613 HW3

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April 2021

1 Exercise 2

1.1 Calculate total crime per month and plot the time series of crime

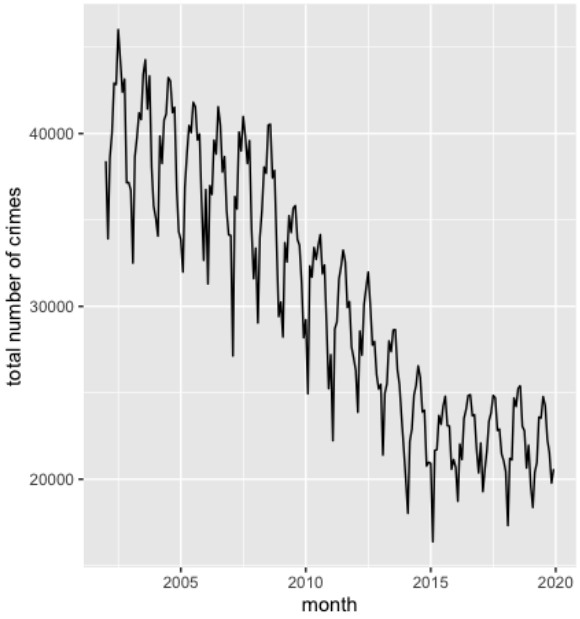

Figure 1: total crime per month

1.2 Merge the two datasets by districts-units and period

Only the first 20 rows and 9 columns are displayed here.

Table 1: crime and population

crime_month	district	crime_type	crimes	period	tot_pop	tot_white	tot_black	tot_hisp
2005-01-01	1	drug	1	1	38472	22608	4953	2543
2005-01-01	1	drug	188	1	38472	22608	4953	2543
2005-01-01	1	other	62	1	38472	22608	4953	2543
2005-01-01	1	other	302	1	38472	22608	4953	2543
2005-01-01	1	property	624	1	38472	22608	4953	2543
2005-01-01	1	property	160	1	38472	22608	4953	2543
2005-01-01	1	violent	150	1	38472	22608	4953	2543
2005-01-01	1	violent	62	1	38472	22608	4953	2543
2005-01-01	10	drug	234	1	117209	4204	39545	72559
2005-01-01	10	other	110	1	117209	4204	39545	72559
2005-01-01	10	other	150	1	117209	4204	39545	72559
2005-01-01	10	property	422	1	117209	4204	39545	72559
2005-01-01	10	property	38	1	117209	4204	39545	72559
2005-01-01	10	violent	337	1	117209	4204	39545	72559
2005-01-01	10	violent	104	1	117209	4204	39545	72559
2005-01-01	11	drug	724	1	72356	1794	61028	8493
2005-01-01	11	other	129	1	72356	1794	61028	8493
2005-01-01	11	other	270	1	72356	1794	61028	8493
2005-01-01	11	property	494	1	72356	1794	61028	8493
2005-01-01	11	property	64	1	72356	1794	61028	8493

1.3 Construct a panel data of unit over time with the following variables

Only the first 20 rows and 6 columns are displayed here.

Table 2: panel data

crime_month	district	share_white	share_black	share_hisp	tot_pop
2005-01-01	1	0.5876482	0.1287430	0.0661000	38472
2005-01-01	10	0.0358676	0.3373888	0.6190566	117209
2005-01-01	11	0.0247941	0.8434408	0.1173780	72356
2005-01-01	12	0.3113898	0.1741782	0.4124954	67385
2005-01-01	13	0.5158945	0.1838842	0.2480417	56938
2005-01-01	14	0.4173754	0.0722320	0.4608716	120999
2005-01-01	15	0.0163104	0.9334959	0.0370486	57816
2005-01-01	16	0.6881501	0.0101165	0.2318509	200465
2005-01-01	17	0.3862763	0.0332500	0.4326034	144451
2005-01-01	18	0.7529789	0.0928000	0.0497764	114472
2005-01-01	19	0.7975955	0.0251464	0.1069499	106218
2005-01-01	2	0.0165824	0.9466730	0.0165298	37992
2005-01-01	20	0.5403410	0.1065515	0.1834418	89140
2005-01-01	21	0.2393394	0.4680074	0.0401071	69813
2005-01-01	22	0.3428577	0.6077602	0.0329803	101879
2005-01-01	23	0.6963304	0.1123731	0.0914552	94560
2005-01-01	24	0.4272880	0.1801236	0.2118000	139915
2005-01-01	25	0.1470635	0.1649494	0.6630614	199152
2005-01-01	3	0.0409137	0.9130473	0.0174363	78629
2005-01-01	4	0.0797147	0.6209012	0.2841896	124519

