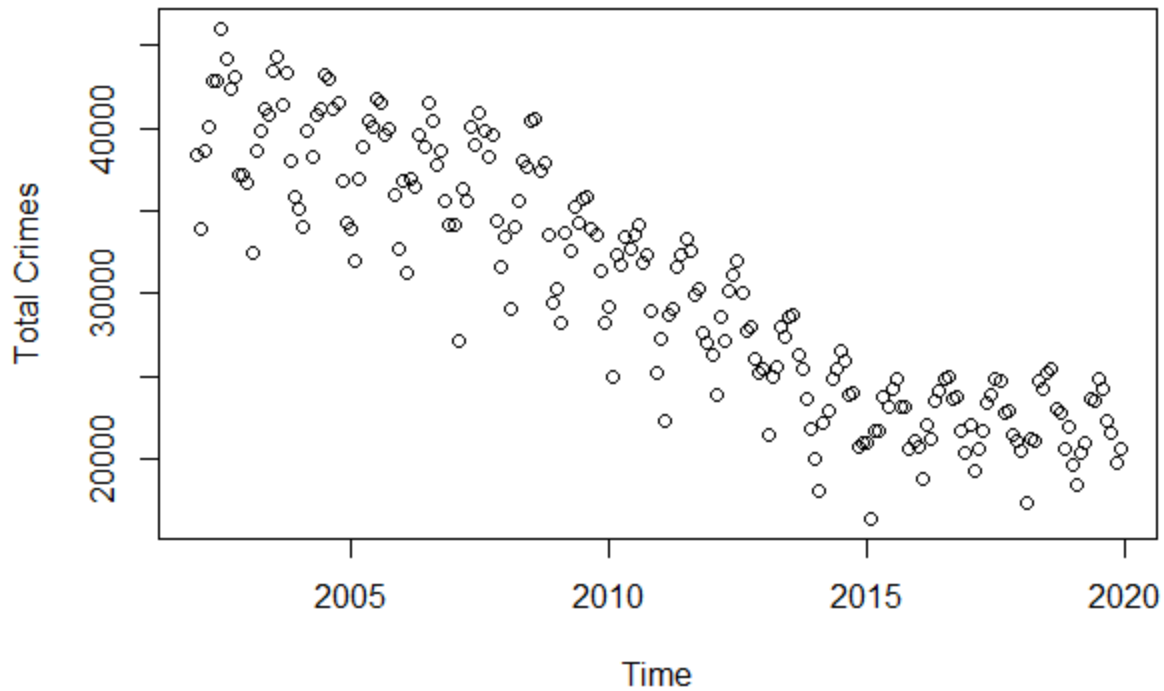


Exercise 2:

Total crimes per month calculation:

	crime_month	Total_crime
	<date>	<int>
1	2002-01-01	38405
2	2002-02-01	33909
3	2002-03-01	38583
4	2002-04-01	40032
5	2002-05-01	42913
6	2002-06-01	42834
7	2002-07-01	46012
8	2002-08-01	44210
9	2002-09-01	42389
10	2002-10-01	43144
11	2002-11-01	37151
12	2002-12-01	37171
13	2003-01-01	36715
14	2003-02-01	32509
15	2003-03-01	38651
16	2003-04-01	39789
17	2003-05-01	41194
18	2003-06-01	40813
19	2003-07-01	43413
20	2003-08-01	44267

Plot of time series of crime:



First 10 rows of panel dataset:

	month	period	district	p50_inc	Total_Crime_Dist	total_crime_res	violent_crime_res	prop_crime_res
1	2005-01-01	1	1	91084.91	1549	0.040263048	0.005510501	0.020378457
2	2005-01-01	1	2	29890.17	1351	0.035560118	0.009607286	0.013397557
3	2005-01-01	1	3	28047.56	1707	0.021709547	0.006778669	0.007707080
4	2005-01-01	1	4	39010.22	1839	0.014768830	0.004947036	0.005734065
5	2005-01-01	1	5	33146.90	1411	0.018969133	0.005848032	0.006278232
6	2005-01-01	1	6	34672.25	1742	0.019448476	0.006598191	0.008194708
7	2005-01-01	1	7	23960.59	1970	0.027507819	0.009941912	0.008908624
8	2005-01-01	1	8	49069.15	2383	0.009633226	0.002546761	0.004741827
9	2005-01-01	1	9	36323.73	1533	0.009928756	0.002940415	0.004365285
10	2005-01-01	1	10	29147.49	1395	0.011901816	0.003762510	0.003924613

	share_black	share_hisp	share_white
1	0.1287430	0.06610002	0.587648160
2	0.9466730	0.01652980	0.016582438
3	0.9130473	0.01743631	0.040913658
4	0.6209012	0.28418956	0.079714742
5	0.9417751	0.03393203	0.011333082
6	0.9745227	0.01011499	0.003449816
7	0.9679541	0.01636506	0.003700290
8	0.2110942	0.56535677	0.208151253
9	0.1215997	0.61083549	0.151658031
10	0.3373888	0.61905656	0.035867553

Exercise 3:

Estimated coefficient for model:

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5.068e-01	1.273e-02	39.809	<2e-16 ***
tenure	-4.394e-06	8.338e-06	-0.527	0.598
total_crime_res	-2.334e-02	1.266e-01	-0.184	0.854
p50_inc	2.613e-08	9.529e-08	0.274	0.784
share_black	-7.643e-03	1.262e-02	-0.605	0.545
share_hisp	-5.229e-03	1.325e-02	-0.395	0.693
share_white	-1.275e-02	1.695e-02	-0.752	0.452

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.7068 on 1077898 degrees of freedom

(31 observations deleted due to missingness)

Multiple R-squared: 2.049e-06, Adjusted R-squared: -3.517e-06

F-statistic: 0.3681 on 6 and 1077898 DF, p-value: 0.8995

Exercise 4:

Estimated coefficients for model:

coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	6.447e-01	1.065e-01	6.056	1.4e-09	***
tenure	-3.667e-06	8.526e-06	-0.430	0.6671	
total_crime_res	-6.000e-01	3.939e-01	-1.523	0.1277	
p50_inc	-4.522e-08	6.531e-07	-0.069	0.9448	
share_black	-7.815e-02	1.044e-01	-0.749	0.4539	
share_hisp	-1.434e-01	2.026e-01	-0.708	0.4792	
share_white	-1.729e-01	1.846e-01	-0.936	0.3491	
factor(month)2007-02-01	2.688e-03	1.108e-02	0.243	0.8083	
factor(month)2007-03-01	5.459e-03	1.098e-02	0.497	0.6190	
factor(month)2007-04-01	-4.482e-03	1.099e-02	-0.408	0.6835	
factor(month)2007-05-01	9.708e-03	1.103e-02	0.881	0.3786	
factor(month)2007-06-01	-1.514e-02	1.098e-02	-1.378	0.1681	
factor(month)2007-07-01	-2.428e-03	1.103e-02	-0.220	0.8257	
factor(month)2007-08-01	-9.282e-03	1.098e-02	-0.845	0.3981	
factor(month)2007-09-01	2.826e-03	1.095e-02	0.258	0.7963	
factor(month)2007-10-01	5.442e-03	1.095e-02	0.497	0.6193	
factor(month)2007-11-01	3.148e-03	1.088e-02	0.289	0.7724	
factor(month)2007-12-01	-8.606e-03	1.089e-02	-0.790	0.4293	
factor(month)2008-01-01	-1.592e-02	1.090e-02	-1.461	0.1441	
factor(month)2008-02-01	-8.111e-03	1.095e-02	-0.741	0.4588	
factor(month)2008-03-01	-7.140e-03	1.090e-02	-0.655	0.5124	
factor(month)2008-04-01	7.855e-03	1.089e-02	0.721	0.4708	
factor(month)2008-05-01	1.881e-02	1.090e-02	1.726	0.0843	.
factor(month)2008-06-01	9.715e-04	1.087e-02	0.089	0.9288	
factor(month)2008-07-01	4.697e-05	1.088e-02	0.004	0.9966	
factor(month)2008-08-01	1.097e-03	1.090e-02	0.101	0.9198	
factor(month)2008-09-01	9.332e-03	1.085e-02	0.860	0.3896	
factor(month)2008-10-01	-3.433e-03	1.084e-02	-0.317	0.7515	
factor(month)2008-11-01	-1.710e-03	1.083e-02	-0.158	0.8746	
factor(month)2008-12-01	1.069e-02	1.087e-02	0.983	0.3257	
factor(month)2009-01-01	-6.240e-03	1.085e-02	-0.575	0.5654	
factor(month)2009-02-01	-6.053e-03	1.091e-02	-0.555	0.5790	
factor(month)2009-03-01	-9.074e-03	1.085e-02	-0.836	0.4031	
factor(month)2009-04-01	-5.101e-03	1.087e-02	-0.469	0.6390	
factor(month)2009-05-01	-1.690e-03	1.086e-02	-0.156	0.8763	
factor(month)2009-06-01	4.015e-03	1.086e-02	0.370	0.7116	
factor(month)2009-07-01	5.287e-03	1.086e-02	0.487	0.6265	

