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FORECASTING MODELS

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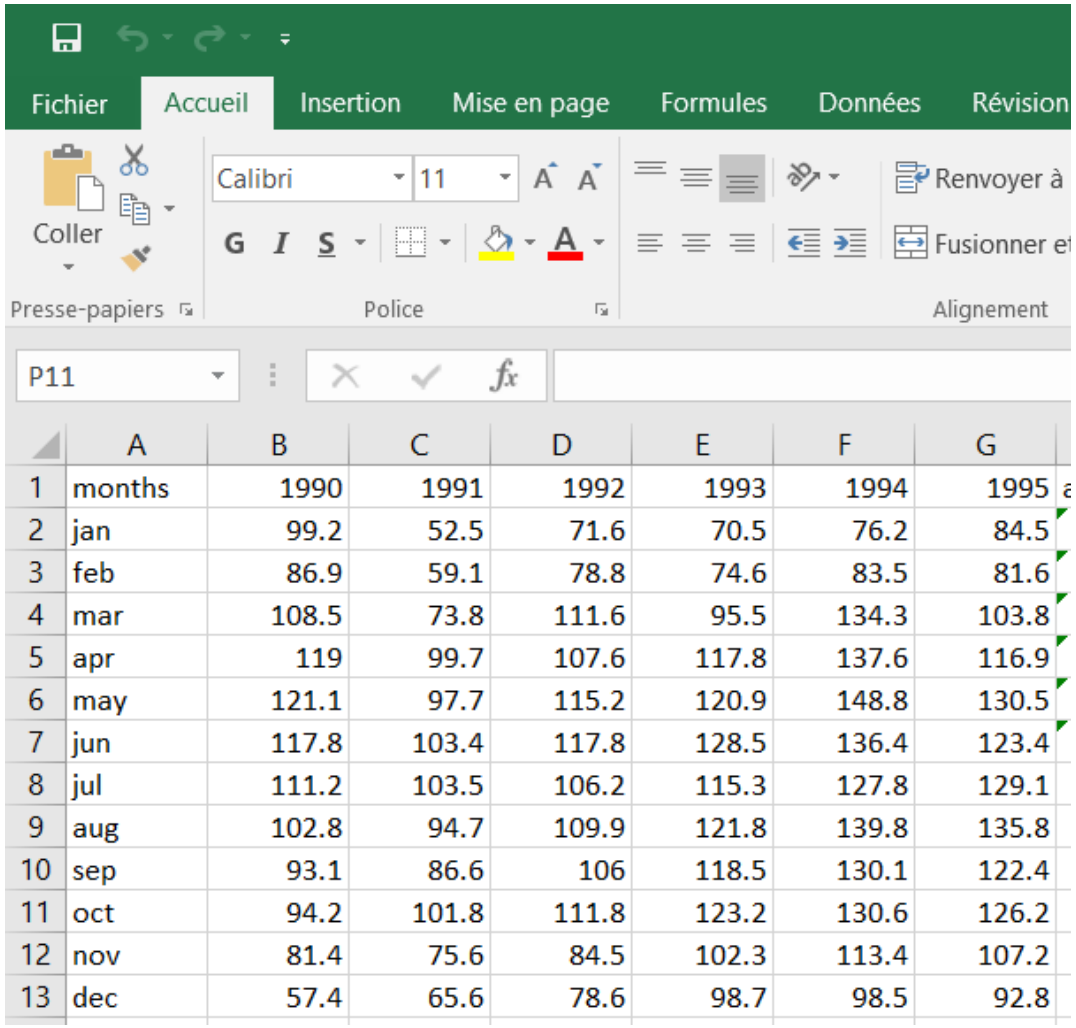
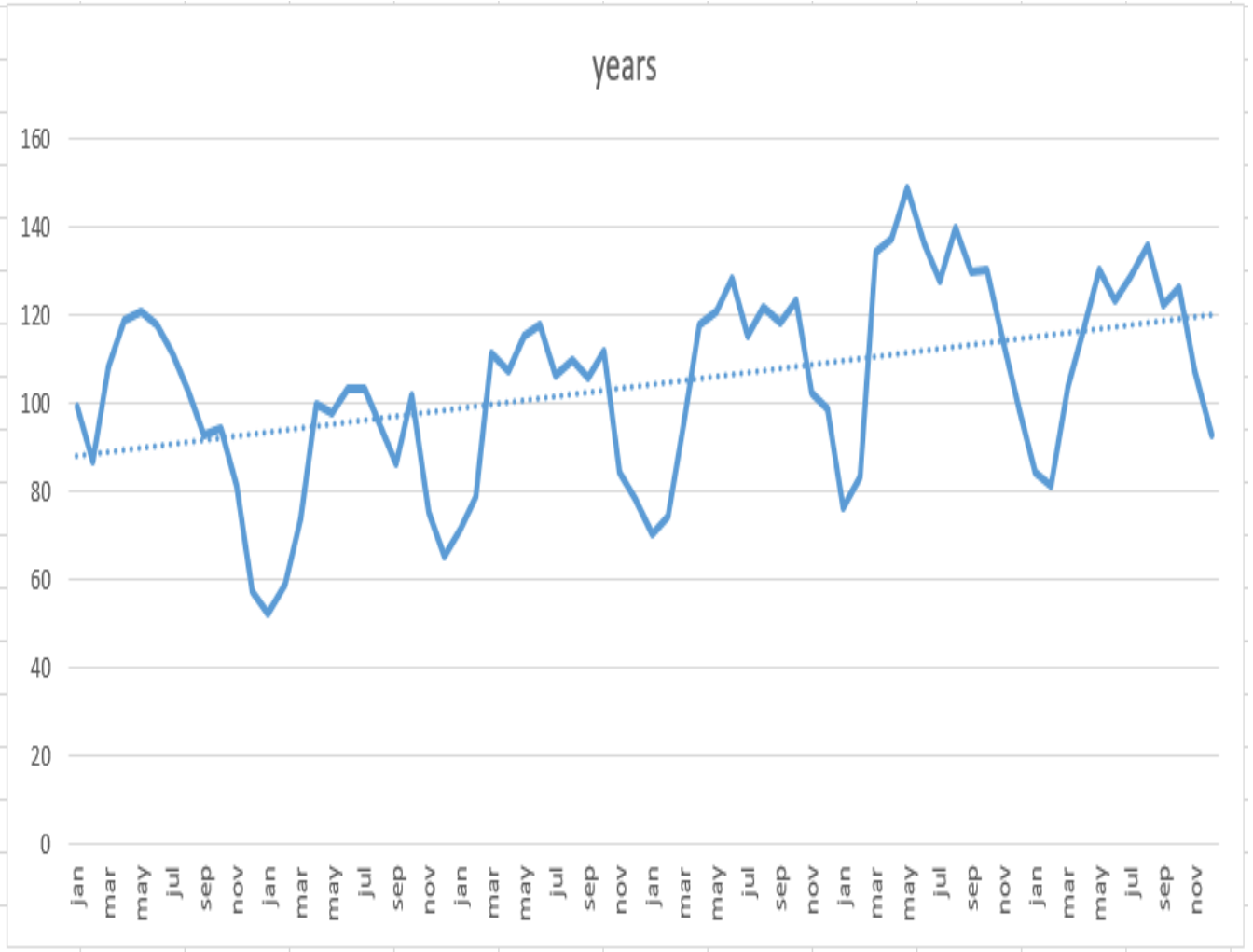
The Table shows the monthly new housing starts (in thousands) for the U.S.A. from January 1990 through December1995.
Initial data graph for Monthly new Housing starts from jan1990 to dec 1995 :



	A	B	C	D	E	F	G
1	months	1990	1991	1992	1993	1994	1995
2	jan	99.2	52.5	71.6	70.5	76.2	84.5
3	feb	86.9	59.1	78.8	74.6	83.5	81.6
4	mar	108.5	73.8	111.6	95.5	134.3	103.8
5	apr	119	99.7	107.6	117.8	137.6	116.9
6	may	121.1	97.7	115.2	120.9	148.8	130.5
7	jun	117.8	103.4	117.8	128.5	136.4	123.4
8	jul	111.2	103.5	106.2	115.3	127.8	129.1
9	aug	102.8	94.7	109.9	121.8	139.8	135.8
10	sep	93.1	86.6	106	118.5	130.1	122.4
11	oct	94.2	101.8	111.8	123.2	130.6	126.2
12	nov	81.4	75.6	84.5	102.3	113.4	107.2
13	dec	57.4	65.6	78.6	98.7	98.5	92.8



THE AVERAGE PERCENTAGE METHOD

We express the data for each month as percentage of the average of the year. The percentage for corresponding month at different years are averaged by using a mean or a median. The resulting 12 percentages give the seasonal index.

We calculate the data for each month as percentage of the average of the year.

=average(c2:c13)

=99.383333

In the same way,for every year we compute the average

I1

	A	B	C	D	E
1	num	months	years	mean	mean per
2	1	jan	99.2	99.3833333	0.99815532
3	2	feb	86.9	84.5	0.87439211
4	3	mar	108.5	99.9666667	1.09173239
5	4	apr	119	107.3	1.19738391
6	5	may	121.1	121.416667	1.21851421
7	6	jun	117.8	112.85	1.18530945
8	7	jul	111.2		1.11889992
9	8	aug	102.8		1.0343787
10	9	sep	93.1		0.93677682
11	10	oct	94.2		0.94784508
12	11	nov	81.4		0.81905084
13	12	dec	57.4		0.57756165
14	13	jan	52.5		0.62130178
15	14	feb	59.1		0.69940828
16	15	mar	73.8		0.87337278
17	16	apr	99.7		1.17988166
18	17	may	97.7		1.15621302
19	18	jun	103.4		1.22366864
20	19	jul	103.5		1.22485207
21	20	aug	94.7		1.12071006
22	21	sep	86.6		1.02485207
23	22	oct	101.8		1.20473373
24	23	nov	75.6		0.89467456
25	24	dec	65.6		0.77633136
26	25	jan	71.6		0.71623872
27	26	feb	78.8		0.78826273
28	27	mar	111.6		1.11637209
29	28	apr	107.6		1.07635875

Presse-papiers Police Aligner

G57

	A	B	C	D	E
29	28	apr	107.6		1.07635875
30	29	may	115.2		1.15238409
31	30	jun	117.8		1.17839276
32	31	jul	106.2		1.06235408
33	32	aug	109.9		1.09936642
34	33	sep	106		1.06035342
35	34	oct	111.8		1.11837275
36	35	nov	84.5		0.84528173
37	36	dec	78.6		0.78626206
38	37	jan	70.5		0.65703635
39	38	feb	74.6		0.69524697
40	39	mar	95.5		0.89002796
41	40	apr	117.8		1.09785648
42	41	may	120.9		1.12674744
43	42	jun	128.5		1.19757689
44	43	jul	115.3		1.07455732
45	44	aug	121.8		1.13513514
46	45	sep	118.5		1.10438024
47	46	oct	123.2		1.14818267
48	47	nov	102.3		0.95340168
49	48	dec	98.7		0.91985089
50	49	jan	76.2		0.62759077
51	50	feb	83.5		0.68771429
52	51	mar	134.3		1.10610814
53	52	apr	137.6		1.13328727
54	53	may	148.8		1.22553158
55	54	jun	136.4		1.12340395
56	55	jul	127.8		1.05257349
57	56	aug	139.8		1.15140668

	A	B	C	D	E
58	57	sep	130.1		1.07151652
59	58	oct	130.6		1.07563457
60	59	nov	113.4		0.93397366
61	60	dec	98.5		0.81125578
62	61	jan	84.5		0.74878157
63	62	feb	81.6		0.72308374
64	63	mar	103.8		0.91980505
65	64	apr	116.9		1.03588835
66	65	may	130.5		1.1564023
67	66	jun	123.4		1.09348693
68	67	jul	129.1		1.14399646
69	68	aug	135.8		1.2033673
70	69	sep	122.4		1.08462561
71	70	oct	126.2		1.11829863
72	71	nov	107.2		0.94993354
73	72	dec	92.8		0.82233053

We divide the initial data by the average of the year and it gives the percentage values of each month
=initial data/average of the year
=99.2/99.383333
=0.99815532
Likewise,we calculate percentage for remaining months

	A	B	C	D	E	F	G	H	I	J	K	L
1	months	1990	1991	1992	1993	1994	1995	mean		adj_media	adj_mean	median
2	jan	0.9981553	0.621302	0.716239	0.657036	0.627591	0.748782	72.81841		68.78189	72.81841	68.66375
3	feb	0.8743921	0.699408	0.788263	0.695247	0.687714	0.723084	74.46847		71.24697	74.46847	71.1246
4	mar	1.0917324	0.873373	1.116372	0.890028	1.106108	0.919805	99.95697		100.7499	99.95697	100.5769
5	apr	1.1973839	1.179882	1.076359	1.097856	1.133287	1.035888	112.0109		111.7491	112.0109	111.5572
6	may	1.2185142	1.156213	1.152384	1.126747	1.225532	1.156402	117.2632		115.8297	117.2632	115.6308
7	jun	1.1853094	1.223669	1.178393	1.197577	1.123404	1.093487	116.6973		118.3884	116.6973	118.1851
8	jul	1.1188999	1.224852	1.062354	1.074557	1.052573	1.143996	111.2872		109.8615	111.2872	109.6729
9	aug	1.0343787	1.12071	1.099366	1.135135	1.151407	1.203367	112.4061		112.9863	112.4061	112.7923
10	sep	0.9367768	1.024852	1.060353	1.10438	1.071517	1.084626	104.7084		106.7769	104.7084	106.5935
11	oct	0.9478451	1.204734	1.118373	1.148183	1.075635	1.118299	110.2178		112.026	110.2178	111.8336
12	nov	0.8190508	0.894675	0.845282	0.953402	0.933974	0.949934	89.9386		91.58972	89.9386	91.43241
13	dec	0.5775616	0.776331	0.786262	0.919851	0.811256	0.822331	78.22654		80.01332	78.22654	79.87589
14												
15						total		sum				
16						1200		1200			1200	
17												

We compute the mean or median
mean=average(b2:g2) median=median(b2:g2)
=72.8184 =68.6637
From mean and median we obtain the adj mean and adjmedian
=1200/1200*72.8184=72.8184
In the same way,we calculate all values of mean and median which gives seasonal index

Deseasonalization of Data:

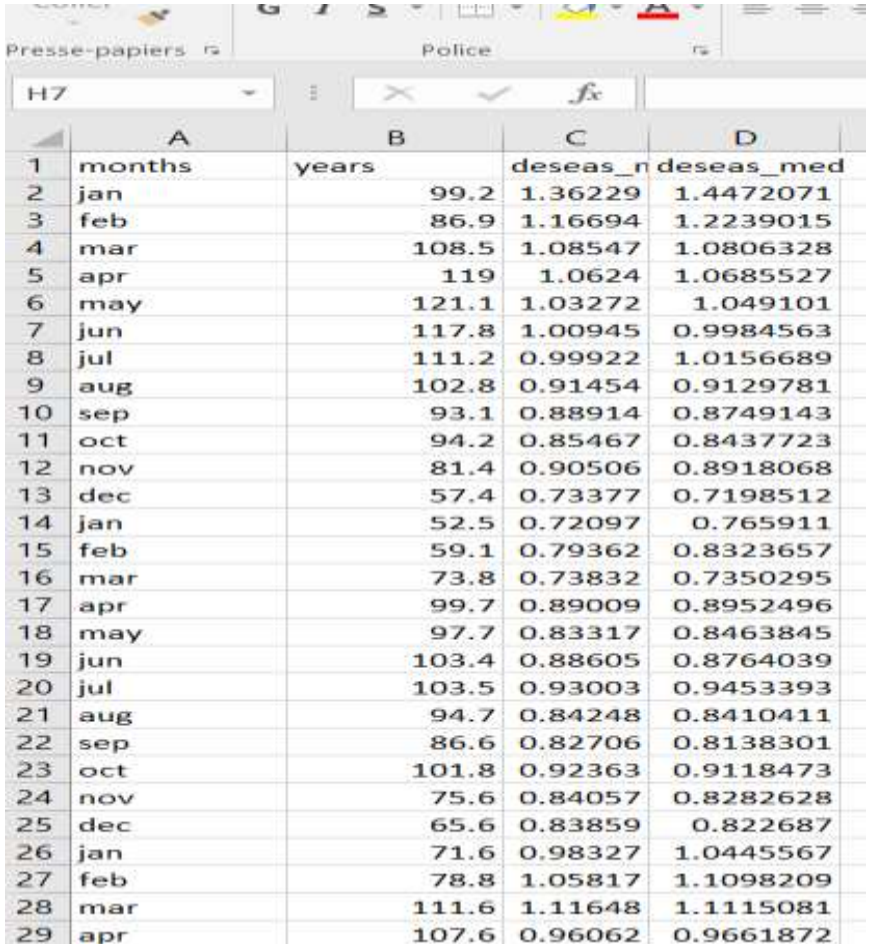
We obtain the Deseasonalization of data by dividing every monthly entry of the initial data by the seasonal index found by one of the three methods. In other words your operation corresponds to:

$$Y/S = T \times C \times I$$

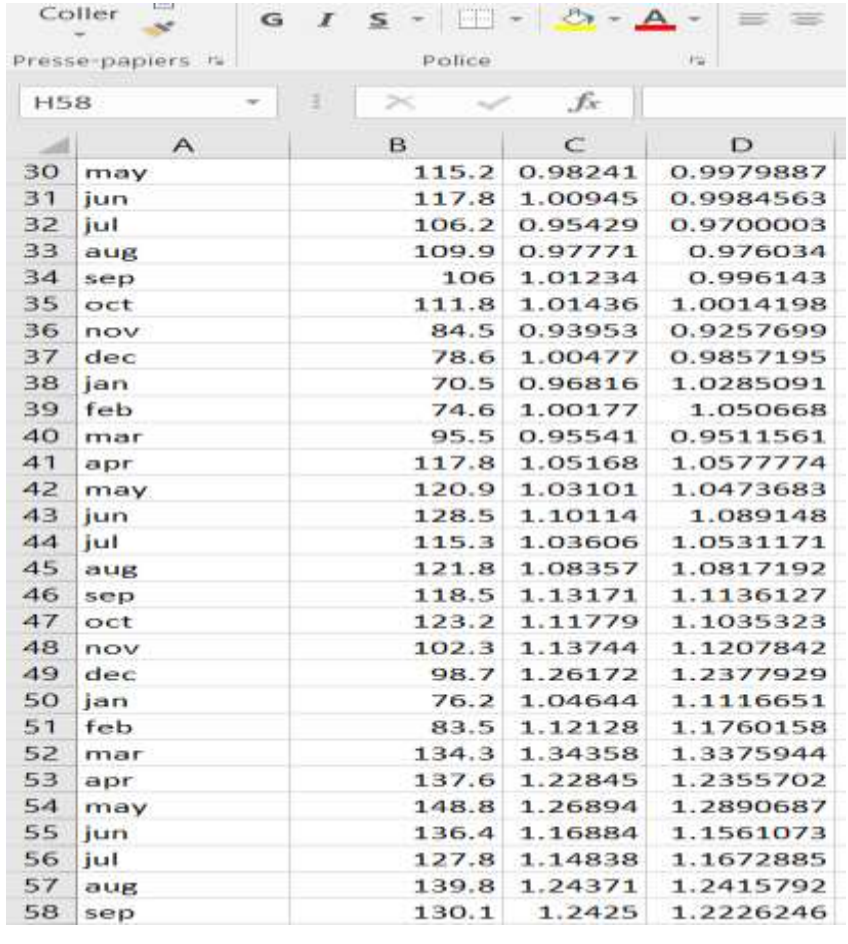
We compute the deseasonalization of data for mean and median

