

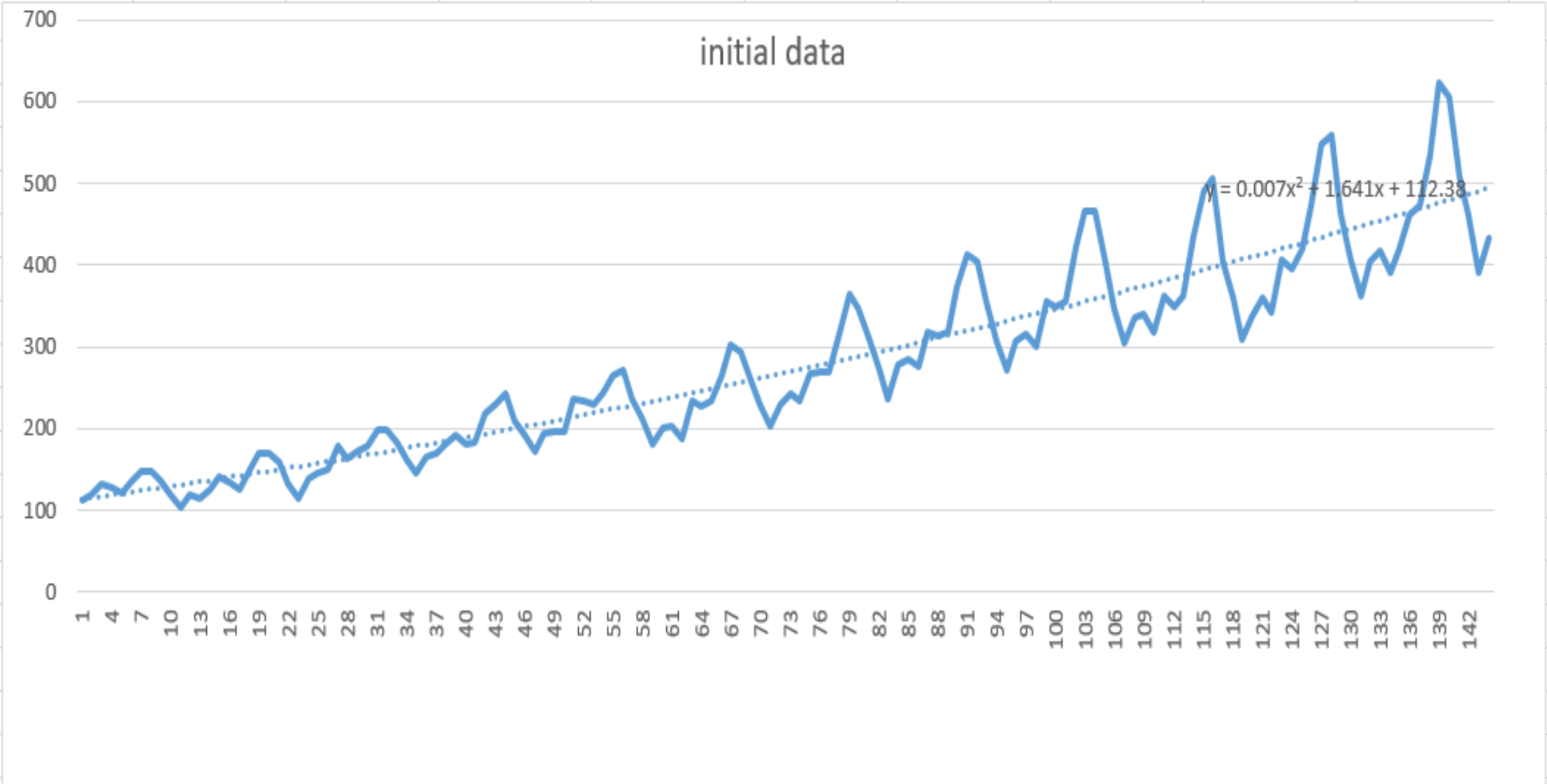
# FORECASTING MODELS

By kodavati sai Narayana phanindra

INITIAL DATA:

	A	B		A	B		A	B		A	B		A	B	
1	months	values	r	30	29	172	59	58	211	88	87	317	117	116	505
2	1	112	31	30	178	60	59	180	89	88	313	118	117	404	
3	2	118	32	31	199	61	60	201	90	89	318	119	118	359	
4	3	132	33	32	199	62	61	204	91	90	374	120	119	310	
5	4	129	34	33	184	63	62	188	92	91	413	121	120	337	
6	5	121	35	34	162	64	63	235	93	92	405	122	121	360	
7	6	135	36	35	146	65	64	227	94	93	355	123	122	342	
8	7	148	37	36	166	66	65	234	95	94	306	124	123	406	
9	8	148	38	37	171	67	66	264	96	95	271	125	124	396	
10	9	136	39	38	180	68	67	302	97	96	306	126	125	420	
11	10	119	40	39	193	69	68	293	98	97	315	127	126	472	
12	11	104	41	40	181	70	69	259	99	98	301	128	127	548	
13	12	118	42	41	183	71	70	229	100	99	356	129	128	559	
14	13	115	43	42	218	72	71	203	101	100	348	130	129	463	
15	14	126	44	43	230	73	72	229	102	101	355	131	130	407	
16	15	141	45	44	242	74	73	242	103	102	422	132	131	362	
17	16	135	46	45	209	75	74	233	104	103	465	133	132	405	
18	17	125	47	46	191	76	75	267	105	104	467	134	133	417	
19	18	149	48	47	172	77	76	269	106	105	404	135	134	391	
20	19	170	49	48	194	78	77	270	107	106	347	136	135	419	
21	20	170	50	49	196	79	78	315	108	107	305	137	136	461	
22	21	158	51	50	196	80	79	364	109	108	336	138	137	472	
23	22	133	52	51	236	81	80	347	110	109	340	139	138	535	
24	23	114	53	52	235	82	81	312	111	110	318	140	139	622	
25	24	140	54	53	229	83	82	274	112	111	362	141	140	606	
26	25	145	55	54	243	84	83	237	113	112	348	142	141	508	
27	26	150	56	55	264	85	84	278	114	113	363	143	142	461	
28	27	178	57	56	272	86	85	284	115	114	435	144	143	390	
29	28	163	58	57	237	87	86	277	116	115	491	145	144	432	

INITIAL GRAPH:



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(a2:a13)

=126.666667

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

▲	A	B	C	▲	A	B	C	▲	A	B	C	▲	A	B	C	▲	A	B	C
1	values	year average	mean percentage	30	172		1.010773749	59	211		0.937777778	88	317		0.965727342	114	363		0.952755906
2	112	126.666667	0.884210524	31	178		1.046033299	60	180		0.8	89	313		0.953541508	115	435		1.141732283
3	118	139.666667	0.931578945	32	199		1.169441722	61	201		0.893333333	90	318		0.9687738	116	491		1.288713911
4	132	170.166667	1.04210526	33	199		1.169441722	62	204		0.853854202	91	374		1.139375476	117	505		1.325459318
5	129	197	1.01842105	34	184		1.081292848	63	188		0.786885245	92	413		1.258187357	118	404		1.060367454
6	121	225	0.955263155	35	162		0.952007834	64	235		0.983606556	93	405		1.233815689	119	359		0.942257218
7	135	238.916667	1.065789471	36	146		0.857982369	65	227		0.950122078	94	355		1.081492765	120	310		0.813648294
8	148	284	1.16842105	37	166		0.9755142	66	234		0.979420996	95	306		0.932216299	121	337		0.884514436
9	148	328.25	1.16842105	38	171		0.868020305	67	264		1.104987791	96	271		0.825590251	122	360		0.840466927
10	136	368.416667	1.073684208	39	180		0.913705584	68	302		1.264039063	97	306		0.932216299	123	342		0.79844358
11	119	381	0.939473682	40	193		0.979695431	69	293		1.226369025	98	315		0.855010178	124	406		0.947859923
12	104	428.333333	0.821052629	41	181		0.918781726	70	259		1.084059992	99	301		0.817009726	125	396		0.924513619
13	118	476.166667	0.931578945	42	183		0.92893401	71	229		0.958493197	100	356		0.966297217	126	420		0.980544748
14	115		0.82338902	43	218		1.106598985	72	203		0.849668642	101	348		0.944582673	127	472		1.101945526
15	126		0.902147969	44	230		1.16751269	73	229		0.958493197	102	355		0.963582899	128	548		1.279377433
16	141		1.009546537	45	242		1.228426396	74	242		0.852112676	103	422		1.145442207	129	559		1.305058367
17	135		0.96658711	46	209		1.060913706	75	233		0.820422535	104	465		1.262157882	130	463		1.080933853
18	125		0.894988065	47	191		0.969543147	76	267		0.940140845	105	467		1.267586518	131	407		0.950194553
19	149		1.066825773	48	172		0.873096447	77	269		0.947183099	106	404		1.096584482	132	362		0.845136187
20	170		1.217183768	49	194		0.984771574	78	270		0.950704225	107	347		0.941868355	133	405		0.945525293
21	170		1.217183768	50	196		0.871111111	79	315		1.10915493	108	305		0.827866998	134	417		0.875743787
22	158		1.131264914	51	196		0.871111111	80	364		1.281690141	109	336		0.912010856	135	391		0.821141056
23	133		0.952267301	52	236		1.048888889	81	347		1.221830986	110	340		0.892388451	136	419		0.879943997
24	114		0.816229115	53	235		1.044444444	82	312		1.098591549	111	318		0.834645669	137	461		0.968148407
25	140		1.002386632	54	229		1.017777778	83	274		0.964788732	112	362		0.950131234	138	472		0.991249562
26	145		0.852105777	55	243		1.08	84	237		0.834507042	113	348		0.913385827	139	535		1.123556177
27	150		0.881488735	56	264		1.173333333	85	278		0.978873239	114	363		0.952755906	140	622		1.306265312
28	178		1.046033299	57	272		1.208888889	86	284		0.865194212	115	435		1.141732283	141	606		1.272663632
29	163		0.957884425	58	237		1.053333333	87	277		0.843869002	116	491		1.288713911	142	508		1.066853342
																143	461		0.968148407
																144	390		0.819040951
																145	432		0.907245362

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=112/126.666667=0.88421052  
 Likewise,we calculate percentage for remaining months

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	months													mean	median	adjmean	adjmedian
2	1	0.88421052	0.82338902	0.85210578	0.8680203	0.87111111	0.8538542	0.85211268	0.86519421	0.85501018	0.89238845	0.84046693	0.87574379	86.1133931	86.0102195	86.1133931	86.1369176
3	2	0.93157894	0.90214797	0.88148873	0.91370558	0.87111111	0.78688524	0.82042254	0.843869	0.81700973	0.83464567	0.79844358	0.82114106	85.1870763	83.9257336	85.1870763	84.0493611
4	3	1.04210526	1.00954654	1.0460333	0.97969543	1.04888889	0.98360656	0.94014085	0.96572734	0.96629722	0.95013123	0.94785992	0.879944	97.9998044	97.2996324	97.9998044	97.4429605
5	4	1.01842105	0.96658711	0.95788443	0.91878173	1.04444444	0.95012208	0.9471831	0.95354151	0.94458267	0.91338583	0.92451362	0.96814841	95.896633	95.1831793	95.896633	95.3233897
6	5	0.95526316	0.89498806	1.01077375	0.92893401	1.01777778	0.979421	0.95070423	0.9687738	0.9635829	0.95275591	0.98054475	0.99124956	96.6230741	96.617835	96.6230741	96.7601587
7	6	1.06578947	1.06682577	1.0460333	1.10659898	1.08	1.10498779	1.10915493	1.13937548	1.14544221	1.14173228	1.10194553	1.12355618	110.262016	110.659898	110.262016	110.822907
8	7	1.16842105	1.21718377	1.16944172	1.16751269	1.17333333	1.26403906	1.28169014	1.25818736	1.26215788	1.28871391	1.27937743	1.30626531	123.636031	126.017262	123.636031	126.202893
9	8	1.16842105	1.21718377	1.16944172	1.2284264	1.20888889	1.22636903	1.22183099	1.23381569	1.26758652	1.32545932	1.30505837	1.27266363	123.709545	122.739771	123.709545	122.920574
10	9	1.07368421	1.13126491	1.08129285	1.06091371	1.05333333	1.08405999	1.09859155	1.08149276	1.09658448	1.06036745	1.08093385	1.06685334	108.078104	108.111335	108.078104	108.270589
11	10	0.93947368	0.9522673	0.95200783	0.96954315	0.93777778	0.9584932	0.96478873	0.9322163	0.94186835	0.94225722	0.95019455	0.96814841	95.0753042	95.1101193	95.0753042	95.2502221
12	11	0.82105263	0.81622911	0.85798237	0.87309645	0.8	0.84966864	0.83450704	0.82559025	0.827867	0.81364829	0.84513619	0.81904095	83.198491	82.6728625	83.198491	82.7946444
13	12	0.93157894	1.00238663	0.9755142	0.98477157	0.89333333	0.9584932	0.97887324	0.9322163	0.91201086	0.88451444	0.94552529	0.90724536	94.220528	93.8870796	94.220528	94.0253807
14																	
15												1200		1200	1198.23493	1200	