factor(month)2009-08-01	-4.865e-03	1.087e-02	-0.448	0.6544
factor(month)2009-09-01	-4.997e-03	1.088e-02	-0.460	0.6459
factor(month)2009-10-01	-1.736e-03	1.088e-02	-0.160	0.8732
factor(month)2009-11-01	-5.456e-03	1.089e-02	-0.501	0.6163
factor(month)2009-12-01	-1.016e-02	1.094e-02	-0.928	0.3533
factor(month)2010-01-01	1.589e-03	1.093e-02	0.145	0.8844
factor(month)2010-02-01	3.341e-03	1.112e-02	0.301	0.7638
factor(month)2010-03-01	-9.070e-03	1.099e-02	-0.825	0.4094
factor(month)2010-04-01	6.835e-03	1.101e-02	0.621	0.5346
factor(month)2010-05-01	-3.666e-03	1.101e-02	-0.333	0.7393
factor(month)2010-06-01	-6.040e-03	1.102e-02	-0.548	0.5837
factor(month)2010-07-01	-1.367e-02	1.102e-02	-1.240	0.2151
factor(month)2010-08-01	9.654e-03	1.103e-02	0.875	0.3816
factor(month)2010-09-01	2.027e-03	1.103e-02	0.184	0.8542
factor(month)2010-10-01	-2.743e-03	1.103e-02	-0.249	0.8035
factor(month)2010-11-01	-9.360e-03	1.109e-02	-0.844	0.3985
factor(month)2010-12-01	-5.077e-03	1.119e-02	-0.454	0.6500
factor(month)2011-01-01	-8.490e-03	1.117e-02	-0.760	0.4472
factor(month)2011-02-01	-5.744e-03	1.137e-02	-0.505	0.6135
factor(month)2011-03-01	-4.794e-03	1.120e-02	-0.428	0.6686
factor(month)2011-04-01	-1.478e-03	1.120e-02	-0.132	0.8950
factor(month)2011-05-01	-7.965e-04	1.117e-02	-0.071	0.9431
factor(month)2011-06-01	-5.277e-05	1.115e-02	-0.005	0.9962
factor(month)2011-07-01	3.844e-03	1.113e-02	0.345	0.7299
factor(month)2011-08-01	-2.397e-04	1.114e-02	-0.022	0.9828
factor(month)2011-09-01	-1.157e-02	1.100e-02	-1.052	0.2929
factor(month)2011-10-01	1.026e-02	1.099e-02	0.933	0.3506
factor(month)2011-11-01	-7.203e-03	1.104e-02	-0.653	0.5141
factor(month)2011-12-01	5.203e-05	1.106e-02	0.005	0.9962
factor(month)2012-01-01	-1.070e-02	1.110e-02	-0.964	0.3352
factor(month)2012-02-01	2.731e-03	1.115e-02	0.245	0.8065
factor(month)2012-03-01	1.799e-03	1.103e-02	0.163	0.8704
factor(month)2012-04-01	4.312e-03	1.111e-02	0.388	0.6981
factor(month)2012-05-01	4.070e-03	1.107e-02	0.368	0.7131
factor(month)2012-06-01	-2.417e-03	1.108e-02	-0.218	0.8273
factor(month)2012-07-01	2.953e-04	1.108e-02	0.027	0.9787
factor(month)2012-08-01	-5.476e-03	1.111e-02	-0.493	0.6221
factor(month)2012-09-01	2.019e-03	1.115e-02	0.181	0.8564