Deseas_mn=initial data/adjmean=99.2/72.8184=1.36229

Deseas_md=initial data/adjmedian=99.2/68.54582=1.44720



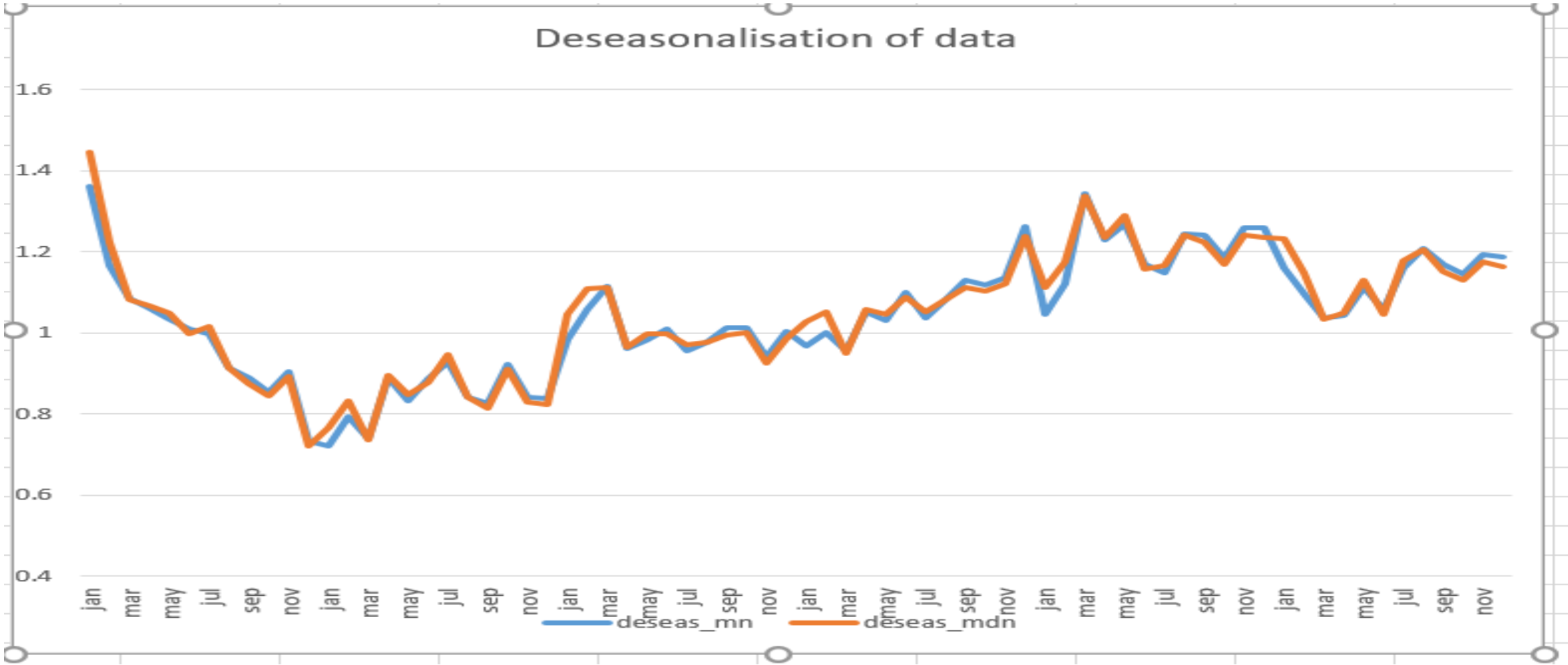
	A	B	C	D
1	months	years	deseas_n	deseas_med
2	jan	99.2	1.36229	1.4472071
3	feb	86.9	1.16694	1.2239015
4	mar	108.5	1.08547	1.0806328
5	apr	119	1.0624	1.0685527
6	may	121.1	1.03272	1.049101
7	jun	117.8	1.00945	0.9984563
8	jul	111.2	0.99922	1.0156689
9	aug	102.8	0.91454	0.9129781
10	sep	93.1	0.88914	0.8749143
11	oct	94.2	0.85467	0.8437723
12	nov	81.4	0.90506	0.8918068
13	dec	57.4	0.73377	0.7198512
14	jan	52.5	0.72097	0.765911
15	feb	59.1	0.79362	0.8323657
16	mar	73.8	0.73832	0.7350295
17	apr	99.7	0.89009	0.8952496
18	may	97.7	0.83317	0.8463845
19	jun	103.4	0.88605	0.8764039
20	jul	103.5	0.93003	0.9453393
21	aug	94.7	0.84248	0.8410411
22	sep	86.6	0.82706	0.8138301
23	oct	101.8	0.92363	0.9118473
24	nov	75.6	0.84057	0.8282628
25	dec	65.6	0.83859	0.822687
26	jan	71.6	0.98327	1.0445567
27	feb	78.8	1.05817	1.1098209
28	mar	111.6	1.11648	1.1115081
29	apr	107.6	0.96062	0.9661872



	A	B	C	D
30	may	115.2	0.98241	0.9979887
31	jun	117.8	1.00945	0.9984563
32	jul	106.2	0.95429	0.9700003
33	aug	109.9	0.97771	0.976034
34	sep	106	1.01234	0.996143
35	oct	111.8	1.01436	1.0014198
36	nov	84.5	0.93953	0.9257699
37	dec	78.6	1.00477	0.9857195
38	jan	70.5	0.96816	1.0285091
39	feb	74.6	1.00177	1.050668
40	mar	95.5	0.95541	0.9511561
41	apr	117.8	1.05168	1.0577774
42	may	120.9	1.03101	1.0473683
43	jun	128.5	1.10114	1.089148
44	jul	115.3	1.03606	1.0531171
45	aug	121.8	1.08357	1.0817192
46	sep	118.5	1.13171	1.1136127
47	oct	123.2	1.11779	1.1035323
48	nov	102.3	1.13744	1.1207842
49	dec	98.7	1.26172	1.2377929
50	jan	76.2	1.04644	1.1116651
51	feb	83.5	1.12128	1.1760158
52	mar	134.3	1.34358	1.3375944
53	apr	137.6	1.22845	1.2355702
54	may	148.8	1.26894	1.2890687
55	jun	136.4	1.16884	1.1561073
56	jul	127.8	1.14838	1.1672885
57	aug	139.8	1.24371	1.2415792
58	sep	130.1	1.2425	1.2226246

	A	B	C	D
57	aug	139.8	1.24371	1.2415792
58	sep	130.1	1.2425	1.2226246
59	oct	130.6	1.18493	1.1698159
60	nov	113.4	1.26086	1.2423942
61	dec	98.5	1.25916	1.2352847
62	jan	84.5	1.16042	1.232752
63	feb	81.6	1.09577	1.1492562
64	mar	103.8	1.03845	1.033822
65	apr	116.9	1.04365	1.0496959
66	may	130.5	1.11288	1.1305341
67	jun	123.4	1.05744	1.0459211
68	jul	129.1	1.16006	1.1791624
69	aug	135.8	1.20812	1.2060547
70	sep	122.4	1.16896	1.1502633
71	oct	126.2	1.14501	1.1304041
72	nov	107.2	1.19192	1.1744679
73	dec	92.8	1.1863	1.1638012

DESEASONALIZATION OF DATA GRAPH:



CYCLICAL FLUCTUATIONS:

Recurring up and down movements with respect to trend that have a duration of several years.

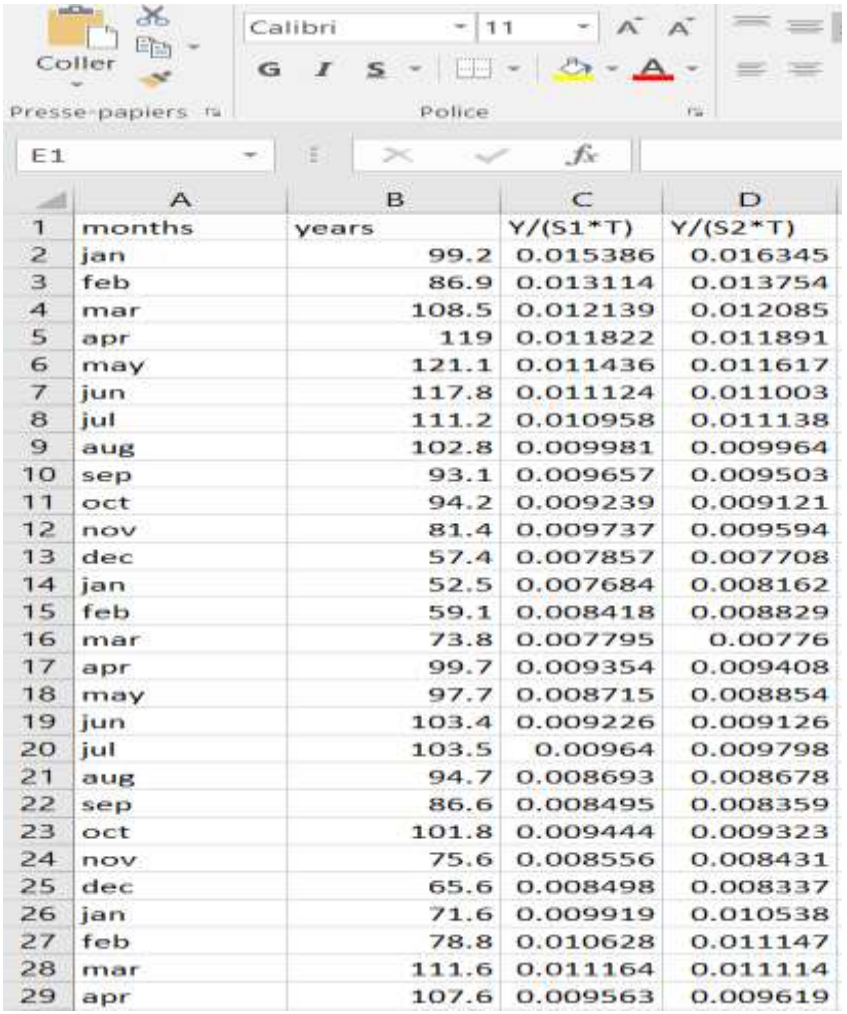
Their study is obtained after the detrading

$$Y / S \times T = C \times I$$

We compute the cyclical fluctuations by

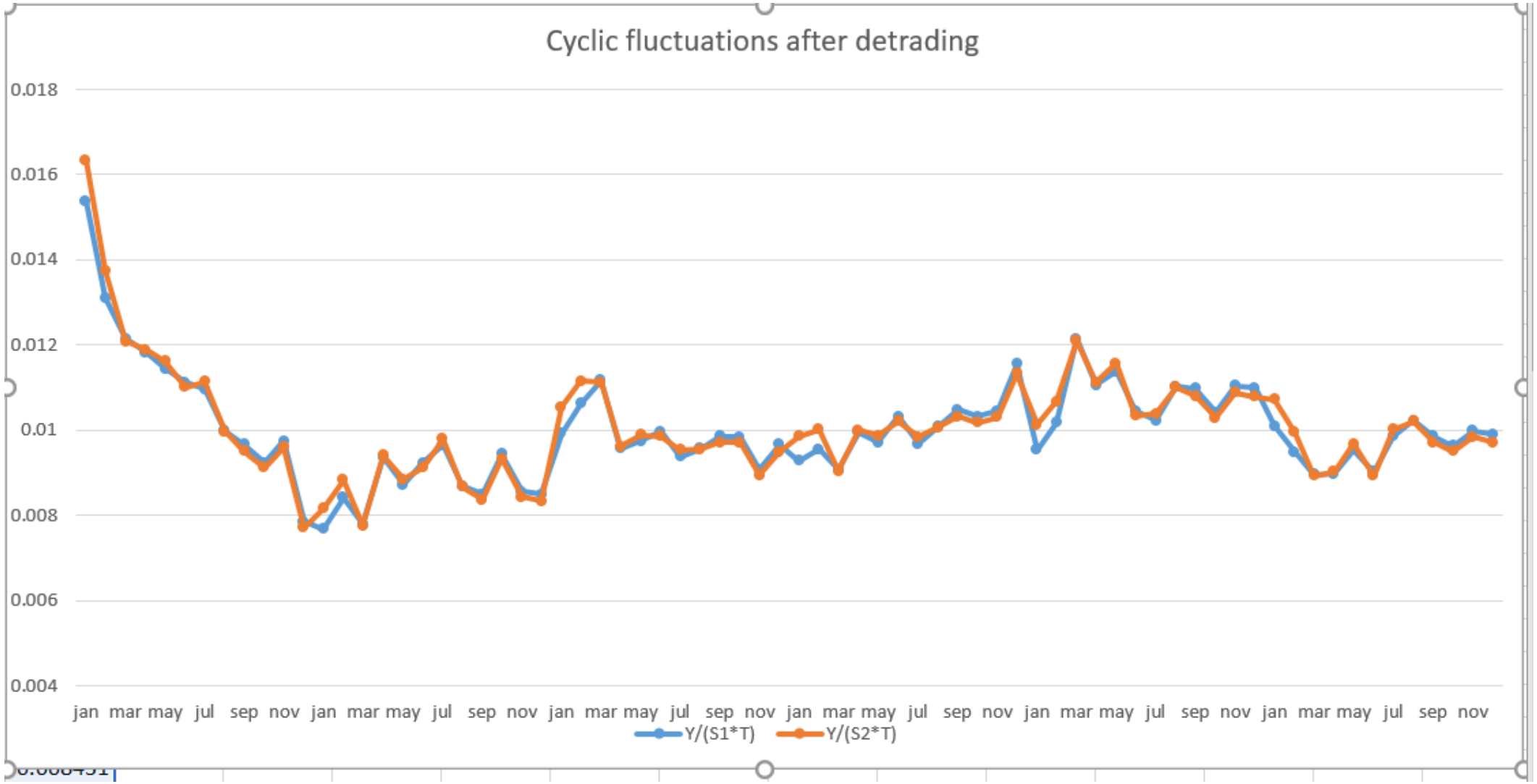
C=deseasionalization data/linear_eq_value

Similarly , we calculate all the values



	A	B	C	D
1	months	years	Y/(S1*T)	Y/(S2*T)
2	jan	99.2	0.015386	0.016345
3	feb	86.9	0.013114	0.013754
4	mar	108.5	0.012139	0.012085
5	apr	119	0.011822	0.011891
6	may	121.1	0.011436	0.011617
7	jun	117.8	0.011124	0.011003
8	jul	111.2	0.010958	0.011138
9	aug	102.8	0.009981	0.009964
10	sep	93.1	0.009657	0.009503
11	oct	94.2	0.009239	0.009121
12	nov	81.4	0.009737	0.009594
13	dec	57.4	0.007857	0.007708
14	jan	52.5	0.007684	0.008162
15	feb	59.1	0.008418	0.008829
16	mar	73.8	0.007795	0.00776
17	apr	99.7	0.009354	0.009408
18	may	97.7	0.008715	0.008854
19	jun	103.4	0.009226	0.009126
20	jul	103.5	0.00964	0.009798
21	aug	94.7	0.008693	0.008678
22	sep	86.6	0.008495	0.008359
23	oct	101.8	0.009444	0.009323
24	nov	75.6	0.008556	0.008431
25	dec	65.6	0.008498	0.008337
26	jan	71.6	0.009919	0.010538
27	feb	78.8	0.010628	0.011147
28	mar	111.6	0.011164	0.011114
29	apr	107.6	0.009563	0.009619
30	may	115.2	0.009737	0.009892
31	jun	117.8	0.009962	0.009854
32	jul	106.2	0.009377	0.009531
33	aug	109.9	0.009565	0.009549
34	sep	106	0.009862	0.009704
35	oct	111.8	0.009839	0.009714
36	nov	84.5	0.009075	0.008942
37	dec	78.6	0.009664	0.00948
38	jan	70.5	0.009272	0.00985
39	feb	74.6	0.009554	0.01002
40	mar	95.5	0.009073	0.009033
41	apr	117.8	0.009946	0.010004
42	may	120.9	0.00971	0.009864
43	jun	128.5	0.010328	0.010215
44	jul	115.3	0.009677	0.009836
45	aug	121.8	0.010079	0.010062
46	sep	118.5	0.010484	0.010316
47	oct	123.2	0.010313	0.010182
48	nov	102.3	0.010452	0.010299
49	dec	98.7	0.011547	0.011328
50	jan	76.2	0.009538	0.010133
51	feb	83.5	0.01018	0.010676
52	mar	134.3	0.012149	0.012095
53	apr	137.6	0.011064	0.011128
54	may	148.8	0.011383	0.011564
55	jun	136.4	0.010444	0.01033
56	jul	127.8	0.010221	0.010389
57	aug	139.8	0.011026	0.011007
58	sep	130.1	0.010973	0.010797
59	oct	130.6	0.010424	0.010291
60	nov	113.4	0.011049	0.010887
61	dec	98.5	0.010991	0.010783
62	jan	84.5	0.010091	0.010719
63	feb	81.6	0.009492	0.009955
64	mar	103.8	0.008961	0.008921
65	apr	116.9	0.008972	0.009024
66	may	130.5	0.009531	0.009682
67	jun	123.4	0.009022	0.008924
68	jul	129.1	0.009861	0.010023
69	aug	135.8	0.010231	0.010213
70	sep	122.4	0.009862	0.009704
71	oct	126.2	0.009624	0.009502
72	nov	107.2	0.009982	0.009836
73	dec	92.8	0.009898	0.00971

CYCLIC FLUCTUATIONS GRAPH:



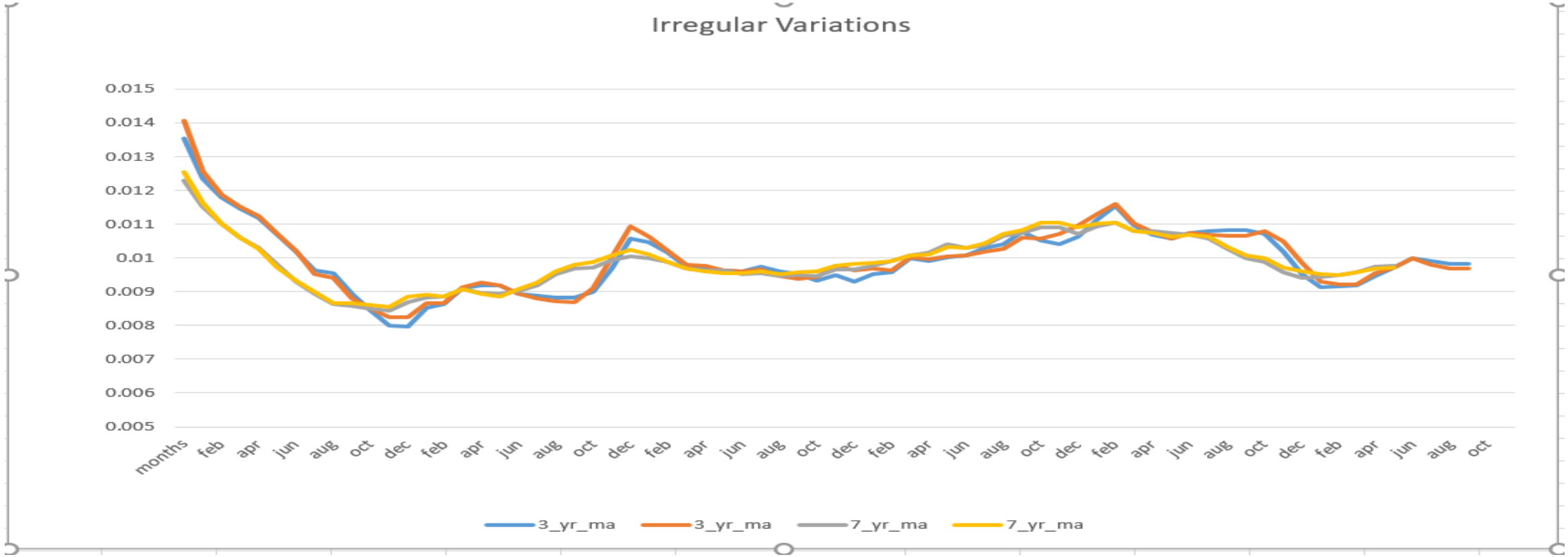
IRREGULAR VARIATIONS:

The erratic variations from trend that cannot be ascribed to the cyclical or seasonal influences. You can study them by appropriate moving averages

By Using cyclic fluctuations,we calculate the irregular variations of three year moving averages and seven year moving