2 Exercise 3

	Model 1
tenure	0.00002879***
	(0.00000832)
total_crime	−0.00001364***
	(0.00000177)
median_income	0.00000072***
	(0.00000009)
share_black	0.50281859***
	(0.00368326)
share_white	0.51517143***
	(0.00947019)
share_hisp	0.51729759***
	(0.00444146)
R^2	0.33170911
Adj. R^2	0.33170539
Num. obs.	1077905

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

3 Exercise 4

	Model 1
tenure	−0.00000381
	(0.00000852)
total_crime	−0.00000632
	(0.00000530)
median_income	−0.00000049
	(0.00000065)
share_black	−0.09200883
	(0.10426584)
share_white	−0.10129765
	(0.18176578)
share_hisp	−0.13984801
	(0.20278842)
factor(unit)1	0.63617251***
	(0.10610544)
factor(unit)2	0.61179460***
	(0.09824142)
factor(unit)3	0.61616041***
	(0.10056088)
factor(unit)4	0.63613618***
	(0.12512742)
factor(unit)5	0.62037073***
	(0.10092143)
factor(unit)6	0.62231497***
	(0.09904932)
factor(unit)7	0.61508719***
	(0.10101415)
factor(unit)8	0.65959891***
	(0.15814168)
factor(unit)9	0.63928209***
	(0.14856492)
factor(unit)10	0.64385402***
	(0.15764673)
factor(unit)11	0.62483653***
	(0.10984934)
factor(unit)12	0.63661376***
	(0.13932732)
factor(unit)13	0.63310861***
	(0.13950674)
factor(unit)14	0.66058147***
	(0.15390954)
factor(unit)15	0.61589853***
	(0.10217792)
factor(unit)16	0.64346061***
	(0.14779615)
factor(unit)17	0.63725287***
	(0.14076827)
factor(unit)18	0.64018902***
	(0.12738972)
factor(unit)19	0.64510790***

	Model 1
	(0.13645365)
factor(unit)20	0.62072405***
	(0.12588033)
factor(unit)21	0.59945598***
	(0.08689790)
factor(unit)22	0.63553798***
	(0.11374130)
factor(unit)23	0.62520077***
	(0.13408274)
factor(unit)24	0.62077613***
	(0.12160769)
factor(unit)25	0.65819880***
	(0.16496039)
factor(month)2007-02-01	0.00274652
	(0.01111880)
factor(month)2007-03-01	0.00542509
	(0.01098193)
factor(month)2007-04-01	−0.00443345
	(0.01099606)
factor(month)2007-05-01	0.00964238
	(0.01105213)
factor(month)2007-06-01	−0.01518439
	(0.01100171)
factor(month)2007-07-01	−0.00247608
	(0.01106668)
factor(month)2007-08-01	−0.00928348
	(0.01101097)
factor(month)2007-09-01	0.00283190
	(0.01096409)
factor(month)2007-10-01	0.00553178
	(0.01098405)
factor(month)2007-11-01	0.00327009
	(0.01088459)
factor(month)2007-12-01	−0.00852239
	(0.01089119)
factor(month)2008-01-01	−0.01580319
	(0.01089587)
factor(month)2008-02-01	−0.00793555
	(0.01096165)
factor(month)2008-03-01	−0.00704203
	(0.01089839)
factor(month)2008-04-01	0.00788003
	(0.01089444)
factor(month)2008-05-01	0.01889847
	(0.01091190)
factor(month)2008-06-01	0.00104288
	(0.01088256)
factor(month)2008-07-01	−0.00001992
	(0.01091536)
factor(month)2008-08-01	0.00104018
	(0.01093230)
factor(month)2008-09-01	0.00936828