factor(month)2012-10-01	-1.480e-02	1.115e-02	-1.328	0.1843
factor(month)2012-11-01	3.212e-03	1.120e-02	0.287	0.7744
factor(month)2012-12-01	-1.712e-02	1.124e-02	-1.523	0.1278
factor(month)2013-01-01	3.537e-03	1.126e-02	0.314	0.7535
factor(month)2013-02-01	-8.270e-03	1.142e-02	-0.724	0.4690
factor(month)2013-03-01	-1.604e-02	1.130e-02	-1.419	0.1558
factor(month)2013-04-01	3.347e-03	1.127e-02	0.297	0.7664
factor(month)2013-05-01	1.396e-02	1.120e-02	1.247	0.2125
factor(month)2013-06-01	6.787e-03	1.123e-02	0.604	0.5455
factor(month)2013-07-01	1.735e-02	1.120e-02	1.550	0.1213
factor(month)2013-08-01	-2.991e-03	1.121e-02	-0.267	0.7896
factor(month)2013-09-01	2.827e-03	1.126e-02	0.251	0.8017
factor(month)2013-10-01	-8.852e-03	1.128e-02	-0.785	0.4327
factor(month)2013-11-01	-5.916e-03	1.134e-02	-0.522	0.6020
factor(month)2013-12-01	3.222e-03	1.141e-02	0.282	0.7776
factor(month)2014-01-01	-1.504e-02	1.152e-02	-1.305	0.1917
factor(month)2014-02-01	2.457e-03	1.160e-02	0.212	0.8323
factor(month)2014-03-01	-4.543e-03	1.142e-02	-0.398	0.6907
factor(month)2014-04-01	-1.875e-02	1.138e-02	-1.648	0.0993
factor(month)2014-05-01	-6.031e-03	1.130e-02	-0.534	0.5935
factor(month)2014-06-01	-1.927e-03	1.124e-02	-0.171	0.8639
factor(month)2014-07-01	5.428e-03	1.122e-02	0.484	0.6284
factor(month)2014-08-01	-1.231e-03	1.124e-02	-0.109	0.9128
factor(month)2014-09-01	9.240e-04	1.125e-02	0.082	0.9346
factor(month)2014-10-01	-1.863e-03	1.125e-02	-0.166	0.8684
factor(month)2014-11-01	-8.657e-03	1.137e-02	-0.761	0.4465
factor(month)2014-12-01	-7.107e-03	1.137e-02	-0.625	0.5319
factor(month)2015-01-01	-5.012e-03	1.140e-02	-0.439	0.6603
factor(month)2015-02-01	-9.371e-03	1.165e-02	-0.804	0.4212
factor(month)2015-03-01	4.080e-03	1.139e-02	0.358	0.7201
factor(month)2015-04-01	-3.546e-03	1.141e-02	-0.311	0.7559
factor(month)2015-05-01	-6.848e-03	1.133e-02	-0.605	0.5454
factor(month)2015-06-01	-7.264e-03	1.133e-02	-0.641	0.5216
factor(month)2015-07-01	-8.688e-03	1.129e-02	-0.769	0.4417
factor(month)2015-08-01	-5.383e-03	1.128e-02	-0.477	0.6332
factor(month)2015-09-01	-1.112e-03	1.136e-02	-0.098	0.9221
factor(month)2015-10-01	-8.459e-03	1.136e-02	-0.745	0.4564
factor(month)2015-11-01	2.233e-03	1.145e-02	0.195	0.8454