	A	B	C	D	E	F	G	H
1	months	years	Y/(S1*T)	Y/(S2*T)	3_yr_ma	3_yr_ma	7_yr_ma	7_yr_ma
2	jan	99.2	0.015386	0.016345	0.01354629	0.01406135	0.01228269	0.0125476
3	feb	86.9	0.013114	0.013754	0.01235838	0.01257659	0.01151055	0.01163601
4	mar	108.5	0.012139	0.012085	0.01179891	0.0118642	0.01101669	0.01102863
5	apr	119	0.011822	0.011891	0.01146069	0.01150361	0.01060242	0.01060526
6	may	121.1	0.011436	0.011617	0.01117256	0.01125279	0.01030452	0.0102772
7	jun	117.8	0.011124	0.011003	0.0106876	0.01070168	0.00979323	0.00971871
8	jul	111.2	0.010958	0.011138	0.01019873	0.01020169	0.00930175	0.00931295
9	aug	102.8	0.009981	0.009964	0.00962566	0.00952922	0.00893895	0.00898308
10	sep	93.1	0.009657	0.009503	0.00954432	0.00940602	0.00862668	0.00866829
11	oct	94.2	0.009239	0.009121	0.00894417	0.0088077	0.00858336	0.00865478
12	nov	81.4	0.009737	0.009594	0.00842579	0.00848824	0.00850861	0.00861661
13	dec	57.4	0.007857	0.007708	0.00798623	0.00823318	0.00843562	0.00854964
14	jan	52.5	0.007684	0.008162	0.00796566	0.00825071	0.00869031	0.00884829
15	feb	59.1	0.008418	0.008829	0.00852248	0.00866596	0.00883445	0.00892189
16	mar	73.8	0.007795	0.00776	0.00862153	0.00867411	0.00884538	0.0088547
17	apr	99.7	0.009354	0.009408	0.00909851	0.00912917	0.0090809	0.00907798
18	may	97.7	0.008715	0.008854	0.00919372	0.00925922	0.00896691	0.00893834
19	jun	103.4	0.009226	0.009126	0.00918609	0.00920056	0.00893581	0.00886447
20	jul	103.5	0.00964	0.009798	0.00894233	0.00894499	0.00903487	0.00906621
21	aug	94.7	0.008693	0.008678	0.00887705	0.00878666	0.00917603	0.00925881
22	sep	86.6	0.008495	0.008359	0.00883155	0.00870435	0.0095291	0.0096069
23	oct	101.8	0.009444	0.009323	0.00883254	0.00869691	0.00968175	0.00978688
24	nov	75.6	0.008556	0.008431	0.00899109	0.0091017	0.0097237	0.0098681
25	dec	65.6	0.008498	0.008337	0.00968166	0.01000698	0.00992455	0.01007135
26	jan	71.6	0.009919	0.010538	0.01057043	0.01093289	0.01005013	0.01024201
27	feb	78.8	0.010628	0.011147	0.01045172	0.01062656	0.00999956	0.01010078
28	mar	111.6	0.011164	0.011114	0.01015496	0.01020834	0.00989012	0.00989469
29	apr	107.6	0.009563	0.009619	0.00975428	0.00978808	0.00970085	0.0096946
30	may	115.2	0.009737	0.009892	0.0096921	0.00975889	0.00963102	0.00959786
31	jun	117.8	0.009962	0.009854	0.00963476	0.00964461	0.00962045	0.00953905
32	jul	106.2	0.009377	0.009531	0.00960133	0.00959477	0.00952189	0.00953855
33	aug	109.9	0.009565	0.009549	0.00975544	0.00965558	0.00954714	0.00960837
34	sep	106	0.009862	0.009704	0.00959179	0.00945308	0.00947683	0.00953462
35	oct	111.8	0.009839	0.009714	0.00952572	0.00937851	0.00948886	0.00957742
36	nov	84.5	0.009075	0.008942	0.0093367	0.00942396	0.00947041	0.0095989
37	dec	78.6	0.009664	0.00948	0.00949638	0.0097834	0.00964941	0.00978081
38	jan	70.5	0.009272	0.00985	0.00929965	0.00963428	0.00965135	0.00983169
39	feb	74.6	0.009554	0.01002	0.00952427	0.00968546	0.00976667	0.009862
40	mar	95.5	0.009073	0.009033	0.00957641	0.00963349	0.00989962	0.00990436
41	apr	117.8	0.009946	0.010004	0.00999447	0.01002753	0.01007672	0.01006845
42	may	120.9	0.00971	0.009864	0.00990485	0.00997182	0.01014899	0.01011062
43	jun	128.5	0.010328	0.010215	0.01002798	0.01003786	0.01041143	0.01031977
44	jul	115.3	0.009677	0.009836	0.01008021	0.01007168	0.01029869	0.01030803
45	aug	121.8	0.010079	0.010062	0.01029218	0.0101867	0.01037047	0.01042804
46	sep	118.5	0.010484	0.010316	0.01041635	0.01026558	0.01066615	0.01071844
47	oct	123.2	0.010313	0.010182	0.01077063	0.01060277	0.01074897	0.01083438
48	nov	102.3	0.010452	0.010299	0.01051239	0.01058656	0.01090188	0.01103188
49	dec	98.7	0.011547	0.011328	0.01042164	0.01071246	0.01090077	0.01103638
50	jan	76.2	0.009538	0.010133	0.01062232	0.0109681	0.01071133	0.01090228
51	feb	83.5	0.01018	0.010676	0.01113086	0.01129984	0.01092388	0.0110272
52	mar	134.3	0.012149	0.012095	0.01153213	0.01159566	0.01103716	0.01104442
53	apr	137.6	0.011064	0.011128	0.01096379	0.01100744	0.01079066	0.01078665
54	may	148.8	0.011383	0.011564	0.01068281	0.01076119	0.01078847	0.01075219
55	jun	136.4	0.010444	0.01033	0.01056373	0.01057564	0.01073246	0.01064061
56	jul	127.8	0.010221	0.010389	0.01073989	0.01073121	0.01068196	0.0106962
57	aug	139.8	0.011026	0.011007	0.01080741	0.01069832	0.0105778	0.0106342
58	sep	130.1	0.010973	0.010797	0.01081491	0.01065816	0.01028281	0.01033619
59	oct	130.6	0.010424	0.010291	0.01082116	0.01065343	0.009997	0.01008289
60	nov	113.4	0.011049	0.010887	0.01071016	0.01079639	0.00986949	0.00999596
61	dec	98.5	0.010991	0.010783	0.01019125	0.01048587	0.00957997	0.00971553
62	jan	84.5	0.010091	0.010719	0.00951454	0.00986534	0.00941843	0.00960696
63	feb	81.6	0.009492	0.009955	0.00914166	0.00930014	0.00943845	0.00953463
64	mar	103.8	0.008961	0.008921	0.00915467	0.0092091	0.00949136	0.0094988
65	apr	116.9	0.008972	0.009024	0.00917496	0.00920994	0.00958609	0.00958171
66	may	130.5	0.009531	0.009682	0.00947117	0.00954293	0.00973035	0.00969765
67	jun	123.4	0.009022	0.008924	0.00970441	0.00971995	0.00978279	0.00970168
68	jul	129.1	0.009861	0.010023	0.00998448	0.00998019		
69	aug	135.8	0.010231	0.010213	0.00990574	0.00980642		
70	sep	122.4	0.009862	0.009704	0.00982275	0.00968053		
71	oct	126.2	0.009624	0.009502	0.00983468	0.00968247		
72	nov	107.2	0.009982	0.009836				
73	dec	92.8	0.009898	0.00971				

IRREGULAR VARIATIONS GRAPH:



By using the linear regression we predict the values for 1996

Linear regression equation $y = a + b * x$

$y = 88.1225 + 0.4414 * 73 = 87.63672$

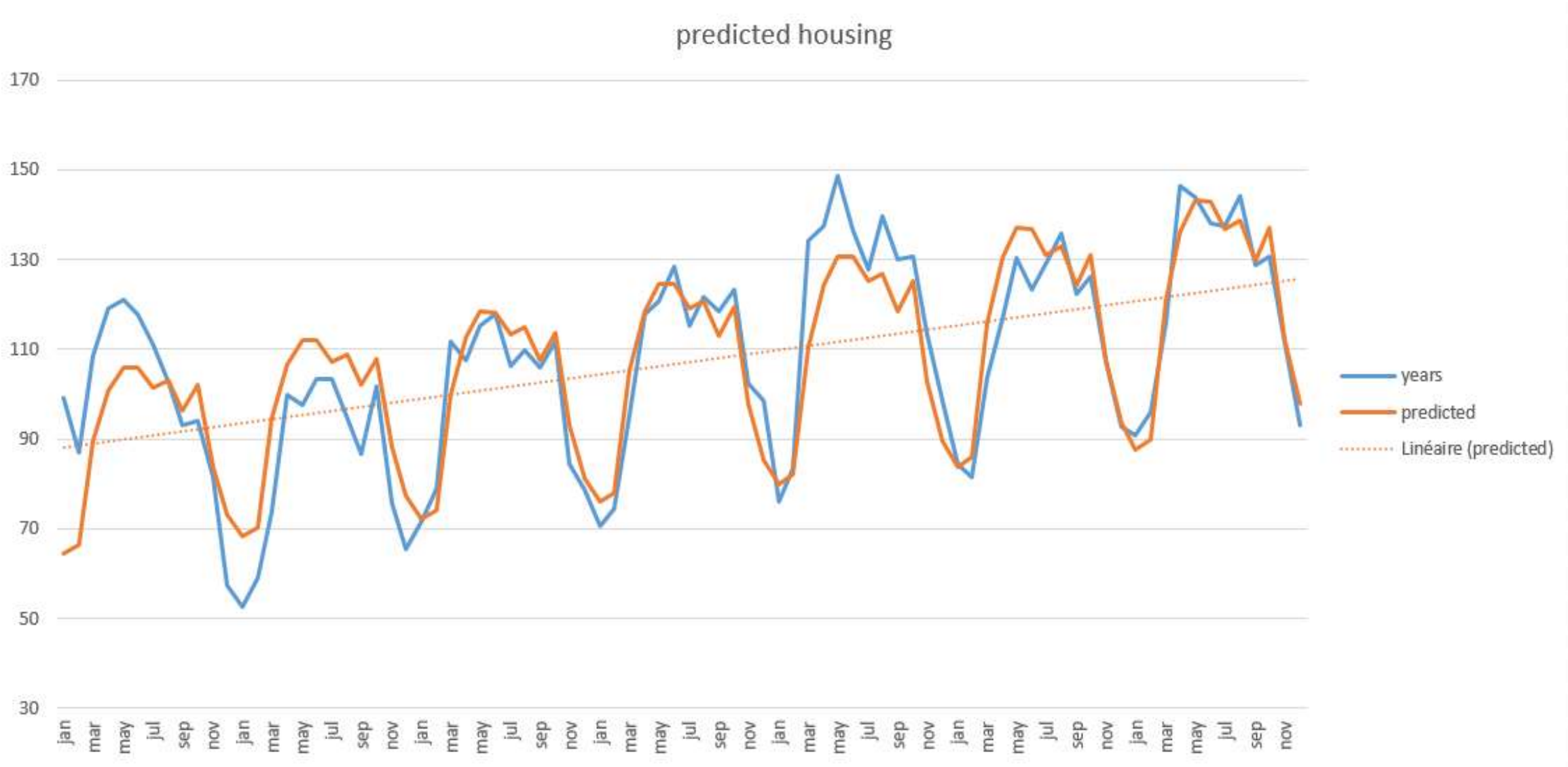
In the same way, we will predict all the values for every month of the year 1996

	A	B	C	D	E	F
1	num	months	years	adj_mean	trend	predicted
2	1	jan	99.2	72.8184084	88.563988	64.49089
3	2	feb	86.9	74.4684688	89.005456	66.281
4	3	mar	108.5	99.9569734	89.446924	89.40844
5	4	apr	119	112.01094	89.888392	100.6848
6	5	may	121.1	117.263211	90.32986	105.9237
7	6	jun	117.8	116.69731	90.771328	105.9277
8	7	jul	111.2	111.287222	91.212796	101.5082
9	8	aug	102.8	112.406072	91.654264	103.025
10	9	sep	93.1	104.708411	92.095732	96.43198
11	10	oct	94.2	110.21779	92.5372	101.9925
12	11	nov	81.4	89.9386002	92.978668	83.62371
13	12	dec	57.4	78.2265378	93.420136	73.07934
14	13	jan	52.5		93.861604	68.34853
15	14	feb	59.1		94.303072	70.22605
16	15	mar	73.8		94.74454	94.70377
17	16	apr	99.7		95.186008	106.6187
18	17	may	97.7		95.627476	112.1358
19	18	jun	103.4		96.068944	112.1099
20	19	jul	103.5		96.510412	107.4038
21	20	aug	94.7		96.95188	108.9798
22	21	sep	86.6		97.393348	101.979
23	22	oct	101.8		97.834816	107.8314
24	23	nov	75.6		98.276284	88.38831
25	24	dec	65.6		98.717752	77.22348
26	25	jan	71.6		99.15922	72.20617
27	26	feb	78.8		99.600688	74.17111
28	27	mar	111.6		100.042156	99.99911
29	28	apr	107.6		100.483624	112.5527
30	29	may	115.2		100.925092	118.348
31	30	jun	117.8		101.36656	118.292
32	31	jul	106.2		101.808028	113.2993

	A	B	C	D	E
33	aug	109.9		102.249496	114.9346
34	sep	106		102.690964	107.5261
35	oct	111.8		103.132432	113.6703
36	nov	84.5		103.5739	93.15292
37	dec	78.6		104.015368	81.36762
38	jan	70.5		104.456836	76.06381
39	feb	74.6		104.898304	78.11616
40	mar	95.5		105.339772	105.2944
41	apr	117.8		105.78124	118.4866
42	may	120.9		106.222708	124.5602
43	jun	128.5		106.664176	124.4742
44	jul	115.3		107.105644	119.1949
45	aug	121.8		107.547112	120.8895
46	sep	118.5		107.98858	113.0731
47	oct	123.2		108.430048	119.5092
48	nov	102.3		108.871516	97.91752
49	dec	98.7		109.312984	85.51176
50	jan	76.2		109.754452	79.92145
51	feb	83.5		110.19592	82.06121
52	mar	134.3		110.637388	110.5898
53	apr	137.6		111.078856	124.4205
54	may	148.8		111.520324	130.7723
55	jun	136.4		111.961792	130.6564
56	jul	127.8		112.40326	125.0905
57	aug	139.8		112.844728	126.8443
58	sep	130.1		113.286196	118.6202
59	oct	130.6		113.727664	125.3481
60	nov	113.4		114.169132	102.6821
61	dec	98.5		114.6106	89.6559
62	jan	84.5		115.052068	83.77908
63	feb	81.6		115.493536	86.00627
64	mar	103.8		115.935004	115.8851

65	apr	116.9		116.376472	130.3544
66	may	130.5		116.81794	136.9845
67	jun	123.4		117.259408	136.8386
68	jul	129.1		117.700876	130.986
69	aug	135.8		118.142344	132.7992
70	sep	122.4		118.583812	124.1672
71	oct	126.2		119.02528	131.187
72	nov	107.2		119.466748	107.4467
73	dec	92.8		119.908216	93.80005
74	jan	90.7		120.349684	87.63672
75	feb	95.9		120.791152	89.95132
76	mar	116		121.23262	121.1805
77	apr	146.6		121.674088	136.2883
78	may	143.9		122.115556	143.1966
79	jun	138		122.557024	143.0208
80	jul	137.5		122.998492	136.8816
81	aug	144.2		123.43996	138.754
82	sep	128.7		123.881428	129.7143
83	oct	130.8		124.322896	137.0259
84	nov	111.5		124.764364	112.2113
85	dec	93.1		125.205832	97.94419

INITIAL DATA AND PREDICTED VALUES GRAPH FROM 1990 TO 1996:



PERCENTAGE OR RATIO TO TREND METHOD

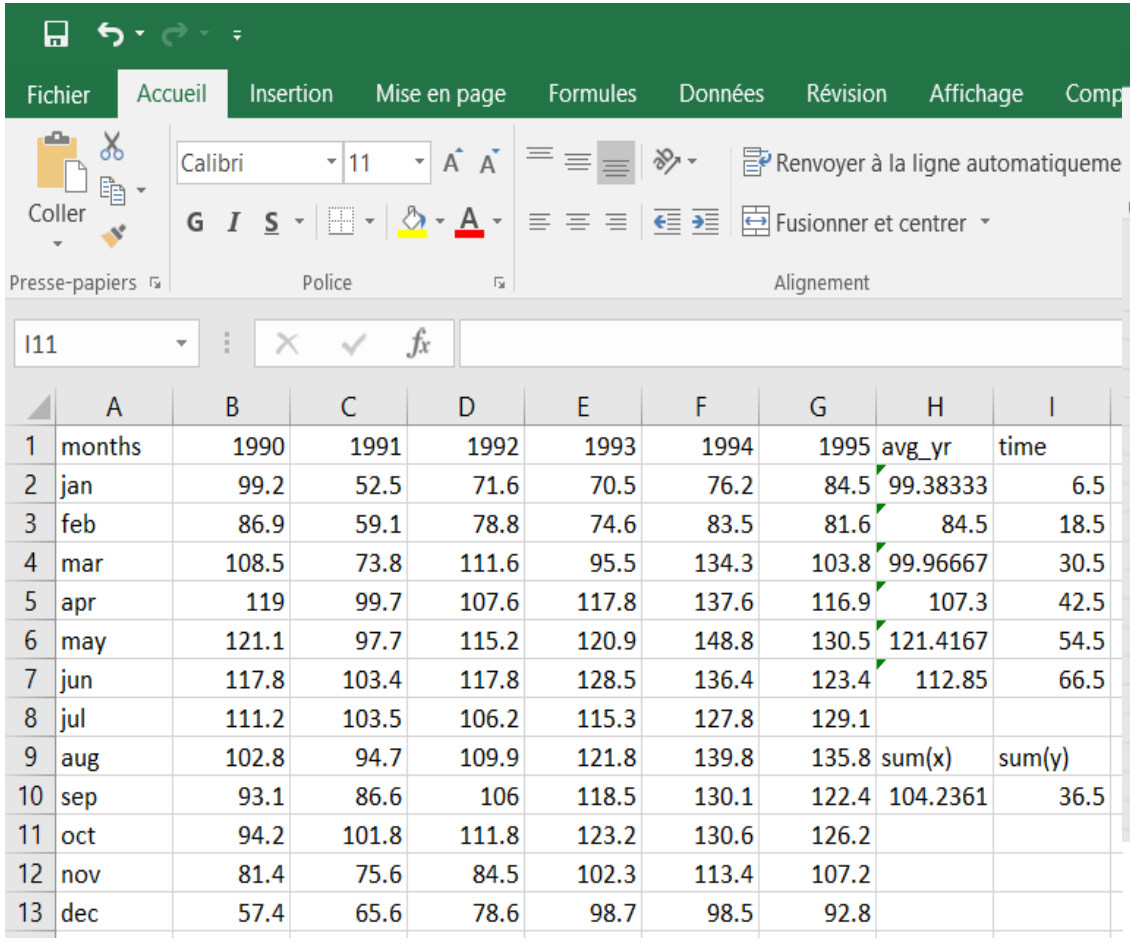
In this method we express the data for each month as percentage of monthly trend values.

For initial data we apply the monthly averages and compute the data for each month as percentage of the average of the year and time

=average(b2:b13)

=98.38333

In the same way,we calculate average for every year



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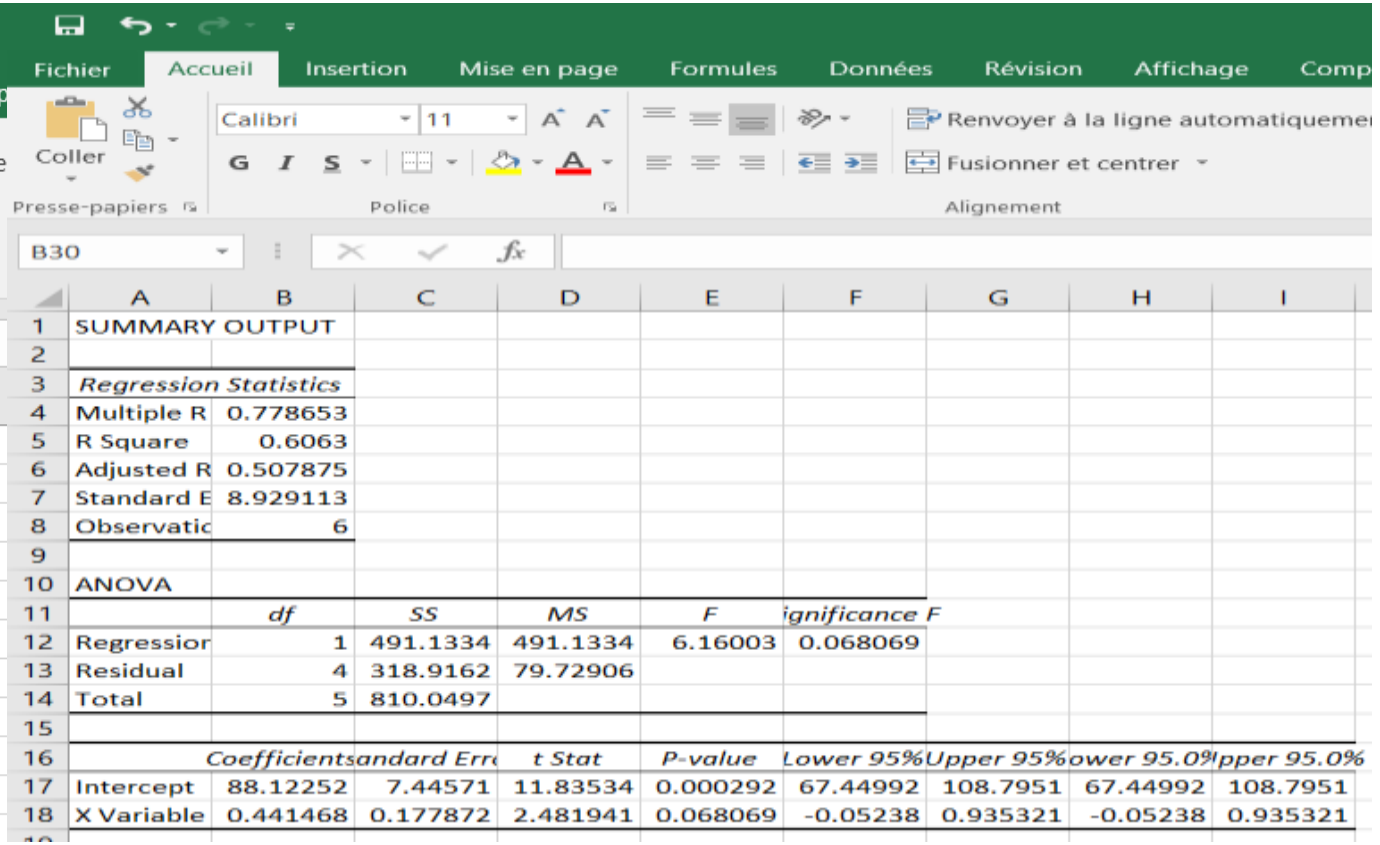
I11

	A	B	C	D	E	F	G	H	I
1	months	1990	1991	1992	1993	1994	1995	avg_yr	time
2	jan	99.2	52.5	71.6	70.5	76.2	84.5	99.38333	6.5
3	feb	86.9	59.1	78.8	74.6	83.5	81.6	84.5	18.5
4	mar	108.5	73.8	111.6	95.5	134.3	103.8	99.96667	30.5
5	apr	119	99.7	107.6	117.8	137.6	116.9	107.3	42.5
6	may	121.1	97.7	115.2	120.9	148.8	130.5	121.4167	54.5
7	jun	117.8	103.4	117.8	128.5	136.4	123.4	112.85	66.5
8	jul	111.2	103.5	106.2	115.3	127.8	129.1		
9	aug	102.8	94.7	109.9	121.8	139.8	135.8	sum(x)	sum(y)
10	sep	93.1	86.6	106	118.5	130.1	122.4	104.2361	36.5
11	oct	94.2	101.8	111.8	123.2	130.6	126.2		
12	nov	81.4	75.6	84.5	102.3	113.4	107.2		
13	dec	57.4	65.6	78.6	98.7	98.5	92.8		