	Model 1
	(0.01085805)
factor(month)2008-10-01	−0.00335644
	(0.01085347)
factor(month)2008-11-01	−0.00154151
	(0.01083093)
factor(month)2008-12-01	0.01093272
	(0.01087893)
factor(month)2009-01-01	−0.00600736
	(0.01085717)
factor(month)2009-02-01	−0.00578315
	(0.01092101)
factor(month)2009-03-01	−0.00889431
	(0.01085014)
factor(month)2009-04-01	−0.00491113
	(0.01087313)
factor(month)2009-05-01	−0.00154461
	(0.01086117)
factor(month)2009-06-01	0.00420571
	(0.01086041)
factor(month)2009-07-01	0.00547112
	(0.01086742)
factor(month)2009-08-01	−0.00466655
	(0.01087476)
factor(month)2009-09-01	−0.00479503
	(0.01087395)
factor(month)2009-10-01	−0.00158649
	(0.01087415)
factor(month)2009-11-01	−0.00521020
	(0.01088471)
factor(month)2009-12-01	−0.00988568
	(0.01095483)
factor(month)2010-01-01	0.00181470
	(0.01093729)
factor(month)2010-02-01	0.00361969
	(0.01116147)
factor(month)2010-03-01	−0.00887837
	(0.01099174)
factor(month)2010-04-01	0.00708232
	(0.01100380)
factor(month)2010-05-01	−0.00341439
	(0.01101212)
factor(month)2010-06-01	−0.00586830
	(0.01102085)
factor(month)2010-07-01	−0.01353438
	(0.01102404)
factor(month)2010-08-01	0.00987535
	(0.01103347)
factor(month)2010-09-01	0.00221522
	(0.01103115)
factor(month)2010-10-01	−0.00254807
	(0.01102608)
factor(month)2010-11-01	−0.00917466

	Model 1
	(0.01109864)
factor(month)2010-12-01	−0.00475948
	(0.01122372)
factor(month)2011-01-01	−0.00820742
	(0.01118945)
factor(month)2011-02-01	−0.00538948
	(0.01144808)
factor(month)2011-03-01	−0.00454875
	(0.01120983)
factor(month)2011-04-01	−0.00118944
	(0.01120282)
factor(month)2011-05-01	−0.00053075
	(0.01116628)
factor(month)2011-06-01	0.00012066
	(0.01114568)
factor(month)2011-07-01	0.00400417
	(0.01113232)
factor(month)2011-08-01	−0.00010427
	(0.01114290)
factor(month)2011-09-01	−0.01134552
	(0.01100831)
factor(month)2011-10-01	0.01049381
	(0.01099646)
factor(month)2011-11-01	−0.00697407
	(0.01105805)
factor(month)2011-12-01	0.00028792
	(0.01108952)
factor(month)2012-01-01	−0.01044974
	(0.01112889)
factor(month)2012-02-01	0.00297317
	(0.01121395)
factor(month)2012-03-01	0.00181951
	(0.01104767)
factor(month)2012-04-01	0.00457625
	(0.01113941)
factor(month)2012-05-01	0.00436115
	(0.01106993)
factor(month)2012-06-01	−0.00206503
	(0.01107144)
factor(month)2012-07-01	0.00067806
	(0.01107470)
factor(month)2012-08-01	−0.00512621
	(0.01111020)
factor(month)2012-09-01	0.00232210
	(0.01117195)
factor(month)2012-10-01	−0.01457656
	(0.01117009)
factor(month)2012-11-01	0.00346256
	(0.01124632)
factor(month)2012-12-01	−0.01687488
	(0.01129534)
factor(month)2013-01-01	0.00379506