factor(month)2015-12-01	-7.467e-03	1.145e-02	-0.652	0.5143
factor(month)2016-01-01	-5.436e-03	1.149e-02	-0.473	0.6362
factor(month)2016-02-01	-7.145e-03	1.157e-02	-0.618	0.5369
factor(month)2016-03-01	-1.459e-02	1.141e-02	-1.278	0.2011
factor(month)2016-04-01	9.746e-03	1.144e-02	0.852	0.3943
factor(month)2016-05-01	9.780e-03	1.134e-02	0.862	0.3885
factor(month)2016-06-01	-5.268e-03	1.132e-02	-0.465	0.6417
factor(month)2016-07-01	-1.088e-02	1.130e-02	-0.963	0.3355
factor(month)2016-08-01	-1.938e-02	1.127e-02	-1.719	0.0857 .
factor(month)2016-09-01	-1.692e-03	1.131e-02	-0.150	0.8811
factor(month)2016-10-01	2.942e-03	1.132e-02	0.260	0.7950
factor(month)2016-11-01	-1.412e-02	1.141e-02	-1.237	0.2159
factor(month)2016-12-01	-1.301e-02	1.145e-02	-1.137	0.2556
factor(month)2017-01-01	-7.456e-05	1.147e-02	-0.007	0.9948
factor(month)2017-02-01	-5.915e-03	1.158e-02	-0.511	0.6095
factor(month)2017-03-01	6.010e-03	1.153e-02	0.521	0.6021
factor(month)2017-04-01	-5.728e-03	1.149e-02	-0.499	0.6180
factor(month)2017-05-01	8.370e-03	1.142e-02	0.733	0.4637
factor(month)2017-06-01	-1.221e-02	1.140e-02	-1.071	0.2841
factor(month)2017-07-01	-6.187e-03	1.138e-02	-0.544	0.5865
factor(month)2017-08-01	-2.645e-03	1.139e-02	-0.232	0.8164
factor(month)2017-09-01	-8.596e-03	1.145e-02	-0.751	0.4528
factor(month)2017-10-01	-9.805e-03	1.143e-02	-0.858	0.3910
factor(month)2017-11-01	-1.685e-02	1.150e-02	-1.466	0.1426
factor(month)2017-12-01	-8.978e-03	1.149e-02	-0.781	0.4347
factor(district)2	-4.795e-02	2.439e-02	-1.966	0.0493 *
factor(district)3	-4.873e-02	2.722e-02	-1.791	0.0734 .
factor(district)4	-3.018e-02	3.375e-02	-0.894	0.3711
factor(district)5	-4.892e-02	2.845e-02	-1.719	0.0855 .
factor(district)6	-5.033e-02	2.974e-02	-1.692	0.0906 .
factor(district)7	-4.987e-02	2.761e-02	-1.806	0.0709 .
factor(district)8	-3.717e-04	6.479e-02	-0.006	0.9954
factor(district)9	-1.359e-02	6.133e-02	-0.222	0.8246
factor(district)10	-1.514e-02	6.868e-02	-0.220	0.8256
factor(district)11	-3.743e-02	2.526e-02	-1.481	0.1385
factor(district)12	-7.258e-03	4.448e-02	-0.163	0.8704
factor(district)13	-1.967e-03	4.237e-02	-0.046	0.9630
factor(district)14	1.745e-02	5.857e-02	0.298	0.7658

```

factor(district)15      -4.782e-02  2.679e-02  -1.785   0.0742 .
factor(district)16       1.700e-02  5.176e-02   0.328   0.7426
factor(district)17      -4.967e-03  4.856e-02  -0.102   0.9185
factor(district)18       7.847e-03  2.580e-02   0.304   0.7611
factor(district)19       1.555e-02  3.617e-02   0.430   0.6673
factor(district)20      -9.171e-03  3.316e-02  -0.277   0.7821
factor(district)21      -5.344e-02  2.696e-02  -1.982   0.0474 *