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B30

	A	B	C	D	E	F	G	H	I
1	SUMMARY OUTPUT								
2									
3	*Regression Statistics*								
4	Multiple R	0.778653							
5	R Square	0.6063							
6	Adjusted R	0.507875							
7	Standard E	8.929113							
8	Observatic	6							
9									
10	ANOVA								
11		*df*	*SS*	*MS*	*F*	*ignificance F*			
12	Regressior	1	491.1334	491.1334	6.16003	0.068069			
13	Residual	4	318.9162	79.72906					
14	Total	5	810.0497						
15									
16		*Coefficients*	*tandard Erı*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
17	Intercept	88.12252	7.44571	11.83534	0.000292	67.44992	108.7951	67.44992	108.7951
18	X Variable	0.441468	0.177872	2.481941	0.068069	-0.05238	0.935321	-0.05238	0.935321

Using data analysis tool in excel we calculate linear regression using average(years) and time
We obtain intercept and x variable a = 88.1225 b = 0.4414
Using these values a and b from eqauation y = a + b * x we find y = 88.1225 + 0.4414 * x

eq_1990	eq_1991	eq_1992	eq_1993	eq_1994	eq_1995
88.56399	93.8616	99.15922	104.4568	109.7545	115.0521
89.00546	94.30307	99.60069	104.8983	110.1959	115.4935
89.44692	94.74454	100.0422	105.3398	110.6374	115.935
89.88839	95.18601	100.4836	105.7812	111.0789	116.3765
90.32986	95.62748	100.9251	106.2227	111.5203	116.8179
90.77133	96.06894	101.3666	106.6642	111.9618	117.2594
91.2128	96.51041	101.808	107.1056	112.4033	117.7009
91.65426	96.95188	102.2495	107.5471	112.8447	118.1423
92.09573	97.39335	102.691	107.9886	113.2862	118.5838
92.5372	97.83482	103.1324	108.43	113.7277	119.0253
92.97867	98.27628	103.5739	108.8715	114.1691	119.4667
93.42014	98.71775	104.0154	109.313	114.6106	119.9082

In this method we compute the data for each month as percentage of monthly trend values
we find The percentage or ratio to trend method as below
= initial_data / linear_eq_value * 100
=99.2/88.541*100=112.0385

Similarly ,for every month of every year we will find values

	A	B	C	D	E	F
1	%_1990	%_1991	%_1992	%_1993	%_1994	%_1995
2	112.0094	55.93341	72.2071	67.49199	69.42771	73.44501
3	97.63446	62.67028	79.11592	71.1165	75.77413	70.6533
4	121.301	77.89367	111.553	90.65902	121.3875	89.53292
5	132.3864	104.7423	107.0821	111.3619	123.876	100.4499
6	134.0642	102.1673	114.1441	113.8175	133.4286	111.7123
7	129.7767	107.631	116.2119	120.4716	121.8273	105.2368
8	121.9127	107.2423	104.314	107.6507	113.6978	109.6848
9	112.1606	97.67732	107.4822	113.2527	123.887	114.9461
10	101.0905	88.91778	103.2223	109.7338	114.8419	103.2181
11	101.7969	104.0529	108.4043	113.6216	114.8357	106.0279
12	87.54696	76.92599	81.58426	93.96397	99.32632	89.73208
13	61.44286	66.45208	75.56576	90.2912	85.94319	77.39253

we calculate the mean and median

mean = average(A2:F2) =75.08577

Adjusted mean = percentage of tot_mon of year / sum of mean * mean =1200/1200.455*75.11214=75.08367

Median = median(A2:F2)=70.81741

Adjusted median = percentage of tot_mon of year / sum of median * median=1200/1184.304*70.84425=71.78317

Similarly, we will find remaining values

	A	B	C	D	E	F	G	H	I	J	K
1	%_1990	%_1991	%_1992	%_1993	%_1994	%_1995	mean	median		adj_mean	adj_median
2	112.0094	55.93341	72.2071	67.49199	69.42771	73.44501	75.08577	70.81741		75.0854	71.75597
3	97.63446	62.67028	79.11592	71.1165	75.77413	70.6533	76.16077	73.44531		76.16039	74.41871
4	121.301	77.89367	111.553	90.65902	121.3875	89.53292	102.0545	101.106		102.054	102.446
5	132.3864	104.7423	107.0821	111.3619	123.876	100.4499	113.3164	109.222		113.3159	110.6696
6	134.0642	102.1673	114.1441	113.8175	133.4286	111.7123	118.2223	113.9808		118.2217	115.4914
7	129.7767	107.631	116.2119	120.4716	121.8273	105.2368	116.8592	118.3417		116.8586	119.9102
8	121.9127	107.2423	104.314	107.6507	113.6978	109.6848	110.7504	108.6678		110.7498	110.108
9	112.1606	97.67732	107.4822	113.2527	123.887	114.9461	111.5677	112.7067		111.5671	114.2004
10	101.0905	88.91778	103.2223	109.7338	114.8419	103.2181	103.5041	103.2202		103.5036	104.5882
11	101.7969	104.0529	108.4043	113.6216	114.8357	106.0279	108.1232	107.2161		108.1227	108.6371
12	87.54696	76.92599	81.58426	93.96397	99.32632	89.73208	88.17993	88.63952		88.17949	89.81429
13	61.44286	66.45208	75.56576	90.2912	85.94319	77.39253	76.18127	76.47914		76.18089	77.49275
14											
15											
16					tot_mon%		sum	sum			
17					1200		1200.006	1183.843		1200	

DESEASONALIZATION OF DATA:

Deaseasonalisation using seasonal index of Adjusted mean

Y / S1 = initial_data / Adusted_mean

Similarly, for all records of 72 months from 1990 to 1995 we calculate the values

Deaseasonalisation using seasonal index of Adjusted median

Y / S2 = initial_data / Adusted_median

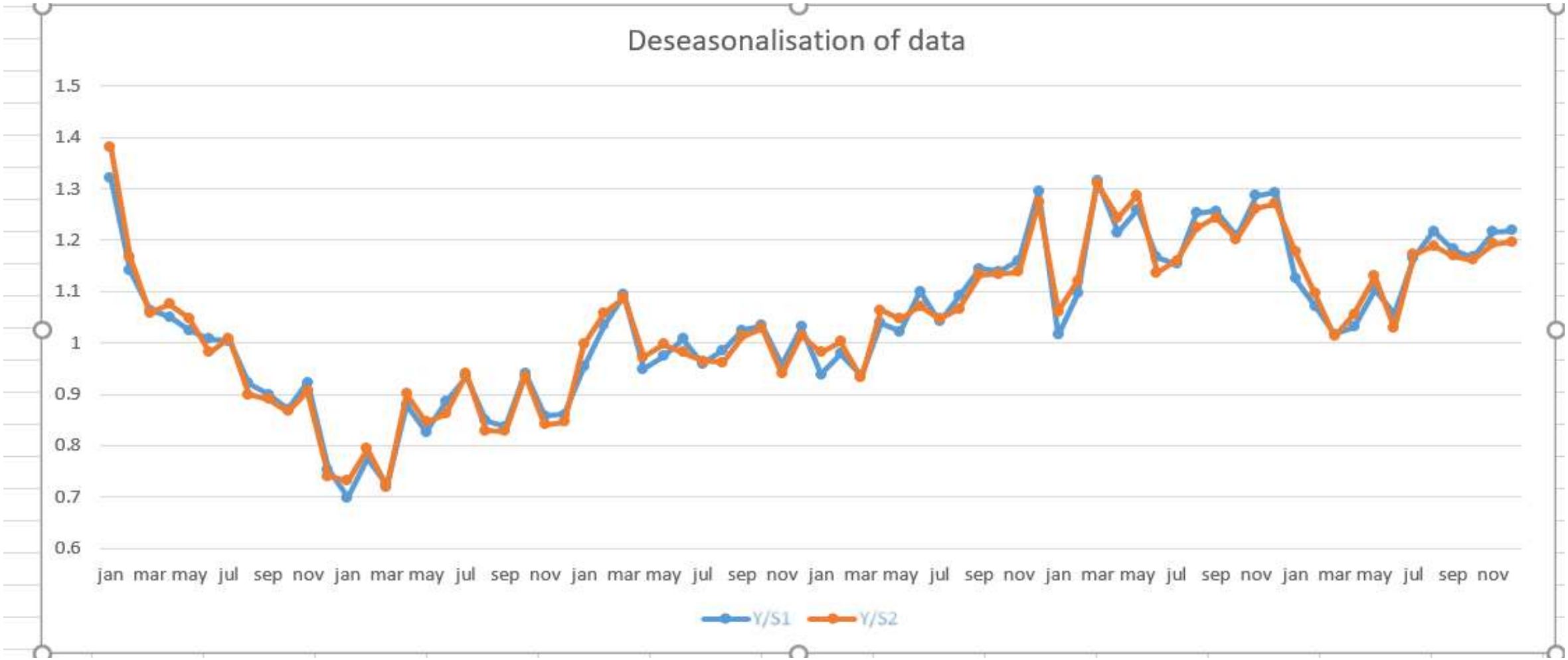
Similarly for all records of 72 months from 1990 to 1995 we calculate the values

	A	B	C	D
1	months	years	Y/S1	Y/S2
2	jan	99.2	1.3	1.4
3	feb	86.9	1.1	1.2
4	mar	108.5	1.1	1.1
5	apr	119	1.1	1.1
6	may	121.1	1	1
7	jun	117.8	1	1
8	jul	111.2	1	1
9	aug	102.8	0.9	0.9
10	sep	93.1	0.9	0.9
11	oct	94.2	0.9	0.9
12	nov	81.4	0.9	0.9
13	dec	57.4	0.8	0.7
14	jan	52.5	0.7	0.7
15	feb	59.1	0.8	0.8
16	mar	73.8	0.7	0.7
17	apr	99.7	0.9	0.9
18	may	97.7	0.8	0.8
19	jun	103.4	0.9	0.9
20	jul	103.5	0.9	0.9
21	aug	94.7	0.8	0.8
22	sep	86.6	0.8	0.8
23	oct	101.8	0.9	0.9
24	nov	75.6	0.9	0.8
25	dec	65.6	0.9	0.8
26	jan	71.6	1	1
27	feb	78.8	1	1.1
28	mar	111.6	1.1	1.1
29	apr	107.6	0.9	1

	A	B	C	D
30	may	115.2	1	1
31	jun	117.8	1	1
32	jul	106.2	1	1
33	aug	109.9	1	1
34	sep	106	1	1
35	oct	111.8	1	1
36	nov	84.5	1	0.9
37	dec	78.6	1	1
38	jan	70.5	0.9	1
39	feb	74.6	1	1
40	mar	95.5	0.9	0.9
41	apr	117.8	1	1.1
42	may	120.9	1	1
43	jun	128.5	1.1	1.1
44	jul	115.3	1	1
45	aug	121.8	1.1	1.1
46	sep	118.5	1.1	1.1
47	oct	123.2	1.1	1.1
48	nov	102.3	1.2	1.1
49	dec	98.7	1.3	1.3
50	jan	76.2	1	1.1
51	feb	83.5	1.1	1.1
52	mar	134.3	1.3	1.3
53	apr	137.6	1.2	1.2
54	may	148.8	1.3	1.3
55	jun	136.4	1.2	1.1
56	jul	127.8	1.2	1.2
57	aug	139.8	1.3	1.2
58	sep	130.1	1.3	1.2

	A	B	C	D
58	sep	130.1	1.3	1.2
59	oct	130.6	1.2	1.2
60	nov	113.4	1.3	1.3
61	dec	98.5	1.3	1.3
62	jan	84.5	1.1	1.2
63	feb	81.6	1.1	1.1
64	mar	103.8	1	1
65	apr	116.9	1	1.1
66	may	130.5	1.1	1.1
67	jun	123.4	1.1	1
68	jul	129.1	1.2	1.2
69	aug	135.8	1.2	1.2
70	sep	122.4	1.2	1.2
71	oct	126.2	1.2	1.2
72	nov	107.2	1.2	1.2
73	dec	92.8	1.2	1.2

DESEASONALIZATION OF DATA GRAPH:



CYCLICAL FLUCTUATIONS:

Recurring up and down movements with respect to trend that have a duration of several years.

Their study is obtained after the detrading

$$Y / S \times T = C \times I$$

We compute the cyclical fluctuations by

C=deseasionalization data/linear_eq_value

Similarly , we calculate all the values

esse-papiers | Police

A1 | months

	A	B	C	D
	months	years	Y/(S1 * T)	Y/(S2 * T)
2	jan	99.2	0.01539	0.016289
3	feb	86.9	0.01311	0.013707
4	mar	108.5	0.01214	0.012043
5	apr	119	0.01182	0.01185
6	may	121.1	0.01144	0.011577
7	jun	117.8	0.01112	0.010965
8	jul	111.2	0.01096	0.0111
9	aug	102.8	0.00998	0.00993
10	sep	93.1	0.00966	0.00947
11	oct	94.2	0.00924	0.00909
12	nov	81.4	0.00974	0.009561
13	dec	57.4	0.00786	0.007681
14	jan	52.5	0.00768	0.008134
15	feb	59.1	0.00842	0.008799
16	mar	73.8	0.0078	0.007734
17	apr	99.7	0.00935	0.009376
18	may	97.7	0.00872	0.008823
19	jun	103.4	0.00923	0.009094
20	jul	103.5	0.00964	0.009765
21	aug	94.7	0.00869	0.008648
22	sep	86.6	0.00849	0.00833
23	oct	101.8	0.00944	0.009291
24	nov	75.6	0.00856	0.008402
25	dec	65.6	0.0085	0.008308
26	jan	71.6	0.00992	0.010502
27	feb	78.8	0.01063	0.011108
28	mar	111.6	0.01116	0.011076
29	apr	107.6	0.00956	0.009586

Graphique 3

	A	B	C	D
30	may	115.2	0.00974	0.009858
31	jun	117.8	0.00996	0.00982
32	jul	106.2	0.00938	0.009498
33	aug	109.9	0.00957	0.009516
34	sep	106	0.00986	0.009671
35	oct	111.8	0.00984	0.00968
36	nov	84.5	0.00907	0.008911
37	dec	78.6	0.00966	0.009448
38	jan	70.5	0.00927	0.009816
39	feb	74.6	0.00955	0.009986
40	mar	95.5	0.00907	0.009002
41	apr	117.8	0.00995	0.009969
42	may	120.9	0.00971	0.00983
43	jun	128.5	0.01033	0.01018
44	jul	115.3	0.00968	0.009803
45	aug	121.8	0.01008	0.010028
46	sep	118.5	0.01048	0.010281
47	oct	123.2	0.01031	0.010147
48	nov	102.3	0.01045	0.010263
49	dec	98.7	0.01155	0.011289
50	jan	76.2	0.00954	0.010098
51	feb	83.5	0.01018	0.01064
52	mar	134.3	0.01215	0.012053
53	apr	137.6	0.01106	0.01109
54	may	148.8	0.01138	0.011524
55	jun	136.4	0.01044	0.010295
56	jul	127.8	0.01022	0.010354
57	aug	139.8	0.01103	0.01097
58	sep	130.1	0.01097	0.01076

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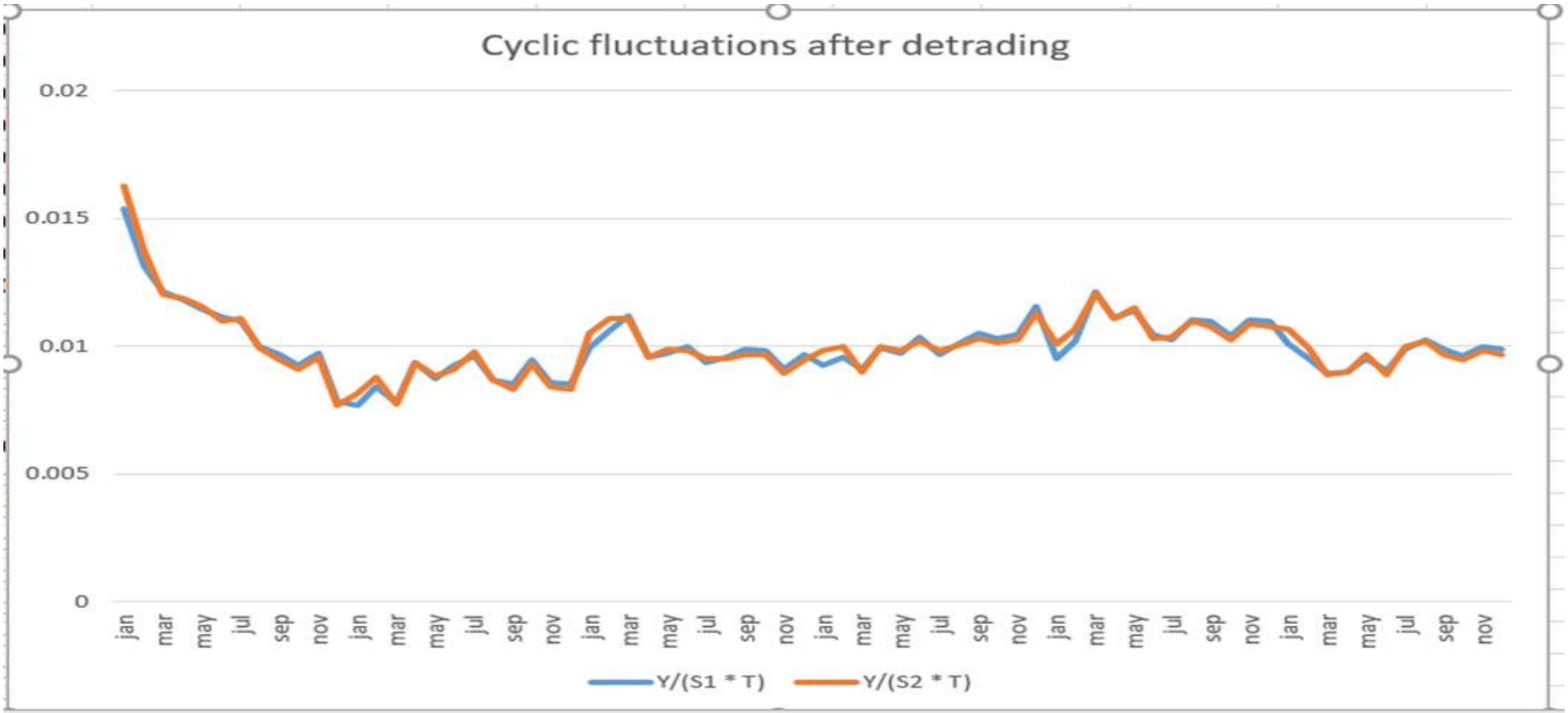
D87

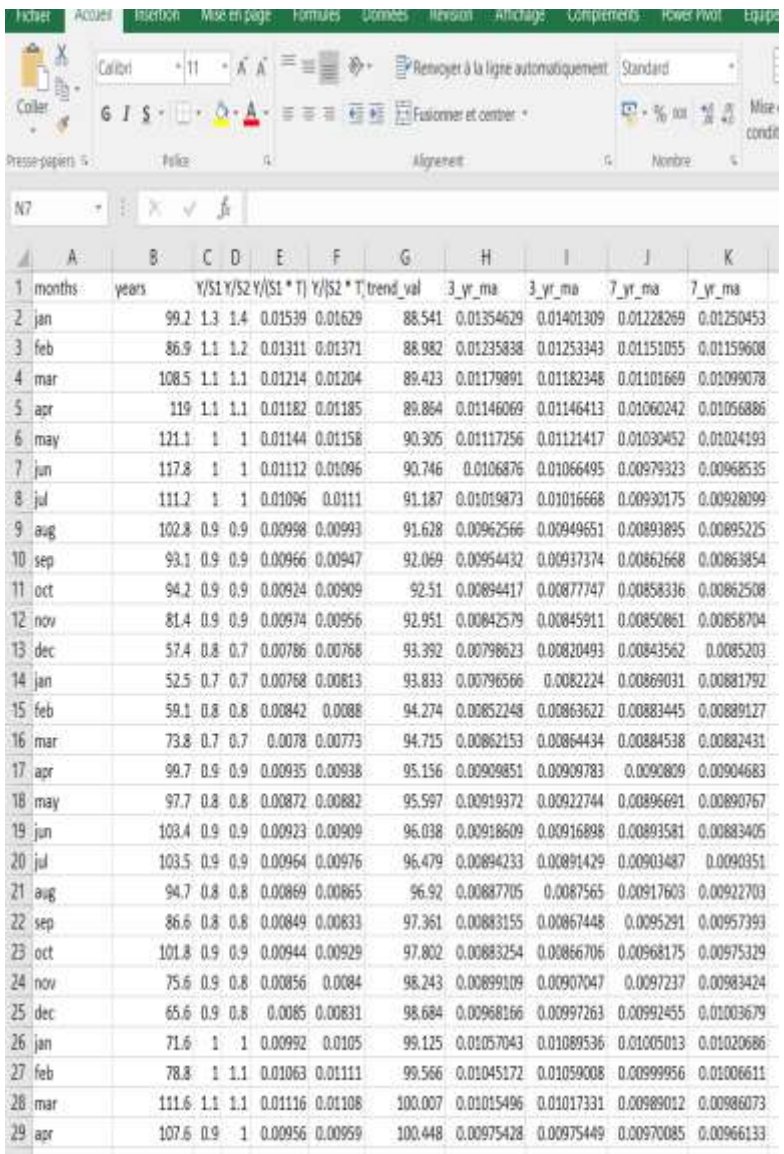
	A	B	C	D
59	oct	130.6	0.01042	0.010255
60	nov	113.4	0.01105	0.010849
61	dec	98.5	0.01099	0.010746
62	jan	84.5	0.01009	0.010683
63	feb	81.6	0.00949	0.009921
64	mar	103.8	0.00896	0.008891
65	apr	116.9	0.00897	0.008993
66	may	130.5	0.00953	0.009649
67	jun	123.4	0.00902	0.008893
68	jul	129.1	0.00986	0.009988
69	aug	135.8	0.01023	0.010178
70	sep	122.4	0.00986	0.009671
71	oct	126.2	0.00962	0.009469
72	nov	107.2	0.00998	0.009802
73	dec	92.8	0.0099	0.009677