We compute the mean or median  
 mean=average(b2:m2)            median=median(b2:m2)  
 =86.1133931                                =86.0102195  
 From mean and median we obtain the adj mean and adjmedian  
 =1200/1200\* 86.1133931 =86.1133931  
 In the same way,we calculate all values of mean and median which gives seasonal index



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:

### Deaseasonalisation using seasonal index of Adjusted mean

$Y / S1 = \text{initial\_data} / \text{Adjusted\_mean}$  Similarly, for all records of 144 months from we calculate the values Deaseasonalisation using seasonal index of Adjusted median

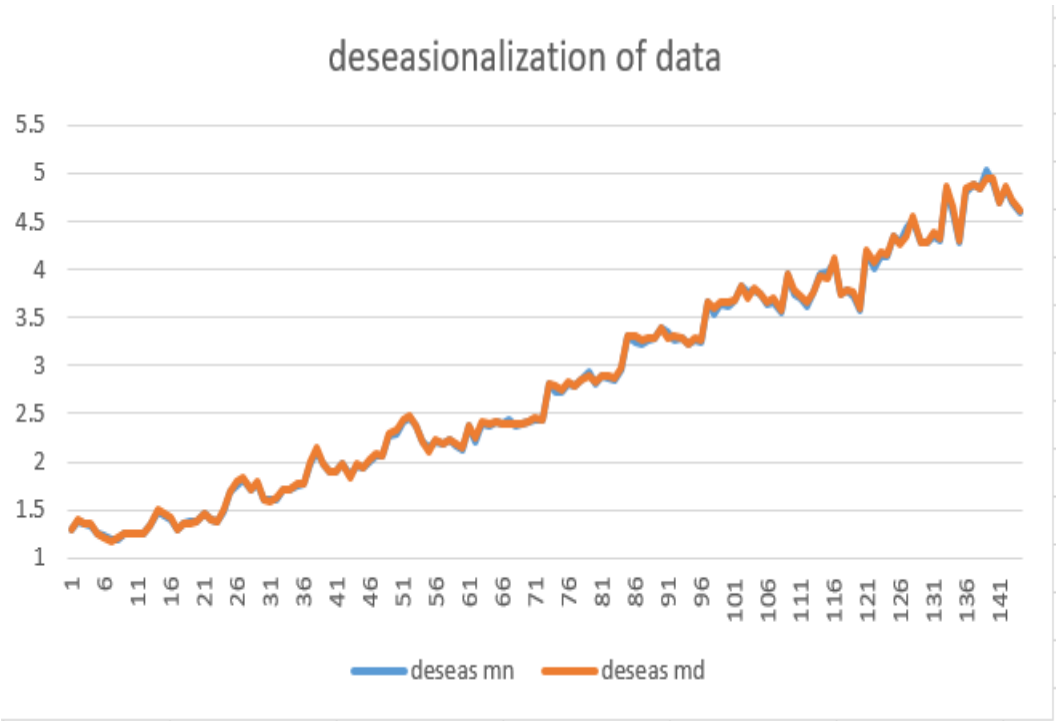
$$Y / S2 = \text{initial data} / \text{Adjusted median}$$

Similarly for all records of 144 months

M25							A	B	C	D	E	F	A	B	C	D	E	F
	A	B	C	D	E	F												
1	months	values	adjmean	deseas mn	adjmedian	deseas md	30	29	172		1.7801131	1.78283198	59	58	211	2.21929345		2.22174903
2	1	112	86.1133931	1.30061069	86.1369176	1.30025549	31	30	178		1.61433653	1.61090157	60	59	180	2.16350078		2.1804634
3	2	118	85.1870763	1.38518664	84.0493611	1.40393691	32	31	199		1.60956316	1.58147491	61	60	201	2.13329307		2.14402329
4	3	132	97.9998044	1.34694146	97.4429605	1.35463865	33	32	199		1.60860668	1.62370466	62	61	204	2.36896948		2.37530499
5	4	129	95.896633	1.34519843	95.3233897	1.35328801	34	33	184		1.70247251	1.70445627	63	62	188	2.20690753		2.24337551
6	5	121	96.6230741	1.25228887	96.7601587	1.25051469	35	34	162		1.70391251	1.70579783	64	63	235	2.39796397		2.41877757
7	6	135	110.262016	1.22435636	110.822907	1.21815971	36	35	146		1.75483952	1.76859809	65	64	227	2.36713212		2.38838822
8	7	148	123.636031	1.19706205	126.202893	1.1727148	37	36	166		1.76182413	1.7706859	66	65	234	2.42178178		2.42548072
9	8	148	123.709545	1.1963507	122.920574	1.20402952	38	37	171		1.98575383	1.99106448	67	66	264	2.39429687		2.38920233
10	9	136	108.078104	1.25834924	108.270589	1.25611212	39	38	180		2.11299657	2.14791272	68	67	302	2.44265364		2.40002726
11	10	119	95.0753042	1.25163943	95.2502221	1.24934092	40	39	193		1.96939169	1.98648541	69	68	293	2.36845104		2.39068074
12	11	104	83.198491	1.25002267	82.7946444	1.25611989	41	40	181		1.88744896	1.90439766	70	69	259	2.3964151		2.39920747
13	12	118	94.220528	1.25238101	94.0253807	1.25498029	42	41	183		1.89395754	1.8968503	71	70	229	2.40861706		2.41128212
14	13	115		1.33544848		1.33508376	43	42	218		1.97710878	1.97290193	72	71	203	2.4399481		2.45907816
15	14	126		1.4790976		1.49911907	44	43	230		1.86029913	1.82783533	73	72	229	2.43046823		2.4426932
16	15	141		1.43877838		1.44700037	45	44	242		1.95619506	1.97455542	74	73	242	2.81024811		2.81776377
17	16	135		1.4077658		1.41623164	46	45	209		1.9337867	1.93604	75	74	233	2.73515667		2.78035368
18	17	125		1.29368685		1.29185402	47	46	191		2.00893388	2.0111567	76	75	267	2.72449523		2.74814303
19	18	149		1.35132664		1.34448738	48	47	172		2.06734519	2.08355391	77	76	269	2.8051037		2.83029265
20	19	170		1.3750037		1.34703727	49	48	194		2.05899929	2.06935581	78	77	270	2.79436359		2.7986316
21	20	170		1.37418661		1.38300688	50	49	196		2.27606872	2.28215578	79	78	315	2.8568315		2.85075278
22	21	158		1.46190574		1.45930673	51	50	196		2.30081849	2.33883829	80	79	364	2.94412558		2.89274809
23	22	133		1.39889113		1.3963222	52	51	236		2.40816807	2.42907024	81	80	347	2.80495738		2.83128401
24	23	114		1.37021716		1.37690065	53	52	235		2.45055528	2.47256049	82	81	312	2.8868012		2.89016498
25	24	140		1.48587577		1.48895967	54	53	229		2.3700343	2.37365421	83	82	274	2.88192609		2.88511485
26	25	145		1.68382635		1.68336648	55	54	243		2.20384144	2.19915215	84	83	237	2.84860936		2.87094347
27	26	150		1.76083047		1.78466556	56	55	264		2.13529987	2.09803707	85	84	278	2.95052475		2.96536554
28	27	178		1.81633016		1.82670969	57	56	272		2.19869858	2.21933502	86	85	284	3.29797712		3.30679715
29	28	163		1.69974685		1.70996857	58	57	237		2.19285861	2.19541378	87	86	277	3.25166694		3.30539902

DESEASONALIZATION OF DATA GRAPH:

▲	A	B	C	D	E	F	▲	A	B	C	D	E	F
88	87	317		3.23470033		3.26277656	117	116	505		4.08214258		4.12045656
89	88	313		3.26393107		3.29324015	118	117	404		3.73803746		3.74239311
90	89	318		3.29113934		3.2961661	119	118	359		3.77595426		3.78013223
91	90	374		3.39192057		3.3847033	120	119	310		3.72602912		3.75524252
92	91	413		3.34045018		3.28215648	121	120	337		3.57671526		3.59470571
93	92	405		3.27379752		3.30452457	122	121	360		4.18053438		4.1917147
94	93	355		3.28466163		3.288489	123	122	342		4.01469348		4.08103416
95	94	306		3.2185014		3.22206257	124	123	406		4.14286541		4.17882423
96	95	271		3.25727061		3.28280878	125	124	396		4.12944634		4.16652747
97	96	306		3.24769991		3.26403545	126	125	420		4.3467878		4.35342693
98	97	315		3.65796758		3.66775036	127	126	472		4.28071259		4.27160417
99	98	301		3.53339982		3.59178738	128	127	548		4.43236488		4.35501635
100	99	356		3.63266031		3.66419071	129	128	559		4.51864892		4.56105983
101	100	348		3.62890739		3.66149384	130	129	463		4.28393897		4.28893072
102	101	355		3.67407064		3.67968228	131	130	407		4.28081723		4.28555381
103	102	422		3.82724727		3.81910373	132	131	362		4.35104045		4.38515417
104	103	465		3.76103955		3.69540621	133	132	405		4.29842635		4.32004692
105	104	467		3.77497146		3.8104024	134	133	417		4.84245232		4.85540286
106	105	404		3.73803746		3.74239311	135	134	391		4.5898981		4.66574374
107	106	347		3.64973852		3.65377684	136	135	419		4.27551874		4.31262895
108	107	305		3.66593187		3.69467409	137	136	461		4.8072595		4.85042718
109	108	336		3.56610186		3.58403892	138	137	472		4.88496153		4.89242264
110	109	340		3.94828247		3.95884166	139	138	535		4.85207889		4.84175472
111	110	318		3.73296061		3.7946458	140	139	622		5.03089591		4.9431025
112	111	362		3.69388492		3.72594673	141	140	606		4.8985711		4.94454787
113	112	348		3.62890739		3.66149384	142	141	508		4.70030453		4.70578144
114	113	363		3.7568666		3.7626047	143	142	461		4.84878806		4.85415309
115	114	435		3.94514826		3.93675384	144	143	390		4.68758502		4.72433736
116	115	491		3.97133423		3.90203107	145	144	432		4.5849881		4.60805005





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=deseasonalization data/poly\_eq\_value  
Similarly , we calculate all the values

