0	NJ	0.12222222	KFC	1
285	-3.0	NJ	0.03696099	Roy Rogers	1
286	16.0	NJ	0.18823529	Burger King	0
287	-6.0	NJ	0.18823529	Burger King	1
288	-7.0	NJ	0.18823529	Burger King	0
289	0.0	NJ	0.18823529	Burger King	0
290	0.0	NJ	0.18823529	Burger King	0
291	23.5	NJ	0.18823529	Burger King	0
292	8.0	NJ	0.13483146	KFC	1
293	0.0	NJ	0.09307359	KFC	1
294	-3.0	NJ	0.18823529	KFC	1
295	-1.0	NJ	0.18823529	KFC	1
296	-3.0	NJ	0.18823529	KFC	1
297	-2.0	NJ	0.18823529	Roy Rogers	1
298	1.0	NJ	0.12222222	Roy Rogers	1
299	0.0	NJ	0.06315789	Roy Rogers	1
300	1.0	NJ	0.06315789	Roy Rogers	1
301	-1.0	NJ	0.12222222	Roy Rogers	1
302	5.0	NJ	0.06315789	Roy Rogers	1
303	1.0	NJ	0.18823529	Roy Rogers	1
304	-8.0	NJ	0.06315789	Wendys	0
305	1.0	NJ	0.10989011	Wendys	0
306	5.0	NJ	0.05208333	Wendys	0
307	6.0	NJ	0.18823529	Burger King	1
308	2.0	NJ	0.16091954	Roy Rogers	1
309	0.0	NJ	0.12222222	Roy Rogers	0
310	5.0	NJ	0.15034169	Roy Rogers	1
311	7.5	NJ	0.18823529	Roy Rogers	1
312	3.0	NJ	0.18823529	Wendys	0
313	-1.0	NJ	0.18823529	Burger King	0
314	-11.0	NJ	0.12222222	Burger King	0
315	7.0	NJ	0.09307359	Burger King	0
316	-3.0	NJ	0.09307359	Burger King	1
317	4.0	NJ	0.18823529	Burger King	0
318	2.0	NJ	0.06315789	KFC	0
319	22.0	NJ	0.09307359	KFC	0
320	4.0	NJ	0.06315789	Roy Rogers	1
321	-3.0	NJ	0.12222222	Roy Rogers	1
322	1.0	NJ	0.18823529	Burger King	0
323	-18.0	NJ	0.12222222	Burger King	0

324	20.0	NJ	0.03696099	Burger King	1
325	-13.0	NJ	0.18823529	Burger King	1
326	9.0	NJ	0.18823529	Burger King	0
327	1.0	NJ	0.09307359	KFC	1
328	-6.0	NJ	0.06315789	KFC	1
329	1.0	NJ	0.18823529	KFC	1
330	-3.0	NJ	0.18823529	Roy Rogers	1
331	-3.0	NJ	0.06315789	Roy Rogers	1
332	8.0	NJ	0.18823529	Roy Rogers	1
333	1.0	NJ	0.03696099	Wendys	0
334	0.0	NJ	0.18823529	Burger King	1
335	2.0	NJ	0.18823529	Burger King	0
336	-2.0	NJ	0.18823529	Burger King	0
337	18.0	NJ	0.18823529	KFC	0
338	14.0	NJ	0.18823529	KFC	0
339	-2.5	NJ	0.18823529	KFC	0
340	-1.0	NJ	0.12222222	Roy Rogers	0
341	0.0	NJ	0.18823529	Wendys	0
342	0.0	NJ	0.16091954	Burger King	1
343	6.0	NJ	0.04123711	Burger King	0
344	-4.0	NJ	0.12222222	Burger King	0
345	-1.0	NJ	0.18823529	Burger King	0
346	8.0	NJ	0.09307359	Burger King	0
347	5.0	NJ	0.12222222	Burger King	0
348	1.0	NJ	0.12222222	Burger King	0
349	-1.0	NJ	0.18823529	Burger King	0
350	14.0	NJ	0.18823529	Burger King	0
351	-3.0	NJ	0.18823529	KFC	0
352	14.0	NJ	0.09307359	KFC	1
353	-16.0	NJ	0.03696099	Roy Rogers	1
354	2.0	NJ	0.18823529	Roy Rogers	1
355	11.0	NJ	0.06315789	Roy Rogers	1
356	5.0	NJ	0.03696099	Roy Rogers	1
357	-8.0	NJ	0.12222222	Roy Rogers	1
358	-3.0	NJ	0.18823529	Roy Rogers	0
359	6.0	NJ	0.06315789	Roy Rogers	1
360	-4.5	NJ	0.16898148	Roy Rogers	1
361	0.0	NJ	0.18823529	Burger King	0
362	4.0	NJ	0.12222222	Burger King	0
363	0.0	NJ	0.12222222	KFC	0
364	0.0	NJ	0.18823529	Burger King	0
365	13.0	NJ	0.18823529	Burger King	0
366	-8.0	NJ	0.18823529	Burger King	0
367	9.0	NJ	0.18823529	Burger King	1
368	-30.0	NJ	0.18823529	Burger King	0
369	2.0	NJ	0.18823529	KFC	1
370	5.0	NJ	0.09307359	KFC	1
371	5.0	NJ	0.06315789	KFC	0
372	17.0	NJ	0.02020202	KFC	1
373	8.5	NJ	0.06315789	KFC	1
374	2.0	NJ	0.18823529	Roy Rogers	1
375	-7.0	NJ	0.06315789	Wendys	0
376	10.0	NJ	0.09307359	Wendys	0