CYCLIC FLUCTUATIONS GRAPH:

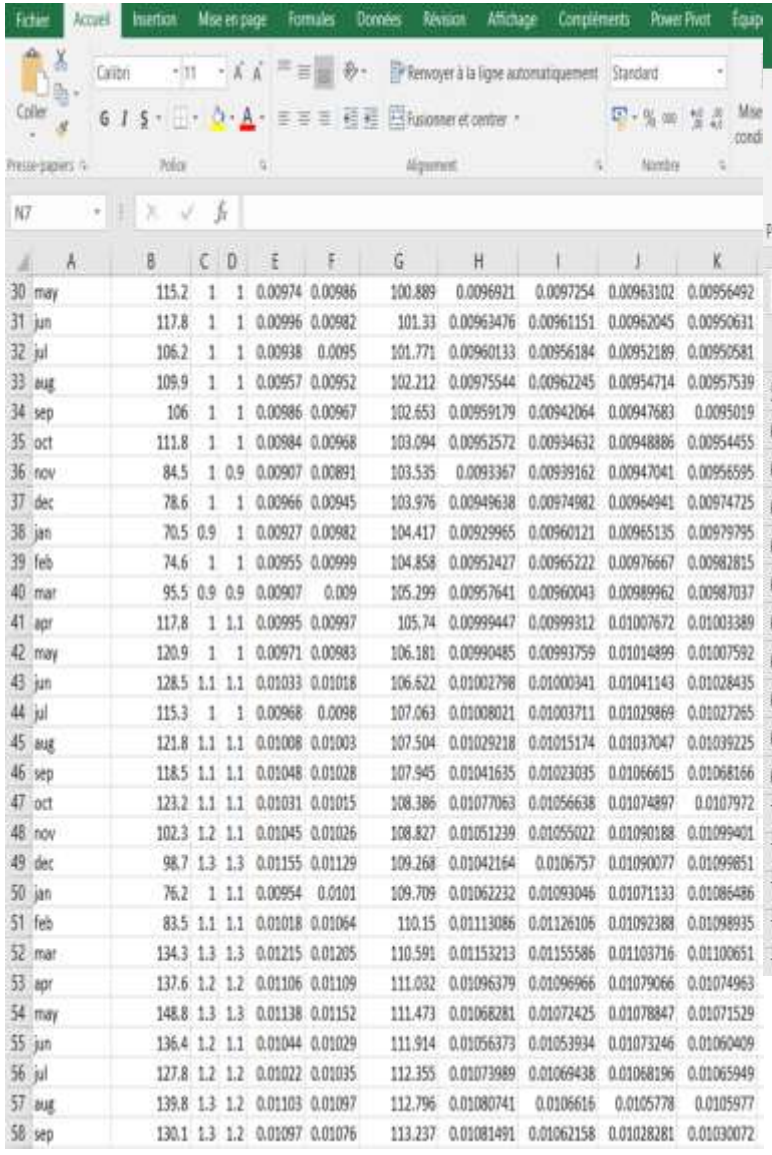


IRREGULAR VARIATIONS:

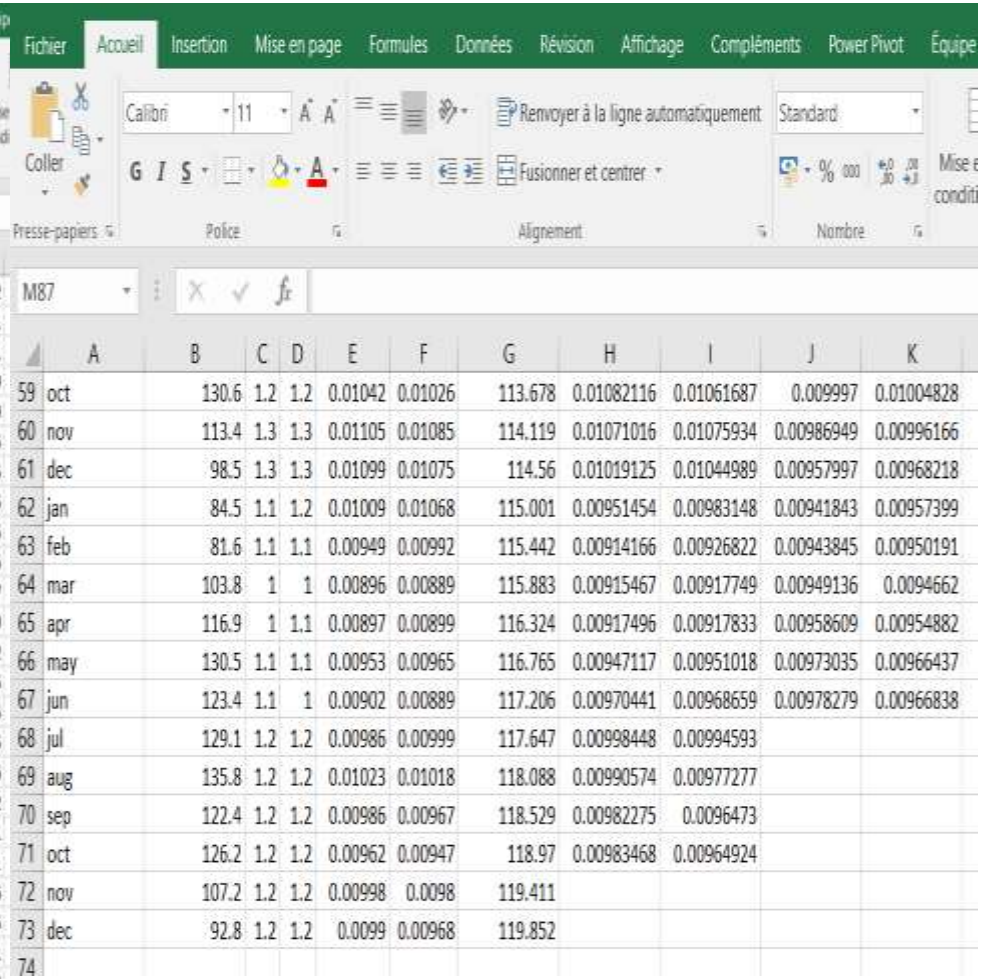
The erratic variations from trend that cannot be ascribed to the cyclical or seasonal influences. You can study them by appropriate moving averages



	A	B	C	D	E	F	G	H	I	J	K
1	months	years	Y/S1	Y/S2	Y/(S1 * T)	Y/(S2 * T)	trend_val	3_yr_ma	3_yr_ma	7_yr_ma	7_yr_ma
2	jan	99.2	1.3	1.4	0.01539	0.01629	88.541	0.01354629	0.01401309	0.01228269	0.01250453
3	feb	86.9	1.1	1.2	0.01311	0.01371	88.982	0.01235838	0.01253343	0.01151055	0.01159608
4	mar	108.5	1.1	1.1	0.01214	0.01204	89.423	0.01179891	0.01182348	0.01101669	0.01099078
5	apr	119	1.1	1.1	0.01182	0.01185	89.864	0.01146069	0.01146413	0.01060242	0.01056886
6	may	121.1	1	1	0.01144	0.01158	90.305	0.01117256	0.01121417	0.01030452	0.01024193
7	jun	117.8	1	1	0.01112	0.01096	90.746	0.0106876	0.01066495	0.00979323	0.00968535
8	jul	111.2	1	1	0.01096	0.0111	91.187	0.01019873	0.01016668	0.00930175	0.00928099
9	aug	102.8	0.9	0.9	0.00998	0.00993	91.628	0.00962566	0.00949651	0.00893895	0.00895225
10	sep	93.1	0.9	0.9	0.00966	0.00947	92.069	0.00954432	0.00937374	0.00862668	0.00863854
11	oct	94.2	0.9	0.9	0.00924	0.00909	92.51	0.00894417	0.00877747	0.00858336	0.00862508
12	nov	81.4	0.9	0.9	0.00974	0.00956	92.951	0.00842579	0.00845911	0.00850861	0.00858704
13	dec	57.4	0.8	0.7	0.00786	0.00768	93.392	0.00798623	0.00820493	0.00843562	0.0085203
14	jan	52.5	0.7	0.7	0.00768	0.00813	93.833	0.00796566	0.0082224	0.00869031	0.00881792
15	feb	59.1	0.8	0.8	0.00842	0.0088	94.274	0.00852248	0.00863622	0.00883445	0.00889127
16	mar	73.8	0.7	0.7	0.0078	0.00773	94.715	0.00862153	0.00864434	0.00884538	0.00882431
17	apr	99.7	0.9	0.9	0.00935	0.00938	95.156	0.00909851	0.00909783	0.0090809	0.00904683
18	may	97.7	0.8	0.8	0.00872	0.00882	95.597	0.00919372	0.00922744	0.00896691	0.00890767
19	jun	103.4	0.9	0.9	0.00923	0.00909	96.038	0.00918609	0.00916898	0.00893581	0.00883405
20	jul	103.5	0.9	0.9	0.00964	0.00976	96.479	0.00894233	0.00891429	0.00903487	0.0090351
21	aug	94.7	0.8	0.8	0.00869	0.00865	96.92	0.00887705	0.0087565	0.00917603	0.00922703
22	sep	86.6	0.8	0.8	0.00849	0.00833	97.361	0.00883155	0.00867448	0.0095291	0.00957393
23	oct	101.8	0.9	0.9	0.00944	0.00929	97.802	0.00883254	0.00866706	0.00968175	0.00975329
24	nov	75.6	0.9	0.8	0.00856	0.0084	98.243	0.00899109	0.00907047	0.0097237	0.00983424
25	dec	65.6	0.9	0.8	0.0085	0.00831	98.684	0.00968166	0.00997263	0.00992455	0.01003679
26	jan	71.6	1	1	0.00992	0.0105	99.125	0.01057043	0.01089536	0.01005013	0.01020686
27	feb	78.8	1	1.1	0.01063	0.01111	99.566	0.01045172	0.01059008	0.00999956	0.01006611
28	mar	111.6	1.1	1.1	0.01116	0.01108	100.007	0.01015496	0.01017331	0.00989012	0.00986073
29	apr	107.6	0.9	1	0.00956	0.00959	100.448	0.00975428	0.00975449	0.00970085	0.00966133

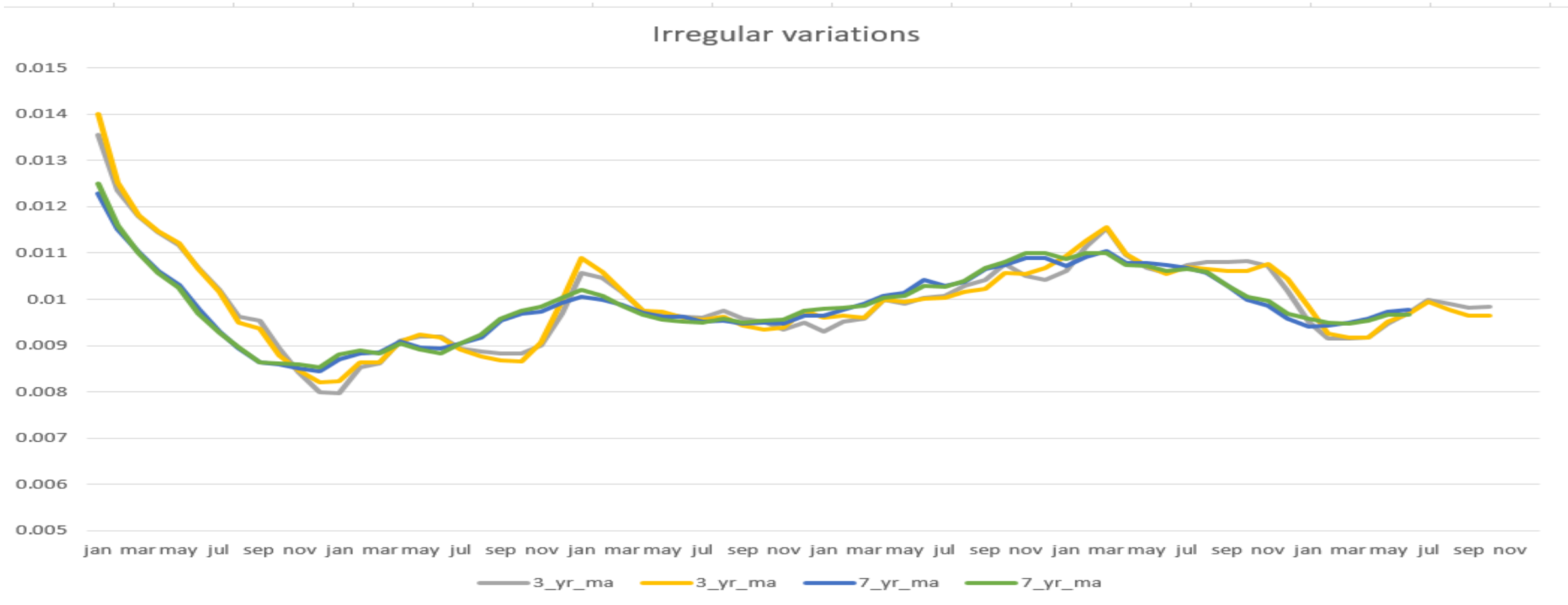


	A	B	C	D	E	F	G	H	I	J	K
30	may	115.2	1	1	0.00974	0.00986	100.889	0.0096921	0.0097254	0.00963102	0.00956492
31	jun	117.8	1	1	0.00996	0.00982	101.33	0.00963476	0.00961151	0.00962045	0.00950631
32	jul	106.2	1	1	0.00938	0.0095	101.771	0.00960133	0.00956184	0.00952189	0.00950581
33	aug	109.9	1	1	0.00957	0.00952	102.212	0.00975544	0.00962245	0.00954714	0.00957539
34	sep	106	1	1	0.00986	0.00967	102.653	0.00959179	0.00942064	0.00947683	0.0095019
35	oct	111.8	1	1	0.00984	0.00968	103.094	0.00952572	0.00934632	0.00948886	0.00954455
36	nov	84.5	1	0.9	0.00907	0.00891	103.535	0.0093367	0.00939162	0.00947041	0.00956595
37	dec	78.6	1	1	0.00966	0.00945	103.976	0.00949638	0.00974982	0.00964941	0.00974725
38	jan	70.5	0.9	1	0.00927	0.00982	104.417	0.00929965	0.00960121	0.00965135	0.00979795
39	feb	74.6	1	1	0.00955	0.00999	104.858	0.00952427	0.00965222	0.00976667	0.00982815
40	mar	95.5	0.9	0.9	0.00907	0.009	105.299	0.00957641	0.00960043	0.00989962	0.00987037
41	apr	117.8	1	1.1	0.00995	0.00997	105.74	0.00999447	0.00999312	0.01007672	0.01003389
42	may	120.9	1	1	0.00971	0.00983	106.181	0.00990485	0.00993759	0.01014899	0.01007592
43	jun	128.5	1.1	1.1	0.01033	0.01018	106.622	0.01002798	0.01000341	0.01041143	0.01028435
44	jul	115.3	1	1	0.00968	0.0098	107.063	0.01008021	0.01003711	0.01029869	0.01027265
45	aug	121.8	1.1	1.1	0.01008	0.01003	107.504	0.01029218	0.01015174	0.01037047	0.01039225
46	sep	118.5	1.1	1.1	0.01048	0.01028	107.945	0.01041635	0.01023035	0.01066615	0.01068166
47	oct	123.2	1.1	1.1	0.01031	0.01015	108.386	0.01077063	0.01056638	0.01074897	0.0107972
48	nov	102.3	1.2	1.1	0.01045	0.01026	108.827	0.01051239	0.01055022	0.01090188	0.01099401
49	dec	98.7	1.3	1.3	0.01155	0.01129	109.268	0.01042164	0.0106757	0.01090077	0.01099851
50	jan	76.2	1	1.1	0.00954	0.0101	109.709	0.01062232	0.01093046	0.01071133	0.01086486
51	feb	83.5	1.1	1.1	0.01018	0.01064	110.15	0.01113086	0.01126106	0.01092388	0.01098935
52	mar	134.3	1.3	1.3	0.01215	0.01205	110.591	0.01153213	0.01155586	0.01103716	0.01100651
53	apr	137.6	1.2	1.2	0.01106	0.01109	111.032	0.01096379	0.01096966	0.01079066	0.01074963
54	may	148.8	1.3	1.3	0.01138	0.01152	111.473	0.01068281	0.01072425	0.01078847	0.01071529
55	jun	136.4	1.2	1.1	0.01044	0.01029	111.914	0.01056373	0.01053934	0.01073246	0.01060409
56	jul	127.8	1.2	1.2	0.01022	0.01035	112.355	0.01073989	0.01069438	0.01068196	0.01065949
57	aug	139.8	1.3	1.2	0.01103	0.01097	112.796	0.01080741	0.0106616	0.0105778	0.0105977
58	sep	130.1	1.3	1.2	0.01097	0.01076	113.237	0.01081491	0.01062158	0.01028281	0.01030072



	A	B	C	D	E	F	G	H	I	J	K
59	oct	130.6	1.2	1.2	0.01042	0.01026	113.678	0.01082116	0.01061687	0.009997	0.01004828
60	nov	113.4	1.3	1.3	0.01105	0.01085	114.119	0.01071016	0.01075934	0.00986949	0.00996166
61	dec	98.5	1.3	1.3	0.01099	0.01075	114.56	0.01019125	0.01044989	0.00957997	0.00968218
62	jan	84.5	1.1	1.2	0.01009	0.01068	115.001	0.00951454	0.00983148	0.00941843	0.00957399
63	feb	81.6	1.1	1.1	0.00949	0.00992	115.442	0.00914166	0.00926822	0.00943845	0.00950191
64	mar	103.8	1	1	0.00896	0.00889	115.883	0.00915467	0.00917749	0.00949136	0.0094662
65	apr	116.9	1	1.1	0.00897	0.00899	116.324	0.00917496	0.00917833	0.00958609	0.00954882
66	may	130.5	1.1	1.1	0.00953	0.00965	116.765	0.00947117	0.00951018	0.00973035	0.00966437
67	jun	123.4	1.1	1	0.00902	0.00889	117.206	0.00970441	0.00968659	0.00978279	0.00966838
68	jul	129.1	1.2	1.2	0.00986	0.00999	117.647	0.00998448	0.00994593		
69	aug	135.8	1.2	1.2	0.01023	0.01018	118.088	0.00990574	0.00977277		
70	sep	122.4	1.2	1.2	0.00986	0.00967	118.529	0.00982275	0.0096473		
71	oct	126.2	1.2	1.2	0.00962	0.00947	118.97	0.00983468	0.00964924		
72	nov	107.2	1.2	1.2	0.00998	0.0098	119.411				
73	dec	92.8	1.2	1.2	0.0099	0.00968	119.852				
74											