	A	B	C	D	E	F	G		A	B	C	D	E	F	G
1	months	values	deseas mn	deseas md	trend values	adj/trendmn	adj/trendmd	30	29	172	1.7801131	1.78283198	165.781306	0.01073772	0.01075412
2	1	112	1.30061069	1.30408902	113.343714	0.01147493	0.01150561	31	30	178	1.61433653	1.61090157	167.852679	0.00961758	0.00959712
3	2	118	1.38518664	1.40807612	115.03158	0.01204179	0.01224078	32	31	199	1.60956316	1.58147491	169.937748	0.00947149	0.0093062
4	3	132	1.34694146	1.35863251	116.733143	0.01153864	0.01163879	33	32	199	1.60860668	1.62370466	172.036514	0.00935038	0.00943814
5	4	129	1.34519843	1.35727789	118.448402	0.01135683	0.01145881	34	33	184	1.70247251	1.70445627	174.148977	0.00977595	0.00978735
6	5	121	1.25228887	1.25420157	120.177359	0.01042034	0.01043626	35	34	162	1.70391251	1.70579783	176.275136	0.00966621	0.00967691
7	6	135	1.22435636	1.22175119	121.920011	0.01004229	0.01002092	36	35	146	1.75483952	1.76859809	178.414992	0.00983572	0.00991283
8	7	148	1.19706205	1.1761723	123.676361	0.00967899	0.00951008	37	36	166	1.76182413	1.7706859	180.568545	0.00975709	0.00980617
9	8	148	1.1963507	1.20757935	125.446407	0.00953675	0.00962626	38	37	171	1.98575383	1.99106448	182.735794	0.0108668	0.01089586
10	9	136	1.25834924	1.2598155	127.23015	0.00989034	0.00990186	39	38	180	2.11299657	2.14791272	184.91674	0.01142675	0.01161557
11	10	119	1.25163943	1.25302433	129.02759	0.00970056	0.00971129	40	39	193	1.96939169	1.98648541	187.111383	0.01052524	0.01061659
12	11	104	1.25002267	1.2598233	130.838726	0.00955392	0.00962883	41	40	181	1.88744896	1.90439766	189.319722	0.00996964	0.01005916
13	12	118	1.25238101	1.25868034	132.663559	0.00944028	0.00948776	42	41	183	1.89395754	1.8968503	191.541758	0.00988796	0.00990306
14	13	115	1.33544848	1.33901997	134.502088	0.00992883	0.00995538	43	42	218	1.97710878	1.97290193	193.777491	0.01020298	0.01018128
15	14	126	1.4790976	1.5035389	136.354314	0.01084746	0.01102671	44	43	230	1.86029913	1.82783533	196.02692	0.00949002	0.00932441
16	15	141	1.43877838	1.45126654	138.220237	0.01040932	0.01049967	45	44	242	1.95619506	1.97455542	198.290046	0.00986532	0.00995791
17	16	135	1.4077658	1.42040709	140.099856	0.0100483	0.01013853	46	45	209	1.9337867	1.93604	200.566869	0.00964161	0.00965284
18	17	125	1.29368685	1.29566278	141.993173	0.00911091	0.00912482	47	46	191	2.00893388	2.0111567	202.857388	0.00990318	0.00991414
19	18	149	1.35132664	1.34845132	143.900185	0.00939072	0.00937074	48	47	172	2.06734519	2.08355391	205.161604	0.01007667	0.01015567
20	19	170	1.3750037	1.35100872	145.820895	0.0094294	0.00926485	49	48	194	2.05899929	2.06935581	207.479516	0.00992387	0.00997378
21	20	170	1.37418661	1.38708439	147.755301	0.00930042	0.00938771	50	49	196	2.27606872	2.28215578	209.811126	0.01084818	0.01087719
22	21	158	1.46190574	1.46360919	149.703404	0.00976535	0.00977673	51	50	196	2.30081849	2.33883829	212.156432	0.01084492	0.01102412
23	22	133	1.39889113	1.40043896	151.665203	0.00922355	0.00923375	52	51	236	2.40816807	2.42907024	214.515434	0.01122608	0.01132352
24	23	114	1.37021716	1.38096015	153.640699	0.00891832	0.00898824	53	52	235	2.45055528	2.47256049	216.888133	0.01129871	0.01140016
25	24	140	1.48587577	1.49334955	155.629892	0.0095475	0.00959552	54	53	229	2.3700343	2.37365421	219.274529	0.01080853	0.01082503
26	25	145	1.68382635	1.68832953	157.632782	0.01068196	0.01071052	55	54	243	2.20384144	2.19915215	221.674622	0.00994179	0.00992063
27	26	150	1.76083047	1.78992726	159.649368	0.01102936	0.01121162	56	55	264	2.13529987	2.09803707	224.088411	0.00952883	0.00936254
28	27	178	1.81633016	1.83209535	161.67965	0.01123413	0.01133164	57	56	272	2.19869858	2.21933502	226.515897	0.0097066	0.0097977
29	28	163	1.69974685	1.71501004	163.72363	0.01038181	0.01047503	58	57	237	2.19285861	2.19541378	228.957079	0.0095776	0.00958876

Police

Alignement

C2

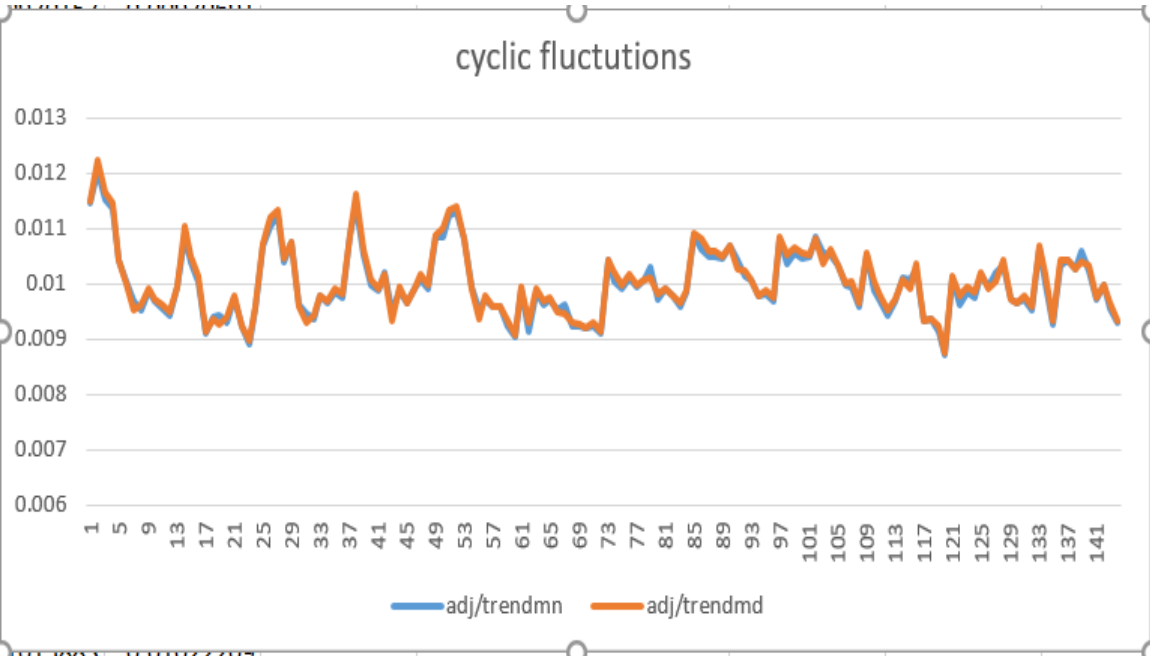
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	A	B	C	D	E	F	G
59	58	211	2.21929345	2.22174903	231.411959	0.00959023	0.00960084
60	59	180	2.16350078	2.1804634	233.880534	0.00925045	0.00932298
61	60	201	2.13329307	2.14402329	236.362807	0.0090255	0.0090709
62	61	204	2.36896948	2.37530499	238.858776	0.00991787	0.00994439
63	62	188	2.20690753	2.24337551	241.368442	0.00914331	0.0092944
64	63	235	2.39796397	2.41877757	243.891805	0.00983208	0.00991742
65	64	227	2.36713212	2.38838822	246.428864	0.00960574	0.009692
66	65	234	2.42178178	2.42548072	248.97962	0.00972683	0.00974168
67	66	264	2.39429687	2.38920233	251.544072	0.0095184	0.00949815
68	67	302	2.44265364	2.40002726	254.122221	0.00961212	0.00944438
69	68	293	2.36845104	2.39068074	256.714067	0.00922603	0.00931262
70	69	259	2.3964151	2.39920747	259.319609	0.00924116	0.00925193
71	70	229	2.40861706	2.41128212	261.938849	0.00919534	0.00920552
72	71	203	2.4399481	2.45907816	264.571784	0.00922225	0.00929456
73	72	229	2.43046823	2.4426932	267.218417	0.00909544	0.00914119
74	73	242	2.81024811	2.81776377	269.878746	0.010413	0.01044085
75	74	233	2.73515667	2.78035368	272.552772	0.01003533	0.01020116
76	75	267	2.72449523	2.74814303	275.240494	0.0098986	0.00998452
77	76	269	2.8051037	2.83029265	277.941913	0.01009241	0.01018304
78	77	270	2.79436359	2.7986316	280.657029	0.00995651	0.00997171
79	78	315	2.8568315	2.85075278	283.385841	0.01008107	0.01005962
80	79	364	2.94412558	2.89274809	286.12835	0.01028953	0.01010997
81	80	347	2.80495738	2.83128401	288.884556	0.00970961	0.00980075
82	81	312	2.8868012	2.89016498	291.654458	0.00989802	0.00990955
83	82	274	2.88192609	2.88511485	294.438057	0.00978789	0.00979872
84	83	237	2.84860936	2.87094347	297.235353	0.00958368	0.00965882
85	84	278	2.95052475	2.96536554	300.046345	0.00983356	0.00988303
86	85	284	3.29797712	3.30679715	302.871035	0.01088905	0.01091817
87	86	277	2.35166604	2.30530002	305.70043	0.01063546	0.01081332



CYCLIC FLUCTUATIONS GRAPH:

	A	B	C	D	E	F	G		A	B	C	D	E	F	G
88	87	317	3.23470033	3.26277656	308.561503	0.01048316	0.01057415	117	116	505	4.08214258	4.12045656	397.229937	0.01027652	0.01037298
89	88	313	3.26393107	3.29324015	311.427282	0.01048056	0.01057467	118	117	404	3.73803746	3.74239311	400.49292	0.00933359	0.00934447
90	89	318	3.29113934	3.2961661	314.306757	0.01047111	0.0104871	119	118	359	3.77595426	3.78013223	403.769598	0.00935175	0.0093621
91	90	374	3.39192057	3.3847033	317.19993	0.01069332	0.01067057	120	119	310	3.72602912	3.75524252	407.059974	0.00915351	0.00922528
92	91	413	3.34045018	3.28215648	320.106798	0.01043542	0.01025332	121	120	337	3.57671526	3.59470571	410.364046	0.00871596	0.0087598
93	92	405	3.27379752	3.30452457	323.027364	0.01013474	0.01022986	122	121	360	4.18053438	4.1917147	413.681815	0.01010568	0.0101327
94	93	355	3.28466163	3.288489	325.961626	0.01007684	0.01008858	123	122	342	4.01469348	4.08103416	417.01328	0.00962726	0.00978634
95	94	306	3.2185014	3.22206257	328.909585	0.00978537	0.0097962	124	123	406	4.14286541	4.17882423	420.358442	0.00985555	0.0099411
96	95	271	3.25727061	3.28280878	331.871241	0.00981486	0.00989181	125	124	396	4.12944634	4.16652747	423.717301	0.00974576	0.00983327
97	96	306	3.24769991	3.26403545	334.846593	0.00969907	0.00974785	126	125	420	4.3467878	4.35342693	427.089857	0.01017769	0.01019323
98	97	315	3.65796758	3.66775036	337.835642	0.01082765	0.01085661	127	126	472	4.28071259	4.27160417	430.476109	0.00994414	0.00992298
99	98	301	3.53339982	3.59178738	340.838388	0.01036679	0.0105381	128	127	548	4.43236488	4.35501635	433.876057	0.01021574	0.01003747
100	99	356	3.63266031	3.66419071	343.85483	0.01056452	0.01065621	129	128	559	4.51864892	4.56105983	437.289703	0.01033331	0.01043029
101	100	348	3.62890739	3.66149384	346.884969	0.01046141	0.01055535	130	129	463	4.28393897	4.28893072	440.717045	0.00972038	0.00973171
102	101	355	3.67407064	3.67968228	349.928805	0.01049948	0.01051552	131	130	407	4.28081723	4.28555381	444.158084	0.00963805	0.00964871
103	102	422	3.82724727	3.81910373	352.986337	0.01084248	0.01081941	132	131	362	4.35104045	4.38515417	447.612819	0.00972054	0.00979676
104	103	465	3.76103955	3.69540621	356.057566	0.01056301	0.01037868	133	132	405	4.29842635	4.32004692	451.081251	0.00952916	0.00957709
105	104	467	3.77497146	3.8104024	359.142491	0.01051107	0.01060972	134	133	417	4.84245232	4.85540286	454.56338	0.01065298	0.01068147
106	105	404	3.73803746	3.74239311	362.241114	0.0103192	0.01033122	135	134	391	4.5898981	4.66574374	458.059205	0.01002032	0.0101859
107	106	347	3.64973852	3.65377684	365.353432	0.00998961	0.01000066	136	135	419	4.27551874	4.31262895	461.568727	0.00926302	0.00934342
108	107	305	3.66593187	3.69467409	368.479448	0.00994881	0.01002681	137	136	461	4.8072595	4.85042718	465.091946	0.01033615	0.01042896
109	108	336	3.56610186	3.58403892	371.61916	0.00959612	0.00964439	138	137	472	4.88496153	4.89242264	468.628861	0.01042395	0.01043987
110	109	340	3.94828247	3.95884166	374.772569	0.01053514	0.01056332	139	138	535	4.85207889	4.84175472	472.179473	0.01027592	0.01025406
111	110	318	3.73296061	3.7946458	377.939675	0.00987713	0.01004035	140	139	622	5.03089591	4.9431025	475.743782	0.0105748	0.01039026
112	111	362	3.69388492	3.72584673	381.120477	0.00969217	0.0097763	141	140	606	4.8985711	4.94454787	479.321787	0.0102198	0.01031572
113	112	348	3.62890739	3.66149384	384.314976	0.00944253	0.00952733	142	141	508	4.70030453	4.70578144	482.913489	0.00973322	0.00974456
114	113	363	3.7568666	3.7626047	387.523171	0.00969456	0.00970937	143	142	461	4.84878806	4.85415309	486.518888	0.00996629	0.00997732
115	114	435	3.94514826	3.93675384	390.745063	0.01009648	0.01007499	144	143	390	4.68758502	4.72433736	490.137983	0.00956381	0.00963879
116	115	491	3.97133423	3.90203107	393.980652	0.01008002	0.00990412	145	144	432	4.5849881	4.60805005	493.770775	0.00928566	0.00933237