	Model 1
	(0.01131203)
factor(month)2013-02-01	−0.00807793
	(0.01156039)
factor(month)2013-03-01	−0.01585271
	(0.01136514)
factor(month)2013-04-01	0.00351227
	(0.01132606)
factor(month)2013-05-01	0.01410776
	(0.01122549)
factor(month)2013-06-01	0.00705939
	(0.01125001)
factor(month)2013-07-01	0.01753106
	(0.01121551)
factor(month)2013-08-01	−0.00273198
	(0.01121880)
factor(month)2013-09-01	0.00303680
	(0.01130153)
factor(month)2013-10-01	−0.00869938
	(0.01134062)
factor(month)2013-11-01	−0.00581036
	(0.01144498)
factor(month)2013-12-01	0.00331905
	(0.01154909)
factor(month)2014-01-01	−0.01496478
	(0.01170642)
factor(month)2014-02-01	0.00249907
	(0.01185621)
factor(month)2014-03-01	−0.00444100
	(0.01154519)
factor(month)2014-04-01	−0.01862457
	(0.01148410)
factor(month)2014-05-01	−0.00590125
	(0.01137176)
factor(month)2014-06-01	−0.00176068
	(0.01129800)
factor(month)2014-07-01	0.00557485
	(0.01126133)
factor(month)2014-08-01	−0.00111296
	(0.01129915)
factor(month)2014-09-01	0.00105471
	(0.01134351)
factor(month)2014-10-01	−0.00172982
	(0.01133362)
factor(month)2014-11-01	−0.00853921
	(0.01153554)
factor(month)2014-12-01	−0.00702118
	(0.01153285)
factor(month)2015-01-01	−0.00492236
	(0.01156913)
factor(month)2015-02-01	−0.00930779
	(0.01195671)
factor(month)2015-03-01	0.00415444

	Model 1
	(0.01153212)
factor(month)2015-04-01	−0.00352437
	(0.01155643)
factor(month)2015-05-01	−0.00672244
	(0.01141892)
factor(month)2015-06-01	−0.00711133
	(0.01143495)
factor(month)2015-07-01	−0.00863121
	(0.01138343)
factor(month)2015-08-01	−0.00534089
	(0.01136232)
factor(month)2015-09-01	−0.00101220
	(0.01147068)
factor(month)2015-10-01	−0.00833486
	(0.01146628)
factor(month)2015-11-01	0.00232034
	(0.01162256)
factor(month)2015-12-01	−0.00737276
	(0.01160816)
factor(month)2016-01-01	−0.00534368
	(0.01165937)
factor(month)2016-02-01	−0.00709858
	(0.01180375)
factor(month)2016-03-01	−0.01453481
	(0.01155461)
factor(month)2016-04-01	0.00981793
	(0.01160011)
factor(month)2016-05-01	0.00985847
	(0.01144688)
factor(month)2016-06-01	−0.00514665
	(0.01141202)
factor(month)2016-07-01	−0.01082352
	(0.01138443)
factor(month)2016-08-01	−0.01921383
	(0.01134446)
factor(month)2016-09-01	−0.00154189
	(0.01140503)
factor(month)2016-10-01	0.00311791
	(0.01141179)
factor(month)2016-11-01	−0.01397966
	(0.01154890)
factor(month)2016-12-01	−0.01289825
	(0.01162749)
factor(month)2017-01-01	0.00008784
	(0.01159335)
factor(month)2017-02-01	−0.00583832
	(0.01179207)
factor(month)2017-03-01	0.00605436
	(0.01170652)
factor(month)2017-04-01	−0.00573771
	(0.01164320)
factor(month)2017-05-01	0.00840986

	Model 1
	(0.01153635)
factor(month)2017-06-01	−0.01219203
	(0.01150744)
factor(month)2017-07-01	−0.00612343
	(0.01145692)
factor(month)2017-08-01	−0.00266422
	(0.01148169)
factor(month)2017-09-01	−0.00849320
	(0.01156817)
factor(month)2017-10-01	−0.00968310
	(0.01154662)
factor(month)2017-11-01	−0.01684569
	(0.01166197)
factor(month)2017-12-01	−0.00892438
	(0.01166404)
R^2	0.33276137
Adj. R^2	0.33266107
Num. obs.	1077905

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

4 Exercise 5

4.1 Implement a within, between, and first difference estimator for the parameter β

within	between	first difference
-2.7676e-04	5.430383e-03	-1.754975e-05

The results obtained by different methods are totally different.

4.2 GMM