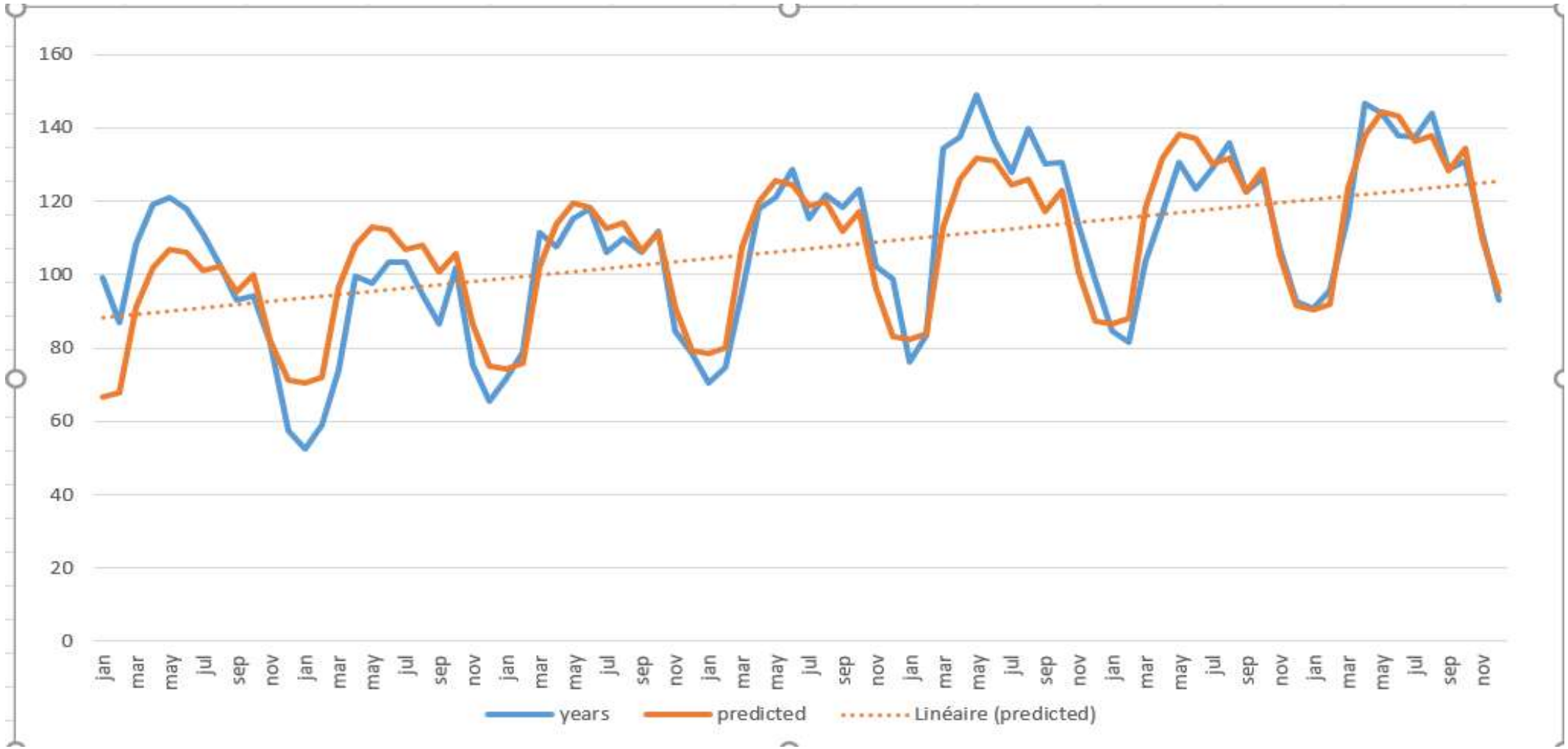
IRREGULAR VARIATIONS GRAPH:



By using the linear regression we predict the values for 1996
Linear regression equation y = a + b * x
y = 88.1225 + 0.4414 * 73
In the same way, we will predict all the values for every month of the year 1996

	A	B	C
1	months	years	predicted
2	jan	99.2	66.49862
3	feb	86.9	67.7869
4	mar	108.5	91.28417
5	apr	119	101.8578
6	may	121.1	106.7895
7	jun	117.8	106.0741
8	jul	111.2	101.018
9	aug	102.8	102.256
10	sep	93.1	95.32235
11	oct	94.2	100.0537
12	nov	81.4	81.98812
13	dec	57.4	71.16829
14	jan	52.5	70.47636
15	feb	59.1	71.82158
16	mar	73.8	96.6906
17	apr	99.7	107.8608
18	may	97.7	113.0525
19	jun	103.4	112.2648
20	jul	103.5	106.8851
21	aug	94.7	108.1664
22	sep	86.6	100.8056
23	oct	101.8	105.7816
24	nov	75.6	86.65953
25	dec	65.6	75.20406
26	jan	71.6	74.45409
27	feb	78.8	75.85627
28	mar	111.6	102.097
29	apr	107.6	113.8639
30	may	115.2	119.3154
31	jun	117.8	118.4556
32	jul	106.2	112.7522
33	aug	109.9	114.0768
34	sep	106	106.2888
35	oct	111.8	111.5096
36	nov	84.5	91.33094
37	dec	78.6	79.23983
38	jan	70.5	78.43183
39	feb	74.6	79.89095
40	mar	95.5	107.5035
41	apr	117.8	119.8669
42	may	120.9	125.5783
43	jun	128.5	124.6463
44	jul	115.3	118.6193
45	aug	121.8	119.9872
46	sep	118.5	111.772
47	oct	123.2	117.2375
48	nov	102.3	96.00235
49	dec	98.7	83.2756
50	jan	76.2	82.40957
51	feb	83.5	83.92564
52	mar	134.3	112.9099
53	apr	137.6	125.87
54	may	148.8	131.8413
55	jun	136.4	130.837
56	jul	127.8	124.4864
57	aug	139.8	125.8976
58	sep	130.1	117.2552
59	oct	130.6	122.9654
60	nov	113.4	100.6738
61	dec	98.5	87.31137
62	jan	84.5	86.3873
63	feb	81.6	87.96032
64	mar	103.8	118.3163
65	apr	116.9	131.873
66	may	130.5	138.1042
67	jun	123.4	137.0277
68	jul	129.1	130.3535
69	aug	135.8	131.808
70	sep	122.4	122.7385
71	oct	126.2	128.6933
72	nov	107.2	105.3452
73	dec	92.8	91.34714
74	jan	90.7	90.36504
75	feb	95.9	91.99501
76	mar	116	123.7227
77	apr	146.6	137.876
78	may	143.9	144.3671
79	jun	138	143.2184
80	jul	137.5	136.2206
81	aug	144.2	137.7184
82	sep	128.7	128.2217
83	oct	130.8	134.4213
84	nov	111.5	110.0166
85	dec	93.1	95.38291

INITIAL DATA AND PREDICTED VALUES GRAPH FROM 1990 TO 1996:



THE PERCENTAGE MOVING AVERAGE

By using initial data, we calculate 12 month moving average
=average(c2:c13)
We compute a 12-month moving average. Since the results thus obtained are between successive months, we compute a 2-month moving average of this 12-month moving average

	A	B	C	D	E
1	months	years	12mon_m	2mon_12_	ratio_ma
2	jan	99.2	99.38333	97.4375	1.018089
3	feb	86.9	95.49167	94.33333	0.921201
4	mar	108.5	93.175	91.72917	1.18283
5	apr	119	90.28333	89.47917	1.329919
6	may	121.1	88.675	87.7	1.380844
7	jun	117.8	86.725	86.125	1.367779
8	jul	111.2	85.525	85.20417	1.3051
9	aug	102.8	84.88333	84.54583	1.215909
10	sep	93.1	84.20833	83.9375	1.109159
11	oct	94.2	83.66667	83.98333	1.121651
12	nov	81.4	84.3	84.05833	0.968375
13	dec	57.4	83.81667	84.15833	0.682048
14	jan	52.5	84.5	85.29583	0.615505
15	feb	59.1	86.09167	86.9125	0.679994
16	mar	73.8	87.73333	89.30833	0.826351
17	apr	99.7	90.88333	91.2125	1.093052
18	may	97.7	91.54167	92.27083	1.058839
19	jun	103.4	93	93.6	1.104701
20	jul	103.5	94.2	94.3125	1.097416
21	aug	94.7	94.425	95.05833	0.99623
22	sep	86.6	95.69167	96.5	0.897409
23	oct	101.8	97.30833	97.725	1.041699
24	nov	75.6	98.14167	98.5125	0.767415
25	dec	65.6	98.88333	99.425	0.659794
26	jan	71.6	99.96667	99.92083	0.716567
27	feb	78.8	99.875	99.7	0.790371
28	mar	111.6	99.525	98.85417	1.128936
29	apr	107.6	98.18333	98.60833	1.091186
30	may	115.2	99.03333	99.27083	1.160462
31	jun	117.8	99.50833	99.95417	1.17854
32	jul	106.2	100.4	100.7792	1.053789
33	aug	109.9	101.1583	101.6542	1.081117
34	sep	106	102.15	102.6708	1.032426
35	oct	111.8	103.1917	103.6667	1.078457
36	nov	84.5	104.1417	104.8833	0.805657
37	dec	78.6	105.625	106.4625	0.738288
38	jan	70.5	107.3	107.5375	0.655585
39	feb	74.6	107.775	108.1458	0.689809
40	mar	95.5	108.5167	110.1333	0.867131
41	apr	117.8	111.75	112.575	1.046414
42	may	120.9	113.4	114.5625	1.055319
43	jun	128.5	115.725	116.0542	1.107242
44	jul	115.3	116.3833	116.9042	0.986278
45	aug	121.8	117.425	118.175	1.030675
46	sep	118.5	118.925	119.4083	0.992393
47	oct	123.2	119.8917	120.2	1.024958
48	nov	102.3	120.5083	120.9708	0.845658
49	dec	98.7	121.4333	121.425	0.812847
50	jan	76.2	121.4167	121.7625	0.625808
51	feb	83.5	122.1083	122.0292	0.684263
52	mar	134.3	121.95	120.6792	1.112868
53	apr	137.6	119.4083	118.5458	1.160732
54	may	148.8	117.6833	116.9208	1.272656
55	jun	136.4	116.1583	115.6167	1.179761
56	jul	127.8	115.075	115.1292	1.110058
57	aug	139.8	115.1833	115.0167	1.215476
58	sep	130.1	114.85	114.5292	1.135955
59	oct	130.6	114.2083	114.025	1.145363
60	nov	113.4	113.8417	113.5833	0.998386
61	dec	98.5	113.325	113.0875	0.871007
62	jan	84.5	112.85		
63	feb	81.6			
64	mar	103.8			
65	apr	116.9			
66	may	130.5			
67	jun	123.4			
68	jul	129.1			
69	aug	135.8			
70	sep	122.4			
71	oct	126.2			
72	nov	107.2			
73	dec	92.8			

We divide initial data by 12 year moving average then we get ratio moving average
=initial value/12_yr_mov_avg
In previous methods, we compute the mean and median
Same process is applied to get the mean and median

	A	B	C	D	E	F	G	H	I	J	K	L
1	months	1990	1991	1992	1993	1994	1995	mean	median		adj_mean	adj_media
2	jan	1.018089	0.615505	0.716567	0.655585	0.625808		72.63109	65.55853		72.72351	66.87553
3	feb	0.921201	0.679994	0.790371	0.689809	0.684263		75.31277	68.98093		75.40861	70.36668
4	mar	1.18283	0.826351	1.128936	0.867131	1.112868		102.3623	111.2868		102.4926	113.5224
5	apr	1.329919	1.093052	1.091186	1.046414	1.160732		114.426	109.3052		114.5716	111.501
6	may	1.380844	1.058839	1.160462	1.055319	1.272656		118.5624	116.0462		118.7133	118.3774
7	jun	1.367779	1.104701	1.17854	1.107242	1.179761		118.7605	117.854		118.9116	120.2216
8	jul	1.3051	1.097416	1.053789	0.986278	1.110058		111.0528	109.7416		111.1941	111.9461
9	aug	1.215909	0.99623	1.081117	1.030675	1.215476		110.7881	108.1117		110.9291	110.2835
10	sep	1.109159	0.897409	1.032426	0.992393	1.135955		103.3468	103.2426		103.4783	105.3166
11	oct	1.121651	1.041699	1.078457	1.024958	1.145363		108.2426	107.8457		108.3803	110.0122
12	nov	0.968375	0.767415	0.805657	0.845658	0.998386		87.70984	84.56584		87.82144	86.26468
13	dec	0.682048	0.659794	0.738288	0.812847	0.871007		75.27968	73.82881		75.37547	75.31196
14												
15												
16					tot_mon			sum	sum			
17					1200			1198.475	1176.368		1200	

Deseasonalization of Data:

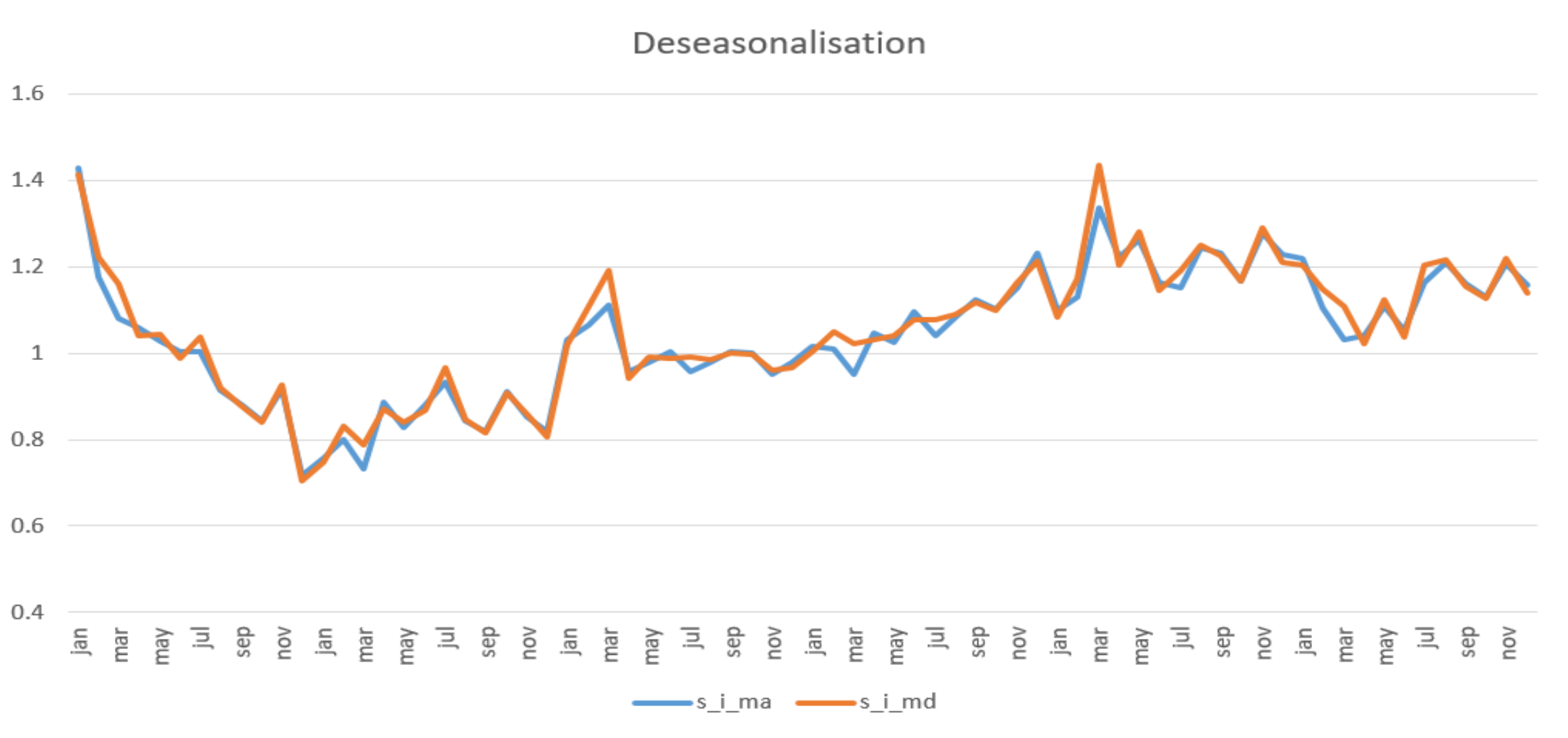
We compute the deseasonalization of data for mean and median

Deseas_mn=initial data/adjmean

Deseas_md=initial data/adjmedian

	A	B	C	D
1	months	years	des_mn	des_md
2	jan	99.2	1.32971	1.41176
3	feb	86.9	1.17609	1.22124
4	mar	108.5	1.07894	1.15928
5	apr	119	1.05753	1.04108
6	may	121.1	1.0273	1.0423
7	jun	117.8	1.0037	0.98885
8	jul	111.2	1.00272	1.03777
9	aug	102.8	0.91513	0.92014
10	sep	93.1	0.88167	0.87776
11	oct	94.2	0.84217	0.84064
12	nov	81.4	0.9164	0.92552
13	dec	57.4	0.7156	0.70513
14	jan	52.5	0.75665	0.74715
15	feb	59.1	0.79985	0.83055
16	mar	73.8	0.73388	0.78852
17	apr	99.7	0.88601	0.87224
18	may	97.7	0.8288	0.8409
19	jun	103.4	0.88101	0.86797
20	jul	103.5	0.93329	0.96591
21	aug	94.7	0.84302	0.84764
22	sep	86.6	0.82011	0.81647
23	oct	101.8	0.91012	0.90847
24	nov	75.6	0.8511	0.85957
25	dec	65.6	0.81783	0.80586
26	jan	71.6	1.03193	1.01897
27	feb	78.8	1.06646	1.10741
28	mar	111.6	1.10977	1.1924
29	apr	107.6	0.95622	0.94135
30	may	115.2	0.97725	0.99152
31	jun	117.8	1.0037	0.98885
32	jul	106.2	0.95763	0.99111
33	aug	109.9	0.97833	0.98369
34	sep	106	1.00383	0.99938
35	oct	111.8	0.99952	0.99771
36	nov	84.5	0.9513	0.96077
37	dec	78.6	0.9799	0.96556
38	jan	70.5	1.01608	1.00332
39	feb	74.6	1.00962	1.04838
40	mar	95.5	0.94967	1.02038
41	apr	117.8	1.04686	1.03059
42	may	120.9	1.02561	1.04058
43	jun	128.5	1.09487	1.07866
44	jul	115.3	1.03969	1.07603
45	aug	121.8	1.08426	1.0902
46	sep	118.5	1.12221	1.11723
47	oct	123.2	1.10144	1.09944
48	nov	102.3	1.15169	1.16315
49	dec	98.7	1.23049	1.21247
50	jan	76.2	1.09823	1.08444
51	feb	83.5	1.13007	1.17346
52	mar	134.3	1.3355	1.43494
53	apr	137.6	1.22282	1.20381
54	may	148.8	1.26229	1.28072
55	jun	136.4	1.16218	1.14498
56	jul	127.8	1.15241	1.19269
57	aug	139.8	1.2445	1.25132
58	sep	130.1	1.23206	1.2266
59	oct	130.6	1.16759	1.16548
60	nov	113.4	1.27665	1.28936
61	dec	98.5	1.22799	1.21002
62	jan	84.5	1.21785	1.20256
63	feb	81.6	1.10436	1.14676
64	mar	103.8	1.0322	1.10906
65	apr	116.9	1.03887	1.02271
66	may	130.5	1.10705	1.12321
67	jun	123.4	1.05142	1.03585
68	jul	129.1	1.16413	1.20482
69	aug	135.8	1.20889	1.21552
70	sep	122.4	1.15914	1.154
71	oct	126.2	1.12826	1.12621
72	nov	107.2	1.20685	1.21887
73	dec	92.8	1.15693	1.14

DESEASONALIZATION OF DATA GRAPH:

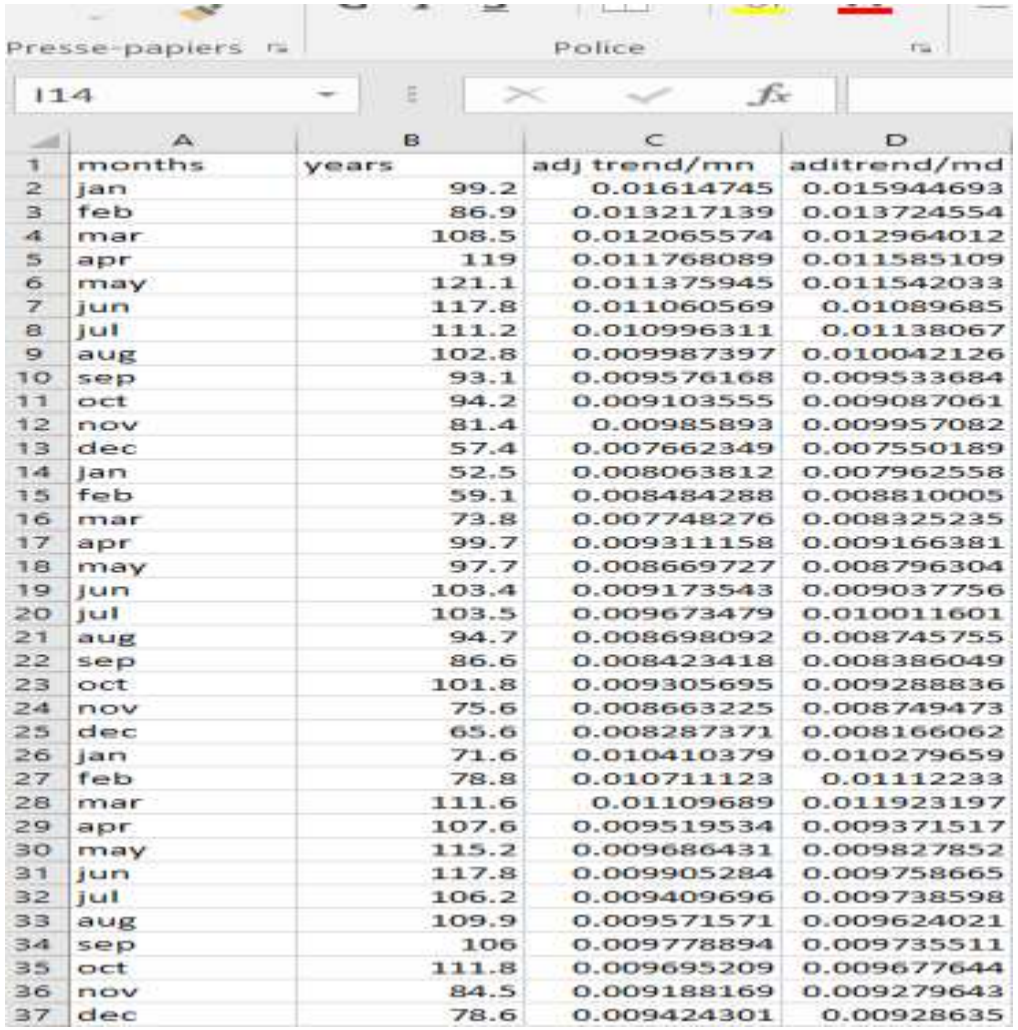


CYCLICAL FLUCTUATIONS:

We compute the cyclical fluctuations by

C=deseasionalization data/linear_eq_value

Similarly , we calculate all the values



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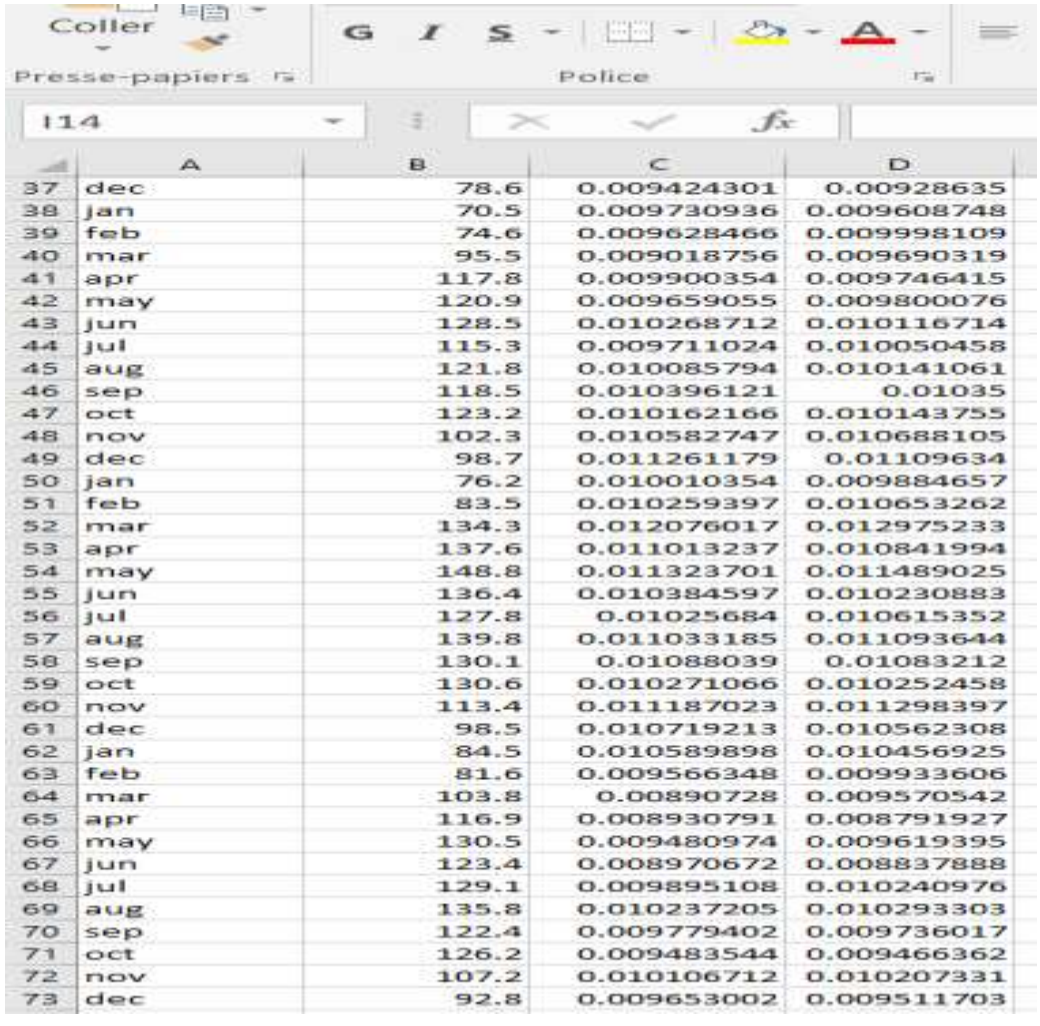
I14

	A	B	C	D
1	months	years	adj trend/mn	aditrend/md
2	jan	99.2	0.01614745	0.015944693
3	feb	86.9	0.013217139	0.013724554
4	mar	108.5	0.012065574	0.012964012
5	apr	119	0.011768089	0.011585109
6	may	121.1	0.011375945	0.011542033
7	jun	117.8	0.011060569	0.01089685
8	jul	111.2	0.010996311	0.01138067
9	aug	102.8	0.009987397	0.010042126
10	sep	93.1	0.009576168	0.009533684
11	oct	94.2	0.009103555	0.009087061
12	nov	81.4	0.00985893	0.009957082
13	dec	57.4	0.007662349	0.007550189
14	jan	52.5	0.008063812	0.007962558
15	feb	59.1	0.008484288	0.008810005
16	mar	73.8	0.007748276	0.008325235
17	apr	99.7	0.009311158	0.009166381
18	may	97.7	0.008669727	0.008796304
19	jun	103.4	0.009173543	0.009037756
20	jul	103.5	0.009673479	0.010011601
21	aug	94.7	0.008698092	0.008745755
22	sep	86.6	0.008423418	0.008386049
23	oct	101.8	0.009305695	0.009288836
24	nov	75.6	0.008663225	0.008749473
25	dec	65.6	0.008287371	0.008166062
26	jan	71.6	0.010410379	0.010279659
27	feb	78.8	0.010711123	0.01112233
28	mar	111.6	0.01109689	0.011923197
29	apr	107.6	0.009519534	0.009371517
30	may	115.2	0.009686431	0.009827852
31	jun	117.8	0.009905284	0.009758665
32	jul	106.2	0.009409696	0.009738598
33	aug	109.9	0.009571571	0.009624021
34	sep	106	0.009778894	0.009735511
35	oct	111.8	0.009695209	0.009677644
36	nov	84.5	0.009188169	0.009279643
37	dec	78.6	0.009424301	0.00928635



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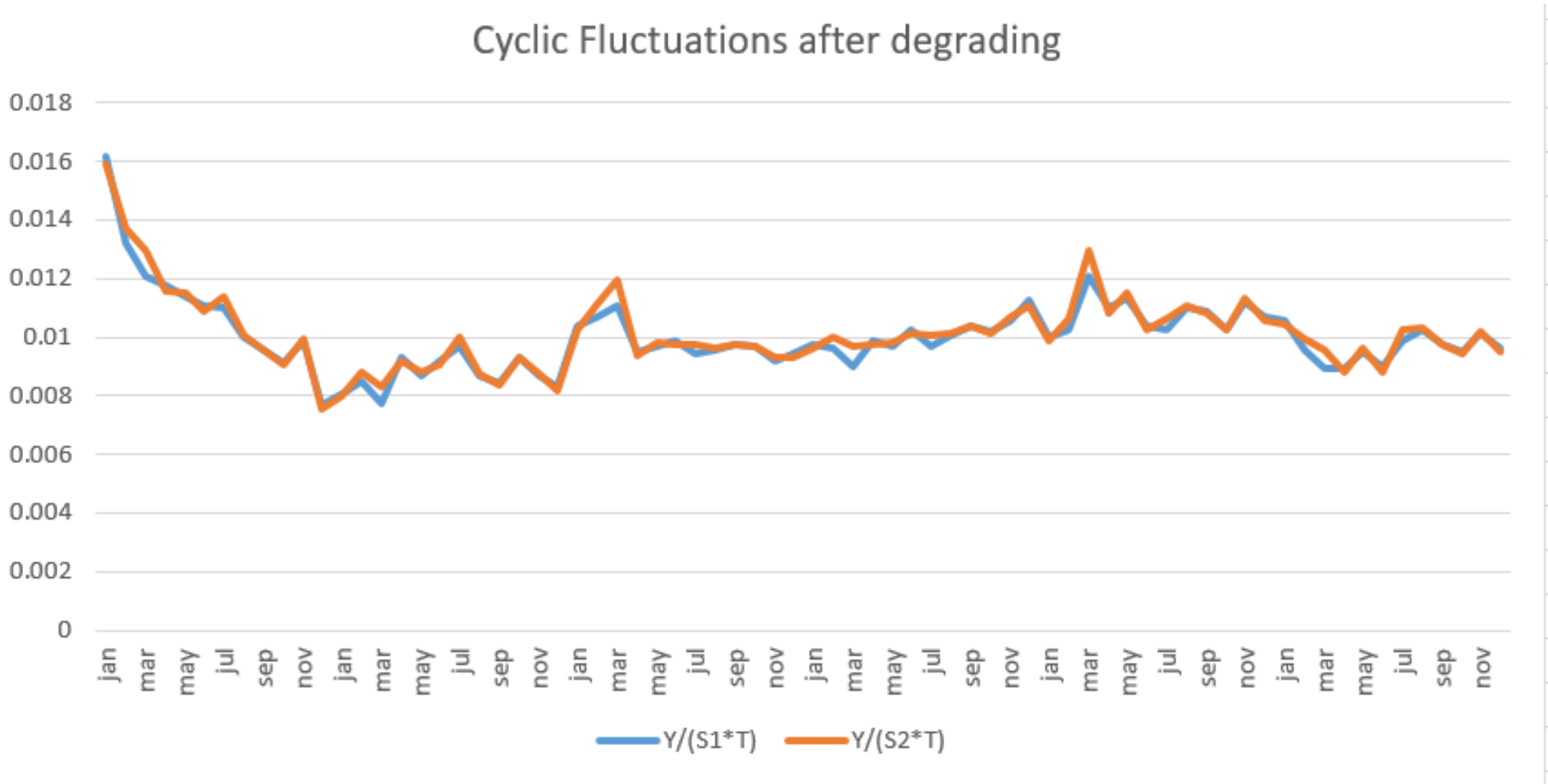
I14

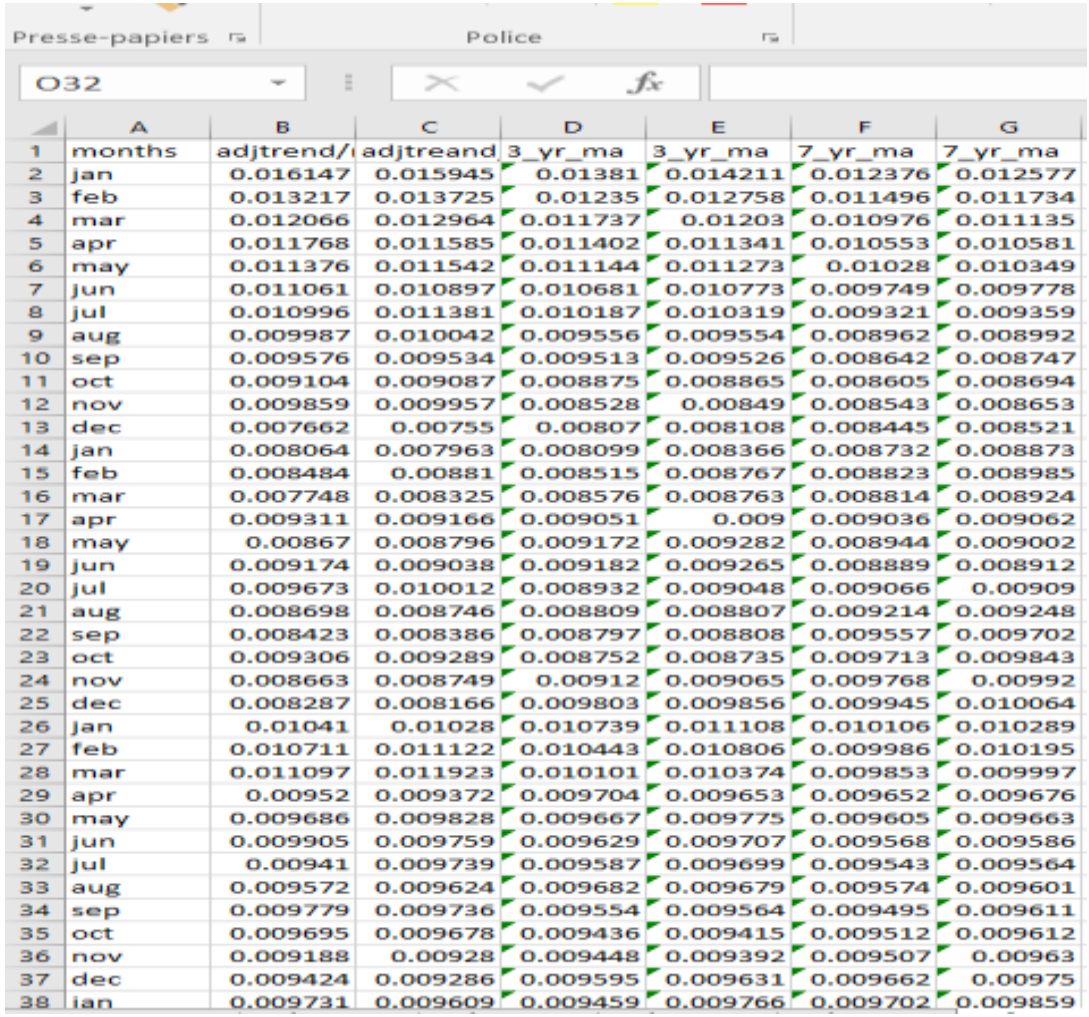
	A	B	C	D
37	dec	78.6	0.009424301	0.00928635
38	jan	70.5	0.009730936	0.009608748
39	feb	74.6	0.009628466	0.009998109
40	mar	95.5	0.009018756	0.009690319
41	apr	117.8	0.009900354	0.009746415
42	may	120.9	0.009659055	0.009800076
43	jun	128.5	0.010268712	0.010116714
44	jul	115.3	0.009711024	0.010050458
45	aug	121.8	0.010085794	0.010141061
46	sep	118.5	0.010396121	0.01035
47	oct	123.2	0.010162166	0.010143755
48	nov	102.3	0.010582747	0.010688105
49	dec	98.7	0.011261179	0.01109634
50	jan	76.2	0.010010354	0.009884657
51	feb	83.5	0.010259397	0.010653262
52	mar	134.3	0.012076017	0.012975233
53	apr	137.6	0.011013237	0.010841994
54	may	148.8	0.011323701	0.011489025
55	jun	136.4	0.010384597	0.010230883
56	jul	127.8	0.01025684	0.010615352
57	aug	139.8	0.011033185	0.011093644
58	sep	130.1	0.01088039	0.01083212
59	oct	130.6	0.010271066	0.010252458
60	nov	113.4	0.011187023	0.011298397
61	dec	98.5	0.010719213	0.010562308
62	jan	84.5	0.010589898	0.010456925
63	feb	81.6	0.009566348	0.009933606
64	mar	103.8	0.00890728	0.009570542
65	apr	116.9	0.008930791	0.008791927
66	may	130.5	0.009480974	0.009619395
67	jun	123.4	0.008970672	0.008837888
68	jul	129.1	0.009895108	0.010240976
69	aug	135.8	0.010237205	0.010293303
70	sep	122.4	0.009779402	0.009736017
71	oct	126.2	0.009483544	0.009466362
72	nov	107.2	0.010106712	0.010207331
73	dec	92.8	0.009653002	0.009511703

CYCLIC FLUCTUATIONS GRAPH:



IRREGULAR VARIATIONS:

By Using cyclic fluctuations,we calculate the irregular variations of three year moving averages and seven year moving averages



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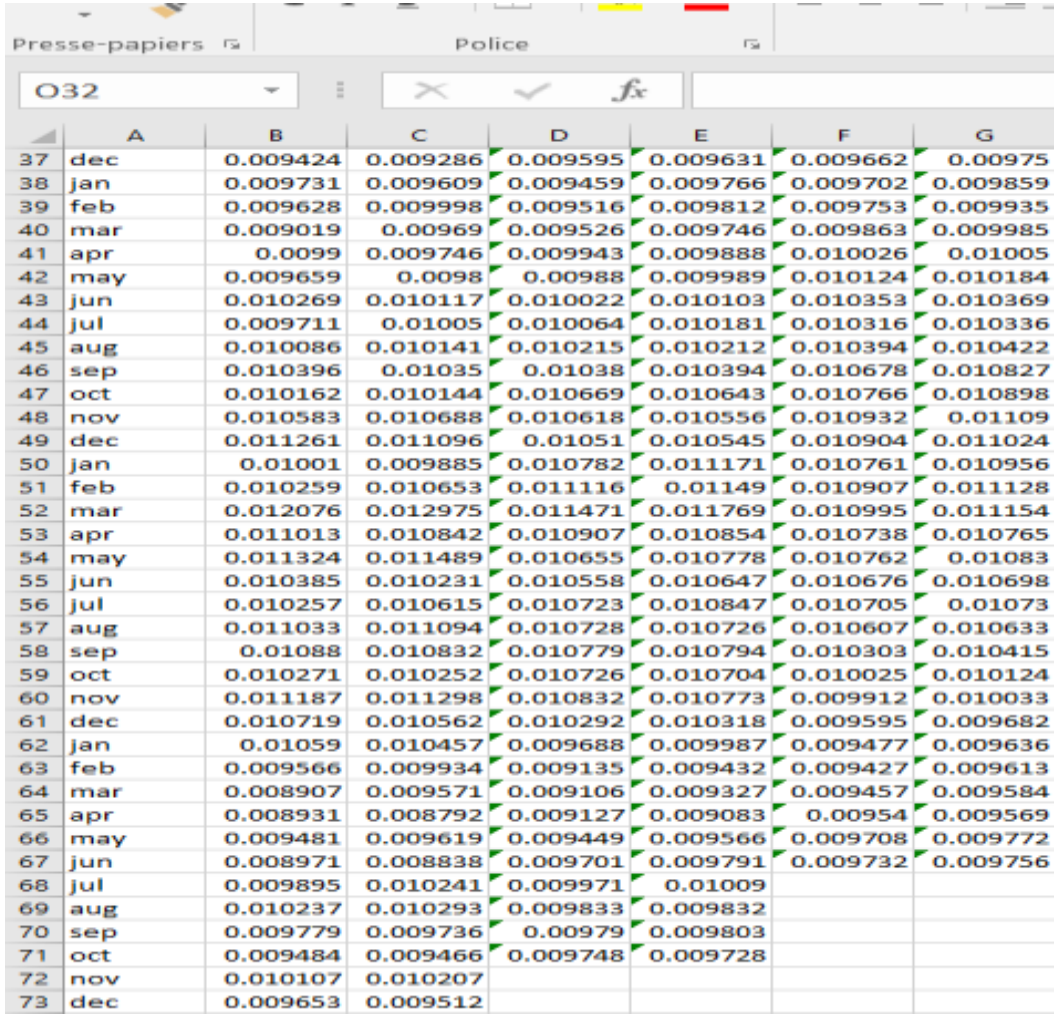
O32

	A	B	C	D	E	F	G
1	months	adjtrend/	adjtreand	3_yr_ma	3_yr_ma	7_yr_ma	7_yr_ma
2	jan	0.016147	0.015945	0.01381	0.014211	0.012376	0.012577
3	feb	0.013217	0.013725	0.01235	0.012758	0.011496	0.011734
4	mar	0.012066	0.012964	0.011737	0.01203	0.010976	0.011135
5	apr	0.011768	0.011585	0.011402	0.011341	0.010553	0.010581
6	may	0.011376	0.011542	0.011144	0.011273	0.01028	0.010349
7	jun	0.011061	0.010897	0.010681	0.010773	0.009749	0.009778
8	jul	0.010996	0.011381	0.010187	0.010319	0.009321	0.009359
9	aug	0.009987	0.010042	0.009556	0.009554	0.008962	0.008992
10	sep	0.009576	0.009534	0.009513	0.009526	0.008642	0.008747
11	oct	0.009104	0.009087	0.008875	0.008865	0.008605	0.008694
12	nov	0.009859	0.009957	0.008528	0.00849	0.008543	0.008653
13	dec	0.007662	0.00755	0.00807	0.008108	0.008445	0.008521
14	jan	0.008064	0.007963	0.008099	0.008366	0.008732	0.008873
15	feb	0.008484	0.00881	0.008515	0.008767	0.008823	0.008985
16	mar	0.007748	0.008325	0.008576	0.008763	0.008814	0.008924
17	apr	0.009311	0.009166	0.009051	0.009	0.009036	0.009062
18	may	0.00867	0.008796	0.009172	0.009282	0.008944	0.009002
19	jun	0.009174	0.009038	0.009182	0.009265	0.008889	0.008912
20	jul	0.009673	0.010012	0.008932	0.009048	0.009066	0.00909
21	aug	0.008698	0.008746	0.008809	0.008807	0.009214	0.009248
22	sep	0.008423	0.008386	0.008797	0.008808	0.009557	0.009702
23	oct	0.009306	0.009289	0.008752	0.008735	0.009713	0.009843
24	nov	0.008663	0.008749	0.00912	0.009065	0.009768	0.00992
25	dec	0.008287	0.008166	0.009803	0.009856	0.009945	0.010064
26	jan	0.01041	0.01028	0.010739	0.011108	0.010106	0.010289
27	feb	0.010711	0.011122	0.010443	0.010806	0.009986	0.010195
28	mar	0.011097	0.011923	0.010101	0.010374	0.009853	0.009997
29	apr	0.00952	0.009372	0.009704	0.009653	0.009652	0.009676
30	may	0.009686	0.009828	0.009667	0.009775	0.009605	0.009663
31	jun	0.009905	0.009759	0.009629	0.009707	0.009568	0.009586
32	jul	0.00941	0.009739	0.009587	0.009699	0.009543	0.009564
33	aug	0.009572	0.009624	0.009682	0.009679	0.009574	0.009601
34	sep	0.009779	0.009736	0.009554	0.009564	0.009495	0.009611
35	oct	0.009695	0.009678	0.009436	0.009415	0.009512	0.009612
36	nov	0.009188	0.00928	0.009448	0.009392	0.009507	0.00963
37	dec	0.009424	0.009286	0.009595	0.009631	0.009662	0.00975
38	jan	0.009731	0.009609	0.009459	0.009766	0.009702	0.009859