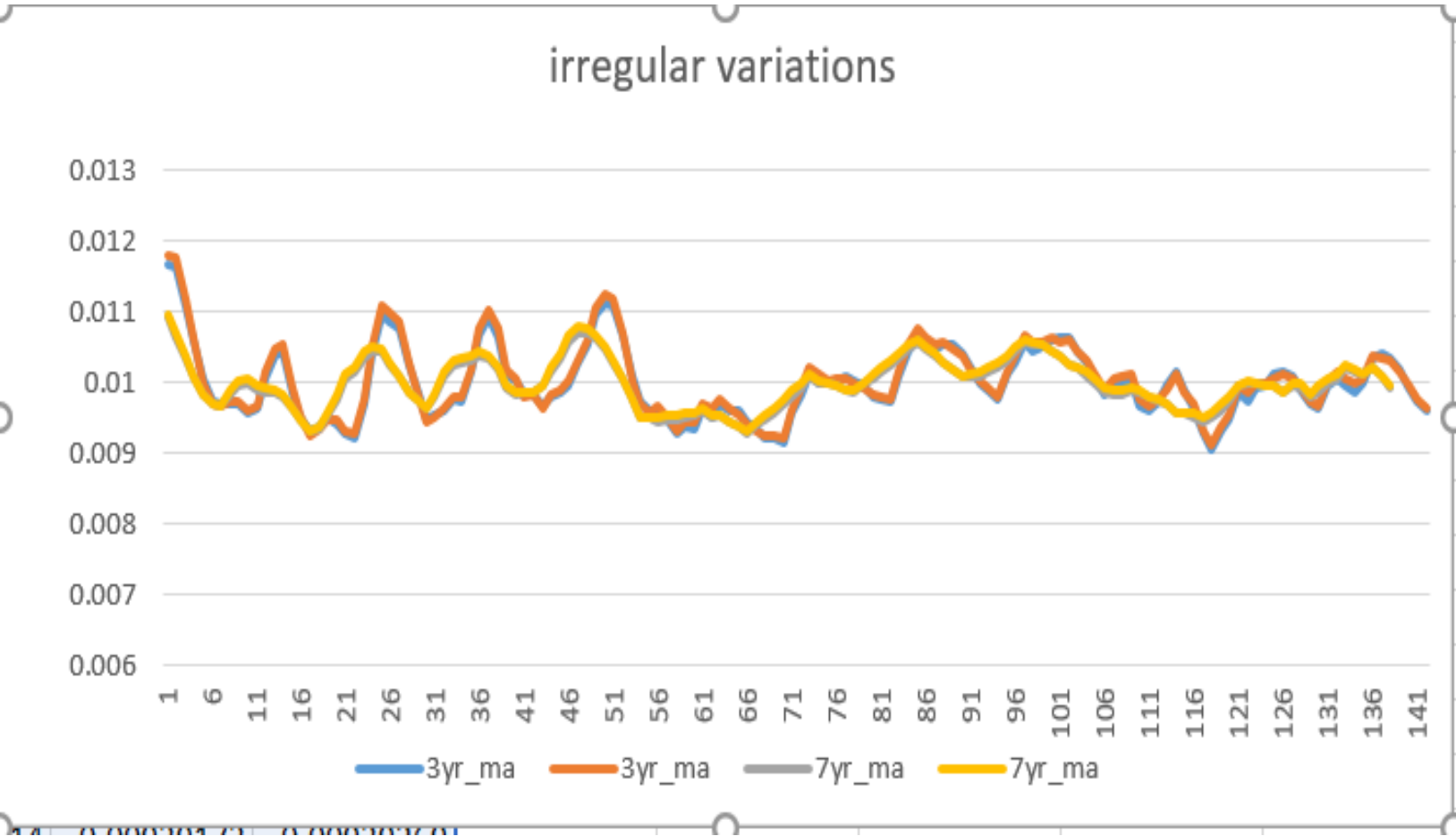
IRREGULAR VARIATIONS:

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

H	I	J	K	H	I	J	K	H	I	J	K	H	I	J	K
3yr_ma	3yr_ma	7yr_ma	7yr_ma	0.00994226	0.00988581	0.00977929	0.00978181	0.00928873	0.00933157	0.00948074	0.00954899	0.01047827	0.01054531	0.01039645	0.01041118
0.01168512	0.01179506	0.01093626	0.01097304	0.00947982	0.00944715	0.0096392	0.00964639	0.00939794	0.00944609	0.00950026	0.00956911	0.01054833	0.01057744	0.01029676	0.01030004
0.01164575	0.01177946	0.01065938	0.01070456	0.00953261	0.00951056	0.00981766	0.00983192	0.00936223	0.00943656	0.00953853	0.00959413	0.01053328	0.01047033	0.01020166	0.01020249
0.01110527	0.01117795	0.01035202	0.01037043	0.00959751	0.00963413	0.01009699	0.01016183	0.00963109	0.00971874	0.00962234	0.00964749	0.01042116	0.01038458	0.01009137	0.01009688
0.01060649	0.01063866	0.01008944	0.01009507	0.00975929	0.00979236	0.01026482	0.01033018	0.00952705	0.00963461	0.0095235	0.00955724	0.01021567	0.01019058	0.01011056	0.01012346
0.01004721	0.00998909	0.00983188	0.00983364	0.00975301	0.00979864	0.01029249	0.01036901	0.00972155	0.0097837	0.00953748	0.00955117	0.00999898	0.01003821	0.01010076	0.01016414
0.00975268	0.00971909	0.00969187	0.00969814	0.0101532	0.01020496	0.01032417	0.01040132	0.00961699	0.00964394	0.00944652	0.00944947	0.00989236	0.00992553	0.01016216	0.01022505
0.00970202	0.0096794	0.00967567	0.00968878	0.01068355	0.01077253	0.01037664	0.01043967	0.00961912	0.0095614	0.00939173	0.00939269	0.00976643	0.00981195	0.0102171	0.01029173
0.00970921	0.00974647	0.00984259	0.00990544	0.0109396	0.01104267	0.01033848	0.01037085	0.00945218	0.00941838	0.00930153	0.00930691	0.01011386	0.01016543	0.01031911	0.01039449
0.00971494	0.00974733	0.00996724	0.01003021	0.01064054	0.01076377	0.01019542	0.01023686	0.00935977	0.00933631	0.00942934	0.00944158	0.01029784	0.01038085	0.01046591	0.01052701
0.00956492	0.00960929	0.00998981	0.01006402	0.01012761	0.01019294	0.0099404	0.00995647	0.00922084	0.00925669	0.00948979	0.00954969	0.01058632	0.01068364	0.01058934	0.01061713
0.00964101	0.00969066	0.00990557	0.00998024	0.01002019	0.01004783	0.00985153	0.00985612	0.00921959	0.00925067	0.00958588	0.00964567	0.01046424	0.01058322	0.01054411	0.01058186
0.01007219	0.01015662	0.00988226	0.00994337	0.00986032	0.00980292	0.00986682	0.00986699	0.00917101	0.00921375	0.00970748	0.00977869	0.01050847	0.0105757	0.01053731	0.0105523
0.0103952	0.01049392	0.00988071	0.00991153	0.00985277	0.0098212	0.00987195	0.00988001	0.0095769	0.00962553	0.00981622	0.00988815	0.01060112	0.01063009	0.01045518	0.01045865
0.01043503	0.01055497	0.00979093	0.00983043	0.00966565	0.00964506	0.00996412	0.00997942	0.00984792	0.00992773	0.00993891	0.00999744	0.01063499	0.0105712	0.01038195	0.01038315
0.00985618	0.00992101	0.00963635	0.00965187	0.00980337	0.00984163	0.01015768	0.01022224	0.01011564	0.01020884	0.01010949	0.01013584	0.01063885	0.0106026	0.0102529	0.0102587
0.00951664	0.0095447	0.00946695	0.00947102	0.00987382	0.00990755	0.01035207	0.01041732	0.01000878	0.0101229	0.01000901	0.01004439	0.01046443	0.01043987	0.01020899	0.01022211
0.00931034	0.00925347	0.00930552	0.00930669	0.00996791	0.01001453	0.0105888	0.01066694	0.00998251	0.01004642	0.00998939	0.01000274	0.01027329	0.01031387	0.01011101	0.01017378
0.00937351	0.0093411	0.00936789	0.00937394	0.0102829	0.01033555	0.01071813	0.01079707	0.01004333	0.01007146	0.00997358	0.00997619	0.01008587	0.01011957	0.00999403	0.01005472
0.00949839	0.00947643	0.00955236	0.00956533	0.01053899	0.01062503	0.01069887	0.01076349	0.01010903	0.0100471	0.0099009	0.0099013	0.00984485	0.00989062	0.00986879	0.00993988
0.00942977	0.00946606	0.00978092	0.00984344	0.01097306	0.01107495	0.01064243	0.01067617	0.01002674	0.00999011	0.00988334	0.00988863	0.01002669	0.01007817	0.00982664	0.00989826
0.00930241	0.00933291	0.01005717	0.01012115	0.01112323	0.01124927	0.01047935	0.01052196	0.00996572	0.00994009	0.00999876	0.01001129	0.0100028	0.01008268	0.00984773	0.00990515
0.00922979	0.00927251	0.01014523	0.0102209	0.01111111	0.01118291	0.0102983	0.01031691	0.00979851	0.00983634	0.01004832	0.01011161	0.01003482	0.01012665	0.00991686	0.00994225
0.00971592	0.00976476	0.01036154	0.0104381	0.01068301	0.01071528	0.01006461	0.01007081	0.00975653	0.00978903	0.01015883	0.01022209	0.00967061	0.00978132	0.00987992	0.00991506
0.0104196	0.01050589	0.01046144	0.01052508	0.01009305	0.01003607	0.009772	0.00977407	0.00973504	0.00978019	0.01024205	0.01031711	0.00960976	0.009671	0.00980227	0.00981565
0.01098182	0.01108459	0.01045058	0.01048375	0.00972574	0.00969362	0.00951728	0.00952348	0.0101021	0.01015334	0.01033965	0.01041545	0.00974452	0.00977056	0.00975364	0.00975648
0.01088177	0.01100609	0.01026035	0.01030198	0.00960434	0.009583	0.00951387	0.00952687	0.01045302	0.01053781	0.01049817	0.01055999	0.00995702	0.00989616	0.00971235	0.00971333
0.01078455	0.0108536	0.01008129	0.01009851	0.00962481	0.00966243	0.00945879	0.00951714	0.01066956	0.01076818	0.01058415	0.01061289	0.01015101	0.01011736	0.00957255	0.00957768
0.0102457	0.01027542	0.00985731	0.00986212	0.00947276	0.00950419	0.00947672	0.00953424	0.01053339	0.01065368	0.0104764	0.01051456	0.00989671	0.00987385	0.00957386	0.00958592

IRREGULAR VARIATIONS GRAPH:

H	I	J	K
0.00965396	0.00969318	0.00950918	0.0095691
0.00927962	0.00931062	0.00944904	0.0095074
0.00907374	0.00911573	0.00950792	0.00957723
0.00932505	0.00937259	0.00962591	0.00969596
0.00948296	0.00955961	0.00973886	0.00979563
0.00986283	0.00995338	0.00995312	0.00997816
0.00974286	0.00985357	0.00998563	0.01002067
0.00992633	0.0099892	0.00999894	0.01001286
0.00995586	0.00998316	0.00996787	0.0099711
0.01011252	0.01005123	0.00996426	0.00996588
0.01016439	0.01013025	0.00987162	0.00987786
0.01008981	0.01006649	0.00997288	0.00998621
0.00989725	0.00993691	0.00994496	0.01000742
0.00969299	0.00972573	0.00979206	0.00985215
0.00962925	0.00967419	0.00988003	0.00995176
0.00996756	0.01001844	0.0099923	0.01006478
0.01006748	0.01014815	0.01007164	0.01013011
0.00997877	0.01007026	0.01022102	0.01024628
0.00987316	0.00998609	0.01015914	0.01019403
0.0100077	0.01007075	0.01011812	0.01013098
0.01034534	0.0103743	0.01021859	0.01022154
0.01042489	0.01036139	0.01010825	0.01010865
0.01035684	0.01032001	0.00994564	0.00995044
0.01017594	0.01015018		
0.0099731	0.01001253		
0.00975444	0.00978689		
0.00960525	0.00964949		



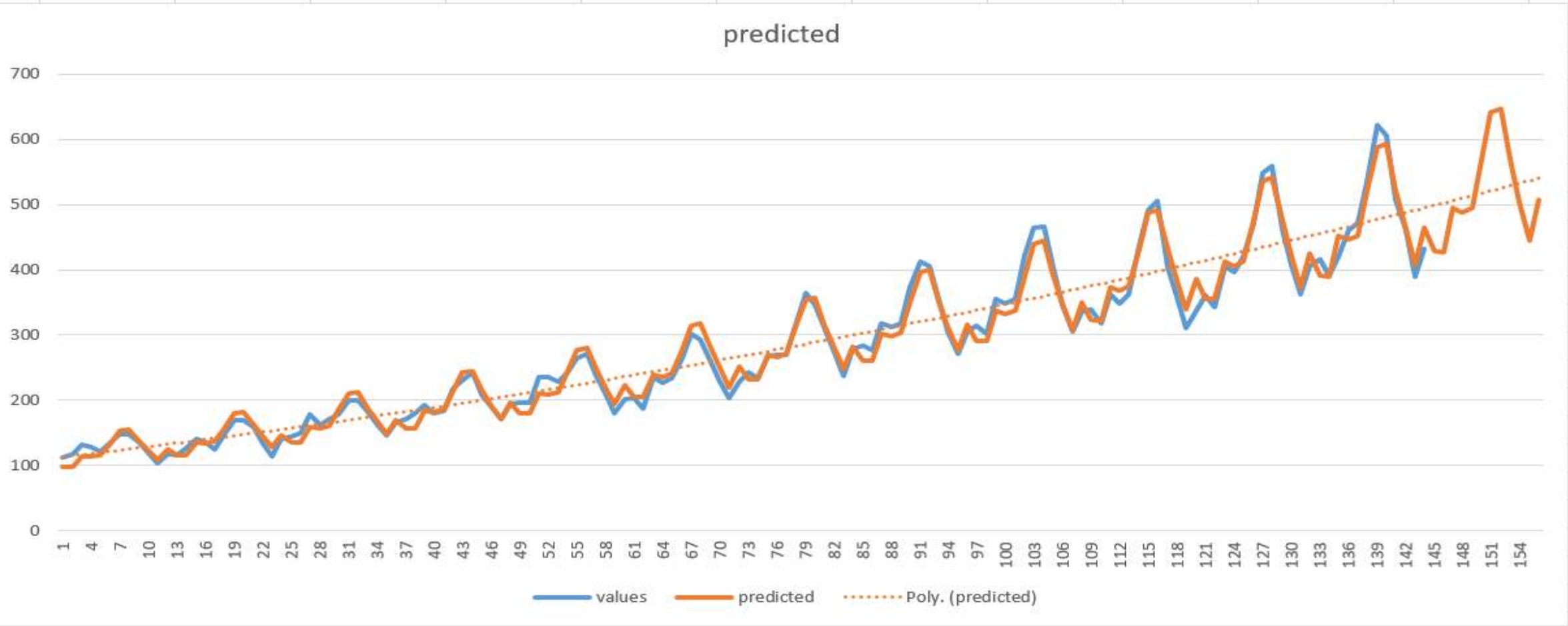


By using the polynomial equation we predict the values  
polynomial equation  $y = ax^2+bx+c$   
 $y = 0.00684833*146^2+1.66732125*146+111.669544$ In the same way, we will predict all the values for every month of the year

▲	A	B	C	D	▲	A	B	C	D	▲	A	B	C	D
1	values	adjmean	trend values	predicted	30	172		165.781306	160.182994	59	211		231.411959	220.015624
2	112	86.1133931	113.343714	97.6041176	31	178		167.852679	185.077747	60	180		233.880534	194.585076
3	118	85.1870763	115.03158	97.9920397	32	199		169.937748	210.104286	61	201		236.362807	222.702285
4	132	97.9998044	116.733143	114.398252	33	199		172.036514	212.825588	62	204		238.858776	205.689397
5	129	95.896633	118.448402	113.58803	34	184		174.148977	188.216912	63	188		241.368442	205.614719
6	121	96.6230741	120.177359	116.119058	35	162		176.275136	167.594122	64	235		243.891805	239.013491
7	135	110.262016	121.920011	134.431462	36	146		178.414992	148.438581	65	227		246.428864	236.316983
8	148	123.636031	123.676361	152.908543	37	166		180.568545	170.132636	66	234		248.97962	240.571762
9	148	123.709545	125.446407	155.189179	38	171		182.735794	157.359993	67	264		251.544072	277.357565
10	136	108.078104	127.23015	137.507933	39	180		184.91674	157.525164	68	302		254.122221	314.186627
11	119	95.0753042	129.02759	122.673373	40	193		187.111383	183.368789	69	293		256.714067	317.579803
12	104	83.198491	130.838726	108.855845	41	181		189.319722	181.551239	70	259		259.319609	280.267716
13	118	94.220528	132.663559	124.996305	42	183		191.541758	185.073535	71	229		261.938849	249.039157
14	115		134.502088	115.824312	43	218		193.777491	213.662968	72	203		264.571784	220.119732
15	126		136.354314	116.156254	44	230		196.02692	242.359903	73	229		267.218417	251.774603
16	141		138.220237	135.455562	45	242		198.290046	245.303713	74	242		269.878746	232.401745
17	135		140.099856	134.351045	46	209		200.566869	216.768868	75	233		272.552772	232.179738
18	125		141.993173	137.198168	47	191		202.857388	192.867278	76	267		275.240494	269.735146
19	149		143.900185	158.667245	48	172		205.161604	170.691359	77	269		277.941913	266.536936
20	170		145.820895	180.287166	49	194		207.479516	195.488296	78	270		280.657029	271.179449
21	170		147.755301	182.78741	50	196		209.811126	180.675479	79	315		283.385841	312.466942
22	158		149.703404	161.7966	51	196		212.156432	180.729861	80	364		286.12835	353.757734
23	133		151.665203	144.196153	52	236		214.515434	210.224706	81	347		288.884556	357.377769
24	114		153.640699	127.826743	53	235		216.888133	207.988417	82	312		291.654458	315.214608
25	140		155.629892	146.635306	54	229		219.274529	211.869791	83	274		294.438057	279.937879
26	145		157.632782	135.742937	55	243		221.674622	244.422907	84	237		297.235353	247.295329
27	150		159.649368	136.000629	56	264		224.088411	277.054016	85	278		300.046345	282.705251
28	178		161.67965	158.445741	57	272		226.515897	280.221785	86	284		302.871035	260.812524
29	163		163.72363	157.005448	58	237		228.957079	247.45247	87	277		305.70942	260.424917

▲	A	B	C	D	▲	A	B	C	D	144	390	490.137983	407.787406
88	317		308.561503	302.389669	117	505		397.229937	491.411347	145	432	493.770775	465.233431
89	313		311.427282	298.648277	118	404		400.49292	432.845153	146		497.417264	428.342883
90	318		314.306757	303.692851	119	359		403.769598	383.885174	147		501.077449	426.853229
91	374		317.19993	349.751037	120	310		407.059974	338.667756	148		504.751331	494.655317
92	413		320.106798	395.767339	121	337		410.364046	386.647171	149		508.438909	487.575795
93	405		323.027364	399.615681	122	360		413.681815	356.235447	150		512.140185	494.84559
94	355		325.961626	352.293145	123	342		417.01328	355.241421	151		515.855157	568.792295
95	306		328.909585	312.711789	124	406		420.358442	411.950451	152		519.583825	642.392817
96	271		331.871241	276.111865	125	396		423.717301	406.330625	153		523.32619	647.404447
97	306		334.846593	315.494228	126	420		427.089857	412.667349	154		527.082252	569.660503
98	315		337.835642	290.921735	127	472		430.476109	474.651636	155		530.852011	504.709164
99	301		340.838388	290.350258	128	548		433.876057	536.427135	156		534.635466	444.80864
100	356		343.85483	336.977061	129	559		437.289703	540.9691	157		538.432618	507.314056
101	348		346.884969	332.651006	130	463		440.717045	476.318625				
102	355		349.928805	338.111968	131	407		444.158084	422.284649				
103	422		352.986337	389.209851	132	362		447.612819	372.407111				
104	465		356.057566	440.215441	133	405		451.081251	425.011137				
105	467		359.142491	444.293541	134	417		454.56338	391.43995				
106	404		362.241114	391.503326	135	391		458.059205	390.207245				
107	347		365.353432	347.360887	136	419		461.568727	452.33645				
108	305		368.479448	306.56934	137	461		465.091946	446.007516				
109	336		371.61916	350.141535	138	472		468.628861	452.803612				
110	340		374.772569	322.729375	139	535		472.179473	520.634606				
111	318		377.939675	321.955759	140	622		475.743782	588.190727				
112	362		381.120477	373.497322	141	606		479.321787	592.9668				
113	348		384.314976	368.545122	142	508		482.913489	521.923741				
114	363		387.523171	374.436801	143	461		486.518888	462.559312				
115	435		390.745063	430.843384	144	390		490.137983	407.787406				
116	491		393.980652	487.102039	145	432		493.770775	465.233431				

Predicted graph:





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

```
=average(b2:b13)
```

In the same way, we calculate average for every year

[illegible]

Using data analysis tool in excel we calculate polynomial equation using average(years) and time  
We obtain intercept and x variable a=0.00684833 b=1.66732125 c=111.669544  
Using these values a and b from equation  $y = ax^2 + bx + c$  we find  $y = 0.00684833 * B17^2 + 1.66732125 * B17 + 111.669544$   
=113.34371

eq_1	eq_2	eq_3	eq_4	eq_5	eq_6	eq_7	eq_8	eq_9	eq_10	eq_11	eq_12
113.34371	134.50209	157.63278	182.73579	209.81113	238.85878	269.87875	302.87103	337.83564	374.77257	413.68181	454.56338
115.03158	136.35431	159.64937	184.91674	212.15643	241.36844	272.55277	305.70942	340.83839	377.93967	417.01328	458.0592
116.73314	138.22024	161.67965	187.11138	214.51543	243.8918	275.24049	308.5615	343.85483	381.12048	420.35844	461.56873
118.4484	140.09986	163.72363	189.31972	216.88813	246.42886	277.94191	311.42728	346.88497	384.31498	423.7173	465.09195
120.17736	141.99317	165.78131	191.54176	219.27453	248.97962	280.65703	314.30676	349.9288	387.52317	427.08986	468.62886
121.92001	143.90019	167.85268	193.77749	221.67462	251.54407	283.38584	317.19993	352.98634	390.74506	430.47611	472.17947
123.67636	145.82089	169.93775	196.02692	224.08841	254.12222	286.12835	320.1068	356.05757	393.98065	433.87606	475.74378
125.44641	147.7553	172.03651	198.29005	226.5159	256.71407	288.88456	323.02736	359.14249	397.22994	437.2897	479.32179
127.23015	149.7034	174.14898	200.56687	228.95708	259.31961	291.65446	325.96163	362.24111	400.49292	440.71704	482.91349
129.02759	151.6652	176.27514	202.85739	231.41196	261.93885	294.43806	328.90959	365.35343	403.7696	444.15808	486.51889
130.83873	153.6407	178.41499	205.1616	233.88053	264.57178	297.23535	331.87124	368.47945	407.05997	447.61282	490.13798
132.66356	155.62989	180.56854	207.47952	236.36281	267.21842	300.04635	334.84659	371.61916	410.36405	451.08125	493.77077