factor(district)22      -2.225e-02  1.984e-02  -1.122   0.2620
factor(district)23       3.059e-03  4.001e-02   0.076   0.9391
factor(district)24      -1.666e-02  3.086e-02  -0.540   0.5893
factor(district)25       5.307e-04  7.431e-02   0.007   0.9943
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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Exercise 5:

Within estimator regression results:

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	6.818e-16	6.768e-04	0.000	1.000
within_tenure	2.273e-05	2.463e-05	0.923	0.356
within_crime_res	2.130e-01	2.334e-01	0.912	0.362
within_p50	-2.854e-07	2.475e-07	-1.153	0.249
within_black	-4.318e-02	3.133e-02	-1.378	0.168
within_hisp	-4.486e-02	3.306e-02	-1.357	0.175
within_white	-2.781e-02	4.229e-02	-0.658	0.511

Residual standard error: 0.7025 on 1077278 degrees of freedom

Multiple R-squared: 4.006e-06, Adjusted R-squared: -1.563e-06

F-statistic: 0.7193 on 6 and 1077278 DF, p-value: 0.634

Between estimator regression results:

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	5.017e-01	1.566e-03	320.330	< 2e-16 ***
tenure_mean	-6.405e-06	1.013e-06	-6.322	2.59e-10 ***
crime_res_mean	-7.177e-02	1.877e-02	-3.824	0.000131 ***
p50_inc_mean	8.625e-08	1.177e-08	7.331	2.29e-13 ***
share_black_mean	-3.069e-03	1.537e-03	-1.997	0.045810 *
share_hisp_mean	-3.800e-04	1.633e-03	-0.233	0.816051
share_white_mean	-1.219e-02	2.111e-03	-5.775	7.68e-09 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.0783 on 1077278 degrees of freedom
Multiple R-squared: 0.0002353, Adjusted R-squared: 0.0002297
F-statistic: 42.26 on 6 and 1077278 DF, p-value: < 2.2e-16

First difference regression results:

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-6.136e-04	1.191e-03	-0.515	0.606
tenure	5.827e-04	6.717e-04	0.867	0.386
total_crime_res	3.598e-01	5.661e-01	0.636	0.525
p50_inc	-4.581e-08	1.169e-06	-0.039	0.969
share_black	-1.114e-01	1.595e-01	-0.698	0.485
share_hisp	-1.245e-01	1.682e-01	-0.740	0.459
share_white	-1.145e-01	2.155e-01	-0.531	0.595

Residual standard error: 0.9995 on 1064865 degrees of freedom
Multiple R-squared: 1.489e-06, Adjusted R-squared: -4.145e-06
F-statistic: 0.2643 on 6 and 1064865 DF, p-value: 0.9536

See R script for comparison of estimated coefficients.

GMM parameter estimates:

Since there are a large number of parameter estimates for the GMM model, I'll just provide a sample:

```
[1] 3.592147e-05 7.909660e-05 6.955243e-05 4.114909e-05 5.410748e-05 2.419701e-05 9.538206e-05 8.064009e-05 2.312103e-05
[10] 3.272076e-05 2.953724e-05 4.605645e-05 6.038269e-05 5.531581e-05 7.134824e-05 8.483377e-05 9.982992e-05 4.527789e-05
[19] 9.679592e-06 4.418954e-05
```