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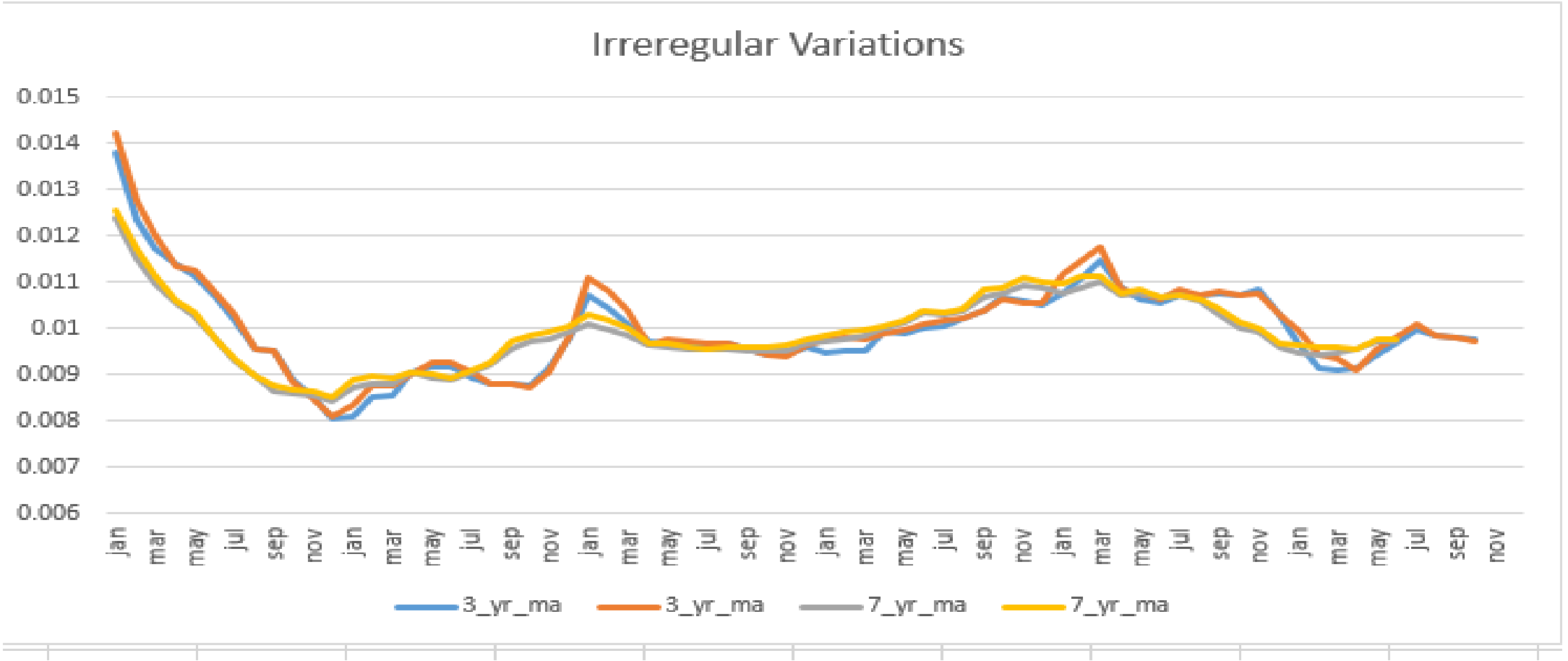
	A	B	C	D	E	F	G
37	dec	0.009424	0.009286	0.009595	0.009631	0.009662	0.00975
38	jan	0.009731	0.009609	0.009459	0.009766	0.009702	0.009859
39	feb	0.009628	0.009998	0.009516	0.009812	0.009753	0.009935
40	mar	0.009019	0.00969	0.009526	0.009746	0.009863	0.009985
41	apr	0.0099	0.009746	0.009943	0.009888	0.010026	0.01005
42	may	0.009659	0.0098	0.00988	0.009989	0.010124	0.010184
43	jun	0.010269	0.010117	0.010022	0.010103	0.010353	0.010369
44	jul	0.009711	0.01005	0.010064	0.010181	0.010316	0.010336
45	aug	0.010086	0.010141	0.010215	0.010212	0.010394	0.010422
46	sep	0.010396	0.01035	0.01038	0.010394	0.010678	0.010827
47	oct	0.010162	0.010144	0.010669	0.010643	0.010766	0.010898
48	nov	0.010583	0.010688	0.010618	0.010556	0.010932	0.01109
49	dec	0.011261	0.011096	0.01051	0.010545	0.010904	0.011024
50	jan	0.01001	0.009885	0.010782	0.011171	0.010761	0.010956
51	feb	0.010259	0.010653	0.011116	0.01149	0.010907	0.011128
52	mar	0.012076	0.012975	0.011471	0.011769	0.010995	0.011154
53	apr	0.011013	0.010842	0.010907	0.010854	0.010738	0.010765
54	may	0.011324	0.011489	0.010655	0.010778	0.010762	0.01083
55	jun	0.010385	0.010231	0.010558	0.010647	0.010676	0.010698
56	jul	0.010257	0.010615	0.010723	0.010847	0.010705	0.01073
57	aug	0.011033	0.011094	0.010728	0.010726	0.010607	0.010633
58	sep	0.01088	0.010832	0.010779	0.010794	0.010303	0.010415
59	oct	0.010271	0.010252	0.010726	0.010704	0.010025	0.010124
60	nov	0.011187	0.011298	0.010832	0.010773	0.009912	0.010033
61	dec	0.010719	0.010562	0.010292	0.010318	0.009595	0.009682
62	jan	0.01059	0.010457	0.009688	0.009987	0.009477	0.009636
63	feb	0.009566	0.009934	0.009135	0.009432	0.009427	0.009613
64	mar	0.008907	0.009571	0.009106	0.009327	0.009457	0.009584
65	apr	0.008931	0.008792	0.009127	0.009083	0.00954	0.009569
66	may	0.009481	0.009619	0.009449	0.009566	0.009708	0.009772
67	jun	0.008971	0.008838	0.009701	0.009791	0.009732	0.009756
68	jul	0.009895	0.010241	0.009971	0.01009		
69	aug	0.010237	0.010293	0.009833	0.009832		
70	sep	0.009779	0.009736	0.00979	0.009803		
71	oct	0.009484	0.009466	0.009748	0.009728		
72	nov	0.010107	0.010207				
73	dec	0.009653	0.009512				

IRREGULAR VARIATIONS GRAPH:



By using the linear regression we predict the values for 1996

Linear regression equation $y = a + b * x$

$y = 88.1225 + 0.4414 * 73 = 83.4649$

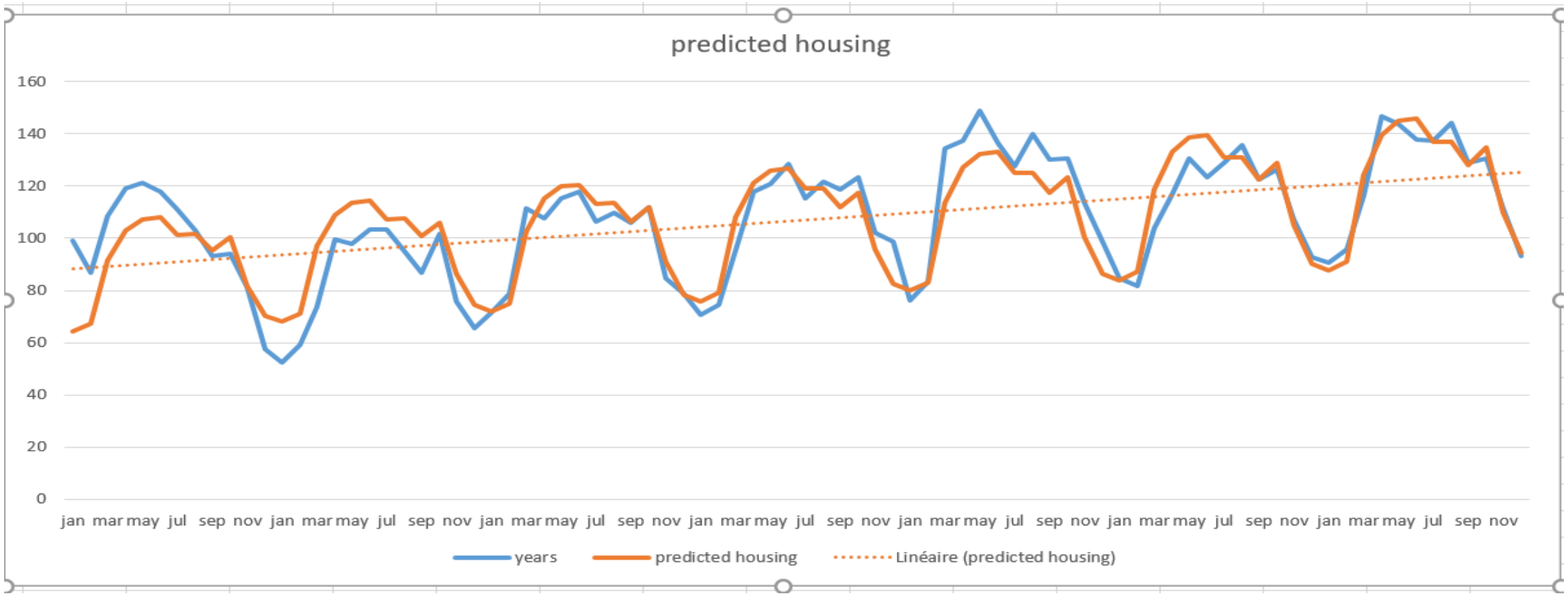
In the same way, we will predict all the values for every month of the year 1996

	A	B	C	D	E
1	months	years	adj_mean	trend	predicted h
2	jan	99.2	72.72351	88.56399	64.40684
3	feb	86.9	75.40861	89.00546	67.11777
4	mar	108.5	102.4926	89.44692	91.67644
5	apr	119	114.5716	89.88839	102.9866
6	may	121.1	118.7133	90.32986	107.2335
7	jun	117.8	118.9116	90.77133	107.9376
8	jul	111.2	111.1941	91.2128	101.4233
9	aug	102.8	110.9291	91.65426	101.6712
10	sep	93.1	103.4783	92.09573	95.29913
11	oct	94.2	108.3803	92.5372	100.2921
12	nov	81.4	87.82144	92.97867	81.65521
13	dec	57.4	75.37547	93.42014	70.41587
14	jan	52.5		93.8616	68.25945
15	feb	59.1		94.30307	71.11263
16	mar	73.8		94.74454	97.1061
17	apr	99.7		95.18601	109.0562
18	may	97.7		95.62748	113.5225
19	jun	103.4		96.06894	114.2371
20	jul	103.5		96.51041	107.3139
21	aug	94.7		96.95188	107.5478
22	sep	86.6		97.39335	100.781
23	oct	101.8		97.83482	106.0337
24	nov	75.6		98.27628	86.30765
25	dec	65.6		98.71775	74.40897
26	jan	71.6		99.15922	72.11206
27	feb	78.8		99.60069	75.10749
28	mar	111.6		100.0422	102.5358
29	apr	107.6		100.4836	115.1257

	A	B	C	D	E
30	may	115.2		100.9251	119.8115
31	jun	117.8		101.3666	120.5366
32	jul	106.2		101.808	113.2045
33	aug	109.9		102.2495	113.4244
34	sep	106		102.691	106.2629
35	oct	111.8		103.1324	111.7752
36	nov	84.5		103.5739	90.96009
37	dec	78.6		104.0154	78.40207
38	jan	70.5		104.4568	75.96467
39	feb	74.6		104.8983	79.10235
40	mar	95.5		105.3398	107.9654
41	apr	117.8		105.7812	121.1953
42	may	120.9		106.2227	126.1004
43	jun	128.5		106.6642	126.836
44	jul	115.3		107.1056	119.0952
45	aug	121.8		107.5471	119.301
46	sep	118.5		107.9886	111.7448
47	oct	123.2		108.43	117.5168
48	nov	102.3		108.8715	95.61254
49	dec	98.7		109.313	82.39518
50	jan	76.2		109.7545	79.81729
51	feb	83.5		110.1959	83.09721
52	mar	134.3		110.6374	113.3951
53	apr	137.6		111.0789	127.2649
54	may	148.8		111.5203	132.3894
55	jun	136.4		111.9618	133.1355
56	jul	127.8		112.4033	124.9858
57	aug	139.8		112.8447	125.1776
58	sep	130.1		113.2862	117.2267

59	oct	130.6		113.7277	123.2584
60	nov	113.4		114.1691	100.265
61	dec	98.5		114.6106	86.38828
62	jan	84.5		115.0521	83.6699
63	feb	81.6		115.4935	87.09207
64	mar	103.8		115.935	118.8247
65	apr	116.9		116.3765	133.3344
66	may	130.5		116.8179	138.6784
67	jun	123.4		117.2594	139.435
68	jul	129.1		117.7009	130.8765
69	aug	135.8		118.1423	131.0542
70	sep	122.4		118.5838	122.7086
71	oct	126.2		119.0253	128.9999
72	nov	107.2		119.4667	104.9174
73	dec	92.8		119.9082	90.38138
74	jan	90.7		120.3497	87.52251
75	feb	95.9		120.7912	91.08692
76	mar	116		121.2326	124.2544
77	apr	146.6		121.6741	139.404
78	may	143.9		122.1156	144.9674
79	jun	138		122.557	145.7345
80	jul	137.5		122.9985	136.7671
81	aug	144.2		123.44	136.9308
82	sep	128.7		123.8814	128.1904
83	oct	130.8		124.3229	134.7415
84	nov	111.5		124.7644	109.5699
85	dec	93.1		125.2058	94.37449

INITIAL DATA AND PREDICTED VALUES GRAPH FROM 1990 TO 1996:

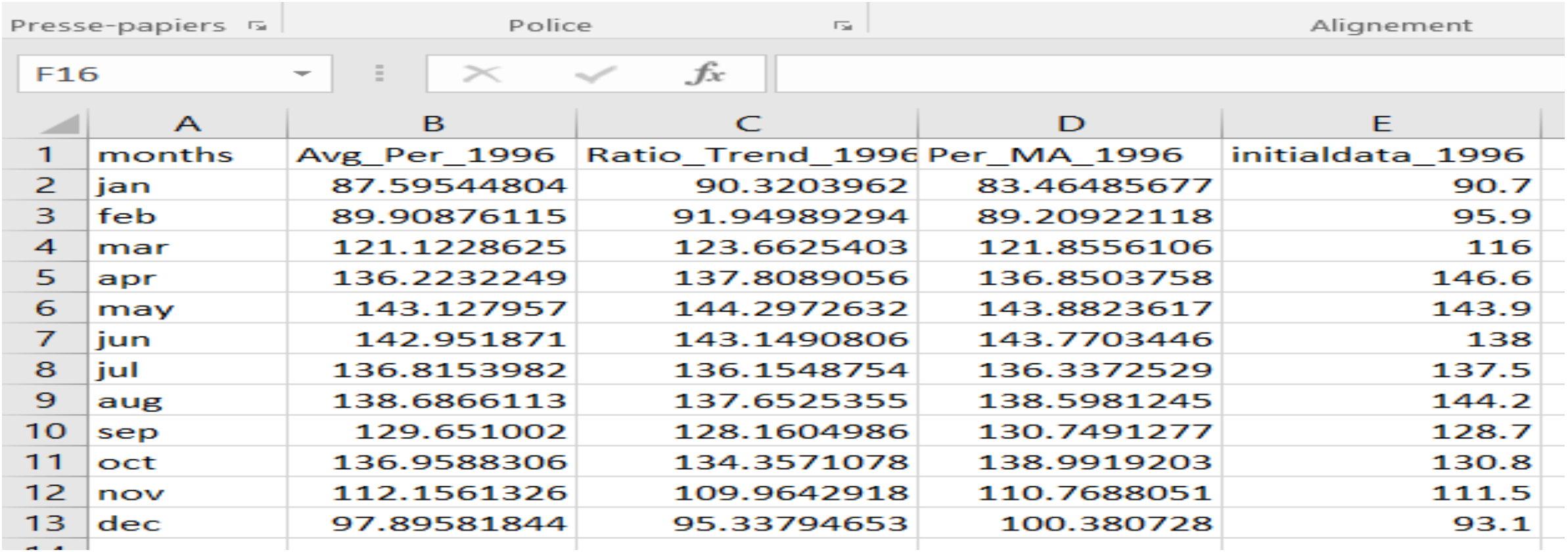


COMPARISION OF PREDICTED VALUES FOR THREE SEASONAL INDEX METHODS:

1.The average percentage method

2.The percentage or ratio to trend method

3. The percentage moving average



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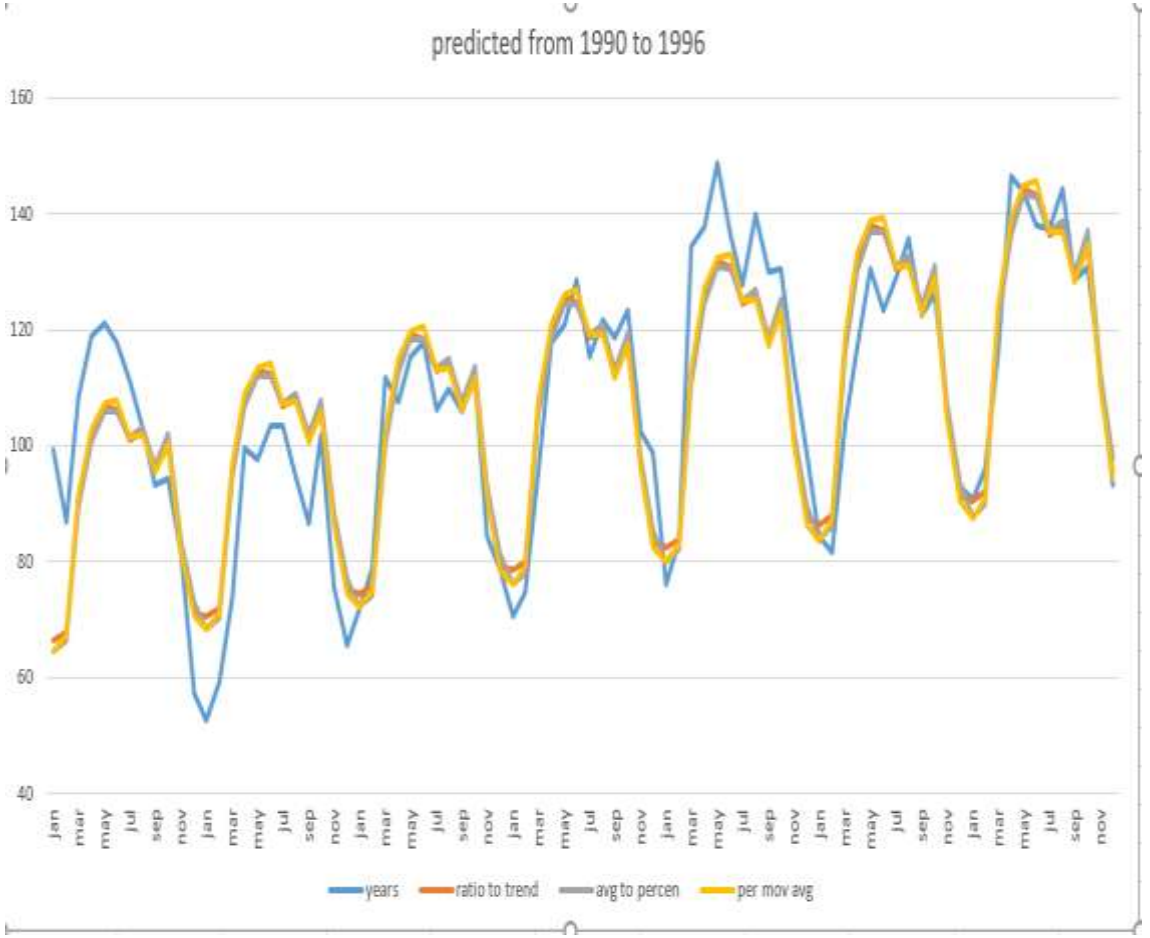
	A	B	C	D	E
1	months	Avg_Per_1996	Ratio_Trend_1996	Per_MA_1996	initialdata_1996
2	jan	87.59544804	90.3203962	83.46485677	90.7
3	feb	89.90876115	91.94989294	89.20922118	95.9
4	mar	121.1228625	123.6625403	121.8556106	116
5	apr	136.2232249	137.8089056	136.8503758	146.6
6	may	143.127957	144.2972632	143.8823617	143.9
7	jun	142.951871	143.1490806	143.7703446	138
8	jul	136.8153982	136.1548754	136.3372529	137.5
9	aug	138.6866113	137.6525355	138.5981245	144.2
10	sep	129.651002	128.1604986	130.7491277	128.7
11	oct	136.9588306	134.3571078	138.9919203	130.8
12	nov	112.1561326	109.9642918	110.7688051	111.5
13	dec	97.89581844	95.33794653	100.380728	93.1

THREE SEASONAL INDEX METHODS GRAPH FOR COMPARISION OF PREDICTED VALUES:



Finally, we can clearly see that ratio to trend method is closest to initial data
So,ratio to trend method is best method to predict the values.