We express the all initial data as the percentage of trend on the basis of the following formula

=initial value/poly\_eq\_value\*100

=112/113.34371\*100=98.814479

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

%_1	%_2	%_3	%_4	%_5	%_6	%_7	%_8	%_9	%_10	%_11	%_12
98.814479	85.500531	91.985943	93.577726	93.417353	85.406115	89.669899	93.769284	93.240606	90.721688	87.023405	91.736382
102.58053	92.406317	93.9559	97.341106	92.384661	77.889221	85.488032	90.608919	88.311649	84.140412	82.011777	85.360145
113.07843	102.01111	110.09425	103.14712	110.01539	96.354201	97.006075	102.73479	103.53206	94.983089	96.584238	90.777381
108.90818	96.359842	99.558018	95.605465	108.35079	92.115833	96.782812	100.505	100.32144	90.550726	93.458539	99.120186
100.68452	88.032402	103.75114	95.540524	104.43529	93.983596	96.202828	101.17504	101.44921	93.671818	98.339961	100.71936
110.72834	103.54399	106.04537	112.50017	109.62013	104.95179	111.15587	117.90671	119.55137	111.32578	109.64604	113.30437
119.66717	116.58137	117.1017	117.33082	117.81064	118.84045	127.21564	129.01944	130.59686	124.62541	126.30335	130.74264
117.97867	115.05509	115.67312	122.04344	120.07987	114.13477	120.11719	125.37638	130.03195	127.1304	127.83288	126.42864
106.8929	105.54202	105.65666	104.20465	103.51285	99.876751	106.97591	108.90853	111.52793	100.87569	105.05607	105.19483
92.228337	87.693154	91.901787	94.154816	91.179385	87.424985	93.058622	93.034686	94.976527	88.912093	91.634041	94.7548
79.48717	74.19909	81.831688	83.83635	76.962369	76.727759	79.734795	81.658175	82.772595	76.155854	80.873466	79.56943
88.946807	89.957012	91.931848	93.503206	85.03876	85.697686	92.652353	91.385132	90.415144	82.122204	89.784268	87.48999



Similarly, we will find remaining values

[illegible]

Deseasonalization of data:

Deaseasonalisation using seasonal index of Adjusted mean

$Y / S1 = \text{initial\_data} / \text{Adusted\_mean}$

Similarly, for all records of 144 months we calculate the values

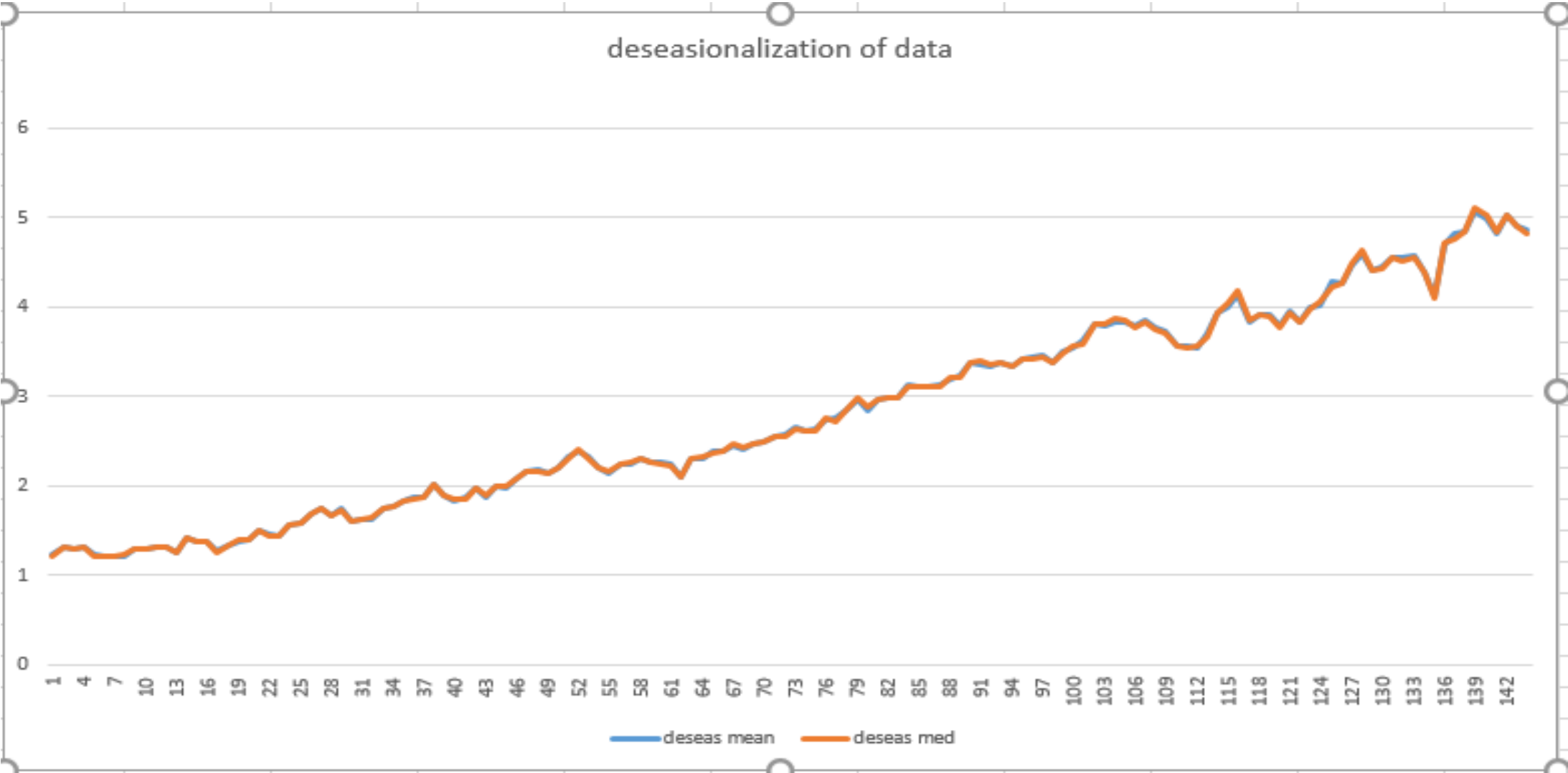
Deaseasonalisation using seasonal index of Adjusted median

$Y / S2 = \text{initial\_data} / \text{Adusted\_median}$

Similarly for all records of 144 months we calculate the values

▲	A	B	C	D	E	F	▲	A	B	C	D	E	F	▲	A	B	C	D	E	F	127	126	472		4.2586942		4.2625658
1	months	values	adjmean	deseas mean	adj median	deseas med	43		42	218		1.9669393		1.9687274	85	84	278		3.121586		3.0992203	128	127	548	4.4567687		4.4949594
2	1	112	91.218399	1.2278225	91.686722	1.2215509	44		43	230		1.8705416		1.8865705	86	85	284		3.113407		3.0975041	129	128	559	4.5896215		4.625554
3	2	118	89.353417	1.3205986	89.290403	1.3215306	45		44	242		1.9869202		2.002476	87	86	277		3.1000493		3.1022371	130	129	463	4.3957622		4.4024659
4	3	132	101.67064	1.2983099	102.17855	1.2918563	46		45	209		1.9842641		1.9872902	88	87	317		3.1179109		3.1024125	131	130	407	4.437139		4.4291975
5	4	129	98.447915	1.3103376	97.765494	1.319484	47		46	191		2.0822937		2.0785669	89	88	313		3.1793462		3.2015386	132	131	362	4.5553817		4.55341
6	5	121	98.143722	1.2328858	99.323273	1.2182442	48		47	172		2.1644355		2.1634987	90	89	318		3.2401461		3.2016665	133	132	405	4.5476342		4.5150512
7	6	135	110.83209	1.2180587	110.73143	1.2191661	49		48	194		2.1783729		2.1627653	91	90	374		3.3744738		3.3775415	134	133	417	4.5714462		4.5480958
8	7	148	122.95904	1.2036529	121.91434	1.2139671	50		49	196		2.1486893		2.1377141	92	91	413		3.3588421		3.3876245	135	134	391	4.3758819		4.3789701
9	8	148	121.79654	1.2151413	120.85039	1.2246547	51		50	196		2.1935367		2.1950847	93	92	405		3.3252177		3.3512511	136	135	419	4.1211503		4.1006651
10	9	136	105.32872	1.2911958	105.16833	1.2931649	52		51	236		2.3212207		2.3096825	94	93	355		3.3704008		3.3755408	137	136	461	4.6826792		4.7153651
11	10	119	91.725772	1.2973453	91.890235	1.2950234	53		52	235		2.387049		2.4037111	95	94	306		3.3360308		3.3300601	138	137	472	4.8092735		4.7521591
12	11	104	79.466448	1.3087284	79.500857	1.308162	54		53	229		2.3333128		2.3056026	96	95	271		3.4102443		3.4087683	139	138	535	4.8271216		4.8315099
13	12	118	89.057295	1.3249897	89.69998	1.3154964	55		54	243		2.1925057		2.1944989	97	96	306		3.4359903		3.411372	140	139	622	5.0585952		5.1019429
14	13	115		1.2607106		1.254271	56		55	264		2.1470565		2.1654549	98	97	315		3.4532507		3.435612	141	140	606	4.975511		5.0144646
15	14	126		1.4101307		1.4111259	57		56	272		2.2332326		2.2507168	99	98	301		3.3686457		3.371023	142	141	508	4.8229961		4.8303513
16	15	141		1.386831		1.3799374	58		57	237		2.2500986		2.25353	100	99	356		3.5015024		3.4840973	143	142	461	5.0258503		5.0168552
17	16	135		1.3712835		1.3808553	59		58	211		2.300335		2.2962179	101	100	348		3.5348641		3.5595381	144	143	390	4.9077316		4.9056075
18	17	125		1.2736423		1.2585167	60		59	180		2.2651069		2.2641265	102	101	355		3.6171443		3.5741875	145	144	432	4.8508098		4.8160546
19	18	149		1.3443759		1.3455981	61		60	201		2.256974		2.2408032	103	102	422		3.8075613		3.8110228						
20	19	170		1.3825742		1.3944217	62		61	204		2.2363909		2.2249677	104	103	465		3.7817472		3.8141535						
21	20	170		1.3957704		1.406698	63		62	188		2.1040046		2.1054894	105	104	467		3.8342634		3.8642821						
22	21	158		1.5000657		1.5023534	64		63	235		2.311385		2.2998957	106	105	404		3.8356111		3.8414605						
23	22	133		1.4499742		1.447379	65		64	227		2.3057878		2.3218826	107	106	347		3.7830153		3.7762446						
24	23	114		1.4345677		1.4339468	66		65	234		2.3842585		2.3559433	108	107	305		3.8380978		3.8364366						
25	24	140		1.5720217		1.5607584	67		66	264		2.3819815		2.3841469	109	108	336		3.7728521		3.7458202						
26	25	145		1.5895916		1.5814722	68		67	302		2.4561025		2.4771491	110	109	340		3.7273182		3.7082796						
27	26	150		1.6787271		1.6799118	69		68	293		2.4056513		2.4244854	111	110	318		3.5589014		3.561413						
28	27	178		1.7507512		1.7420486	70		69	259		2.4589685		2.4627185	112	111	362		3.5605165		3.542818						
29	28	163		1.6556978		1.6672549	71		70	229		2.4965721		2.4921038	113	112	348		3.5348641		3.5595381						
30	29	172		1.7525319		1.731719	72		71	203		2.5545372		2.5534316	114	113	363		3.6986574		3.6547326						
31	30	178		1.606033		1.607493	73		72	229		2.5713784		2.5529549	115	114	435		3.9248559		3.9284239						
32	31	199		1.6184251		1.6322936	74		73	242		2.6529736		2.6394225	116	115	491		3.9931997		4.027418						
33	32	199		1.6338724		1.6466641	75		74	233		2.6076227		2.609463	117	116	505		4.1462591		4.1787205						
34	33	184		1.746912		1.7495761	76		75	267		2.6261268		2.613073	118	117	404		3.8356111		3.8414605						
35	34	162		1.766134		1.762973	77		76	269		2.7324093		2.751482	119	118	359		3.9138401		3.9068352						
36	35	146		1.8372534		1.8364582	78		77	270		2.7510675		2.7183961	120	119	310		3.9010174		3.899329						
37	36	166		1.8639686		1.8506136	79		78	315		2.842137		2.8447208	121	120	337		3.7840808		3.7569685						
38	37	171		1.8746218		1.8650465	80		79	364		2.9603354		2.9857029	122	121	360		3.9465722		3.9264137						
39	38	180		2.0144725		2.0158941	81		80	347		2.8490137		2.8713189	123	122	342		3.8274977		3.8301989						
40	39	193		1.8982864		1.8888505	82		81	312		2.9621551		2.9666725	124	123	406		3.9932865		3.9734368						
41	40	181		1.8385356		1.851369	83		82	274		2.9871648		2.9818185	125	124	396		4.0224316		4.0505089						
42	41	183		1.8646124		1.8424685	84		83	237		2.9823908		2.9810999	126	125	420		4.2794383		4.2286162						

DESEASONALIZATION OF DATA GRAPH:





CYCLICAL FLUCTUATIONS AND IRREGULAR VARIATIONS:

We compute the cyclical fluctuations by  
 $C = \text{deseasonalization data} / \text{poly\_eq\_value}$   
Similarly , we calculate all the values

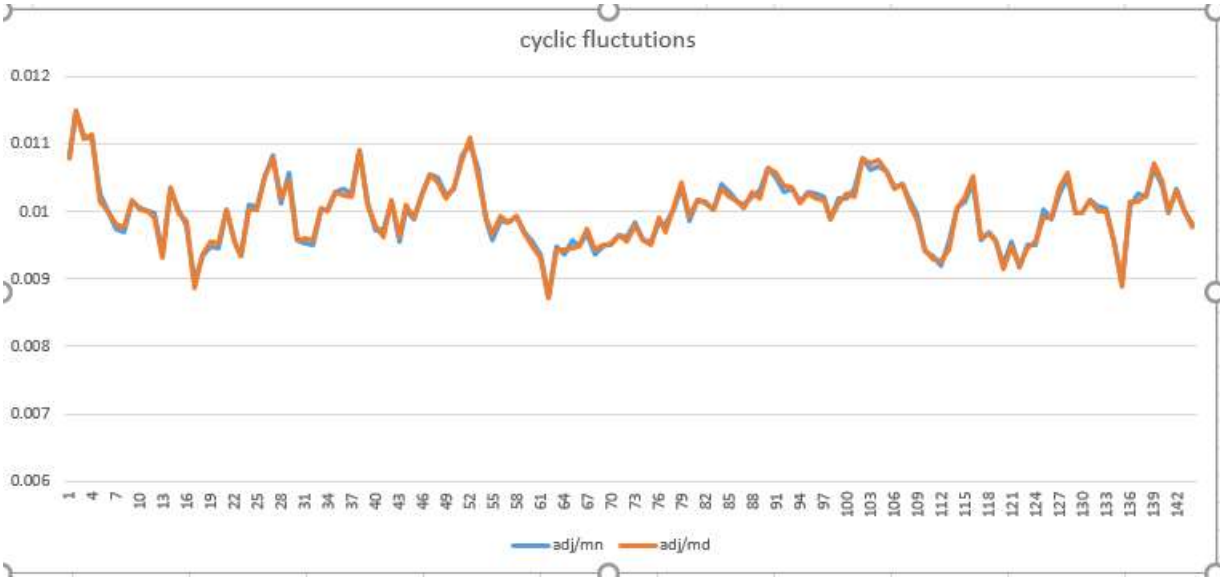
By Using cyclic fluctuations,we calculate the irregular variations of three year moving averages and seven year moving averages

▲	A	B	C	D	E	F	G	H	I	J	K	▲	A	B	C	D	E	F	G	H	I	J	K
1	months	values	deseas mean	deseas med	trend values	adj/mn	adj/md	3yr_ma	3yr_ma	7yr_ma	7yr_ma	43	42	218	1.9669393	1.9687274	193.77749	0.0101505	0.0101597	0.0099043	0.0099608	0.0101315	0.0101438
2	1	112	1.2278225	1.2215509	113.34371	0.0108327	0.0107774	0.0111145	0.0111109	0.0106399	0.0106321	44	43	230	1.8705416	1.8865705	196.02692	0.0095423	0.009624	0.0098186	0.009877	0.0101444	0.010148
3	2	118	1.3205986	1.3215306	115.03158	0.0114803	0.0114884	0.0112216	0.0112316	0.0104762	0.0104871	45	44	242	1.9869202	2.002476	198.29005	0.0100203	0.0100987	0.0100595	0.0100845	0.0102583	0.0102512
4	3	132	1.2983099	1.2918563	116.73314	0.0111122	0.0110667	0.0108145	0.0107812	0.0102859	0.0102979	46	45	209	1.9842641	1.9872902	200.56687	0.0098933	0.0099084	0.010236	0.0102334	0.0103726	0.0103466
5	4	129	1.3103376	1.319484	118.4484	0.0110625	0.0111397	0.0104373	0.0104255	0.0101335	0.0101508	47	46	191	2.0822937	2.0785669	202.85739	0.0102648	0.0102464	0.010438	0.0104053	0.0105316	0.0105144
6	5	121	1.2328858	1.2182442	120.17736	0.0102589	0.0101371	0.0099939	0.0099841	0.009982	0.0099877	48	47	172	2.1644355	2.1634987	205.1616	0.0105499	0.0105453	0.0104301	0.010386	0.0105853	0.0105527
7	6	135	1.2180587	1.2191661	121.92001	0.0099906	0.0099997	0.0098032	0.0098593	0.0099433	0.0099561	49	48	194	2.1783729	2.1627653	207.47952	0.0104992	0.010424	0.0103598	0.0103198	0.0104911	0.0104605
8	7	148	1.2036529	1.2139671	123.67636	0.0097323	0.0098157	0.0098558	0.009914	0.0098551	0.0098598	50	49	196	2.1486893	2.1377141	209.81113	0.0102411	0.0101888	0.010467	0.0104341	0.01036	0.0103518
9	8	148	1.2151413	1.2246547	125.44641	0.0096865	0.0097624	0.0099633	0.0099877	0.0099421	0.009936	51	50	196	2.1935367	2.1950847	212.15643	0.0103392	0.0103465	0.010722	0.0107321	0.0103054	0.0103157
10	9	136	1.2911958	1.2931649	127.23015	0.0101485	0.010164	0.0100686	0.0100664	0.0099917	0.0099676	52	51	236	2.3212207	2.3096825	214.51543	0.0108208	0.010767	0.0108226	0.0107881	0.0102323	0.0102437
11	10	119	1.2973453	1.2950234	129.02759	0.0100548	0.0100368	0.010015	0.0099837	0.0099402	0.0099236	53	52	235	2.387049	2.4037111	216.88813	0.0110059	0.0110827	0.0105125	0.010499	0.0101066	0.0101231
12	11	104	1.3087284	1.308162	130.83873	0.0100026	0.0099983	0.0097878	0.0097465	0.0097852	0.0097559	54	53	229	2.3333128	2.3056026	219.27453	0.0106411	0.0105147	0.0100377	0.0100259	0.0099179	0.0099228
13	12	118	1.3249897	1.3154964	132.66356	0.0099876	0.0099916	0.0099008	0.0098634	0.0096909	0.0096635	55	54	243	2.1925057	2.1944989	221.67462	0.0098906	0.0098996	0.009777	0.0098331	0.0097618	0.0097751
14	13	115	1.2607106	1.254271	134.50209	0.0093732	0.0093253	0.0099161	0.009886	0.0096185	0.009613	56	55	264	2.1470565	2.1654549	224.08841	0.0095813	0.0096634	0.009756	0.0098141	0.0096864	0.0096916
15	14	126	1.4101307	1.4111259	136.35431	0.0103417	0.010349	0.0100544	0.0100629	0.009629	0.0096409	57	56	272	2.2332326	2.2507168	226.5159	0.0098591	0.0099362	0.0098757	0.0099005	0.0095629	0.0095572
16	15	141	1.386831	1.3799374	138.22024	0.0100335	0.0099836	0.009597	0.0095677	0.0095831	0.0095961	58	57	237	2.2500986	2.25353	228.95708	0.0098276	0.0098426	0.0098176	0.0098153	0.0095084	0.0094849
17	16	135	1.37112835	1.3808553	140.09986	0.0097879	0.0098562	0.0093667	0.0093568	0.0095155	0.0095332	59	58	211	2.300335	2.2962179	231.41196	0.0099404	0.0099226	0.0097247	0.0096946	0.0094411	0.0094248
18	17	125	1.2736423	1.2585167	141.99317	0.0089697	0.0088632	0.0092645	0.0092589	0.0094511	0.0094584	60	59	180	2.2651069	2.2641265	233.88053	0.0096849	0.0096807	0.0095322	0.009492	0.0093891	0.0093591
19	18	149	1.3443759	1.3455981	143.90019	0.0093424	0.0093509	0.0094234	0.009478	0.0096127	0.0096249	61	60	201	2.256974	2.2408032	236.36281	0.0095488	0.0094804	0.0092095	0.0091728	0.0093583	0.0093301
20	19	170	1.3825742	1.3944217	145.82089	0.0094813	0.0095626	0.0096494	0.0097062	0.0097187	0.0097223	62	61	204	2.2363909	2.2249677	238.85878	0.0093628	0.009315	0.0091856	0.009156	0.0093749	0.0093684
21	20	170	1.3957704	1.406698	147.7553	0.0094465	0.0095205	0.0096757	0.0096997	0.0098664	0.0098595	63	62	188	2.1040046	2.1054894	241.36844	0.008717	0.0087231	0.0091836	0.0091917	0.0093761	0.0093868
22	21	158	1.5000657	1.5023534	149.7034	0.0100203	0.0100355	0.0096393	0.0096373	0.0100638	0.0100386	64	63	235	2.311385	2.2998957	243.8918	0.0094771	0.00943	0.00947	0.0094382	0.0094854	0.0094974
23	22	133	1.4499742	1.447379	151.6652	0.0095604	0.0095433	0.0096662	0.009635	0.010077	0.0100597	65	64	227	2.3057878	2.3218826	246.42886	0.0093568	0.0094221	0.0094675	0.0094542	0.0094931	0.0095094
24	23	114	1.4345677	1.4339468	153.6407	0.0093372	0.0093331	0.0098408	0.0097981	0.0102214	0.0101887	66	65	234	2.3842585	2.3559433	248.97962	0.0095761	0.0094624	0.0095702	0.0095628	0.0095358	0.0095421
25	24	140	1.5720217	1.5607584	155.62989	0.010101	0.0100287	0.0102334	0.0101946	0.0102544	0.0102235	67	66	264	2.3819815	2.3841469	251.54407	0.0094694	0.009478	0.0095018	0.0095567	0.0095424	0.0095552
26	25	145	1.5895916	1.5814722	157.63278	0.0100841	0.0100326	0.0104759	0.0104433	0.0101719	0.010163	68	67	302	2.4561025	2.4771491	254.12222	0.009665	0.0097479	0.0095061	0.009563	0.009594	0.0095983
27	26	150	1.6787271	1.6799118	159.64937	0.0105151	0.0105225	0.0104855	0.0104935	0.0100881	0.0100971	69	68	293	2.4056513	2.4244854	256.71407	0.0093709	0.0094443	0.0094615	0.0094851	0.00958	0.0095735
28	27	178	1.7507512	1.7420486	161.67965	0.0108285	0.0107747	0.0105042	0.0104679	0.010019	0.0100291	70	69	259	2.4589685	2.4627185	259.31961	0.0094824	0.0094968	0.0095563	0.009554	0.0096044	0.0095806
29	28	163	1.6556978	1.6672549	163.72363	0.0101128	0.0101833	0.0100841	0.0100687	0.0099033	0.0099186	71	70	229	2.4965721	2.4921038	261.93885	0.0095311	0.0095141	0.0096031	0.009573	0.0096541	0.0096381
30	29	172	1.7525319	1.731719	165.78131	0.0105713	0.0104458	0.0098877	0.009876	0.0099298	0.0099343	72	71	203	2.5545372	2.5534316	264.57178	0.0096554	0.0096512	0.0097028	0.0096617	0.0096929	0.0096626
31	30	178	1.606033	1.607493	167.85268	0.0095681	0.0095768	0.0095297	0.0095846	0.0098942	0.0099062	73	72	229	2.5713784	2.5529549	267.21842	0.0096228	0.0095538	0.0096735	0.0096636	0.0097463	0.0097179
32	31	199	1.6184251	1.6322936	169.93775	0.0095236	0.0096052	0.009684	0.0097411	0.0099929	0.0099961	74	73	242	2.6529736	2.6394225	269.87875	0.0098302	0.00978	0.0096463	0.009616	0.0098496	0.0098438
33	32	199	1.6338724	1.6466641	172.03651	0.0094972	0.0095716	0.0098492	0.0098731	0.0101887	0.0101813	75	74	233	2.6076227	2.609463	272.55277	0.0095674	0.0095742	0.0096465	0.0096558	0.0098542	0.0098665
34	33	184	1.746912	1.7495761	174.14898	0.0100311	0.0100464	0.0101116	0.0101136	0.0102812	0.0102561	76	75	267	2.6261268	2.613073	275.24049	0.0095412	0.0094938	0.0097248	0.009693	0.0099383	0.0099519
35	34	162	1.766134	1.762973	176.27514	0.0100192	0.0100013	0.0102132	0.0101811	0.0102355	0.0102179	77	76	269	2.7324093	2.751482	277.94191	0.0098309	0.0098995	0.0098874	0.0098745	0.0100246	0.0100424
36	35	146	1.8372534	1.8364582	178.41499	0.0102976	0.0102932	0.010293	0.0102494	0.0101949	0.0101633	78	77	270	2.7510675	2.7183961	280.65703	0.0098022	0.0098858	0.0100592	0.010053	0.0100536	0.010061
37	36	166	1.8639686	1.8506136	180.56854	0.0103228	0.0102488	0.0104918	0.0104522	0.0101739	0.0101442	79	78	315	2.842137	2.8447208	283.38584	0.0100292	0.0100383	0.0100792	0.0101375	0.0101395	0.0101529
38	37	171	1.8746218	1.8650465	182.73579	0.0102586	0.0102062	0.0104326	0.0104009	0.0100624	0.0100549	80	79	364	2.9603354	2.9857029	286.12835	0.0103462	0.0104348	0.0101216	0.010182	0.0101753	0.0101798
39	38	180	2.0144725	2.0158941	184.91674	0.0108939	0.0109016	0.0102501	0.0102585	0.0100283	0.0100396	81	80	347	2.8490137	2.8713189	288.88456	0.0098621	0.0099339	0.0100546	0.0100795	0.0101459	0.0101388
40	39	193	1.8982864	1.8888505	187.11138	0.0101452	0.0100948	0.0098638	0.009831	0.0098854	0.0098977	82	81	312	2.9621551	2.9666725	291.65446	0.0101564	0.0101719	0.0101118	0.0101095	0.0101806	0.0101553
41	40	181	1.8385356	1.851369	189.31972	0.0097113	0.0097791	0.0098655	0.0098526	0.0099025	0.0099194	83	82	274	2.9871648	2.9818185	294.43806	0.0101453					

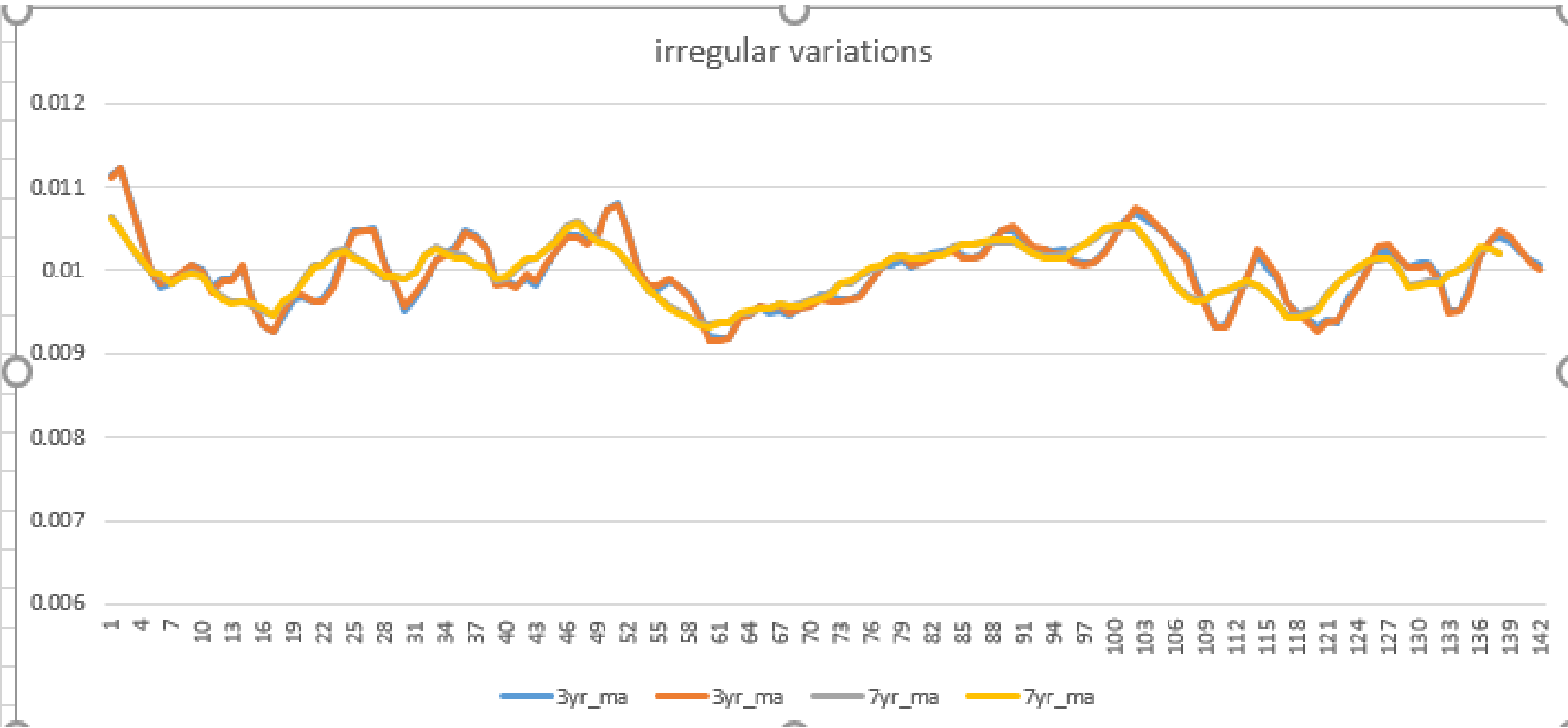
CYCLIC FLUCTUATIONS GRAPH:

▲	A	B	C	D	E	F	G	H	I	J	K
85	84	278	3.121586	3.0992203	300.04635	0.0104037	0.0103291	0.0102746	0.0102346	0.0102978	0.0102676
86	85	284	3.113407	3.0975041	302.87103	0.0102796	0.0102271	0.0101749	0.0101431	0.0103105	0.0103038
87	86	277	3.1000493	3.1022371	305.70942	0.0101405	0.0101477	0.0101514	0.0101608	0.0103126	0.0103249
88	87	317	3.1179109	3.1024125	308.5615	0.0101047	0.0100544	0.0102075	0.0101737	0.0103411	0.0103546
89	88	313	3.1793462	3.2015386	311.42728	0.010209	0.0102802	0.0103854	0.0103715	0.0103465	0.0103646
90	89	318	3.2401461	3.2016665	314.30676	0.0103089	0.0101864	0.01048	0.0104724	0.0103561	0.0103633
91	90	374	3.3744738	3.3775415	317.19993	0.0106383	0.010648	0.010475	0.0105351	0.0103493	0.0103635
92	91	413	3.3588421	3.3876245	320.1068	0.0104929	0.0105828	0.0103756	0.0104376	0.0102897	0.0102952
93	92	405	3.3252177	3.3512511	323.02736	0.0102939	0.0103745	0.0102588	0.0102849	0.0102027	0.0101963
94	93	355	3.3704008	3.3755408	325.96163	0.0103399	0.0103556	0.0102528	0.0102505	0.0101868	0.0101617
95	94	306	3.3360308	3.3300601	328.90959	0.0101427	0.0101245	0.0102266	0.0101946	0.0101655	0.0101482
96	95	271	3.4102443	3.4087683	331.87124	0.0102758	0.0102714	0.010253	0.0102096	0.0101932	0.010161
97	96	306	3.4359903	3.411372	334.84659	0.0102614	0.0101879	0.0101222	0.0100826	0.0102662	0.010236
98	97	315	3.4532507	3.435612	337.83564	0.0102217	0.0101695	0.0100961	0.0100641	0.0103176	0.0103109
99	98	301	3.3686457	3.371023	340.83839	0.0098834	0.0098904	0.0100856	0.0100948	0.0103825	0.0103953
100	99	356	3.5015024	3.4840973	343.85483	0.0101831	0.0101325	0.0102367	0.0102026	0.0104833	0.0104973
101	100	348	3.5348641	3.5595381	346.88497	0.0101903	0.0102614	0.0104379	0.010424	0.0105077	0.0105264
102	101	355	3.6171443	3.5741875	349.9288	0.0103368	0.010214	0.0105816	0.0105742	0.01054	0.0105478
103	102	422	3.8075613	3.8110228	352.98634	0.0107867	0.0107965	0.0106947	0.0107561	0.0105136	0.0105286
104	103	465	3.7817472	3.8141535	356.05757	0.0106212	0.0107122	0.0106286	0.0106922	0.0103935	0.0103998
105	104	467	3.8342634	3.8642821	359.14249	0.0106762	0.0107597	0.0105397	0.0105668	0.0102214	0.0102157
106	105	404	3.8356111	3.8414605	362.24111	0.0105886	0.0106047	0.010453	0.0104507	0.0100308	0.0100065
107	106	347	3.7830153	3.7762446	365.35343	0.0103544	0.0103359	0.0103076	0.0102757	0.0098322	0.0098147
108	107	305	3.8380978	3.8364366	368.47945	0.010416	0.0104115	0.0101714	0.0101287	0.0097164	0.0096854
109	108	336	3.7728521	3.7458202	371.61916	0.0101525	0.0100797	0.0098382	0.0097992	0.0096634	0.0096343
110	109	340	3.7273182	3.7082796	374.77257	0.0099455	0.0098947	0.0095681	0.0095379	0.0096609	0.0096547
111	110	318	3.5589014	3.561413	377.93967	0.0094166	0.0094232	0.0093189	0.009327	0.0097313	0.009744
112	111	362	3.5605165	3.542818	381.12048	0.0093422	0.0092958	0.0093615	0.0093296	0.0097542	0.0097681
113	112	348	3.5348641	3.5595381	384.31498	0.0091978	0.009262	0.0095956	0.0095822	0.0098044	0.0098224
114	113	363	3.6986574	3.6547326	387.52317	0.0095444	0.009431	0.0099081	0.0099024	0.0098595	0.0098677
115	114	435	3.9248559	3.9284239	390.74506	0.0100445	0.0100537	0.010206	0.0102652	0.0098133	0.0098283
116	115	491	3.9931997	4.027418	393.98065	0.0101355	0.0102224	0.0100502	0.0101113	0.0097412	0.0097479
117	116	505	4.1462591	4.1787205	397.22994	0.0104379	0.0105197	0.0099028	0.0099291	0.0096045	0.0095997
118	117	404	3.8356111	3.8414605	400.49292	0.0095772	0.0095918	0.009618	0.0096157	0.0094705	0.0094473
119	118	359	3.9138401	3.9068352	403.7696	0.0096933	0.0096759	0.0094993	0.0094701	0.0094585	0.0094426
120	119	310	3.9010174	3.899329	407.05997	0.0095834	0.0095792	0.0094483	0.0094086	0.0095052	0.0094748
121	120	337	3.7840808	3.7569685	410.36405	0.0092213	0.0091552	0.0093133	0.0092771	0.0095494	0.0095209
122	121	360	3.9465722	3.9264137	413.68181	0.0095401	0.0094914	0.0094061	0.0093762	0.0096995	0.009693
123	122	342	3.8274977	3.8301989	417.01328	0.0091784	0.0091848	0.0093904	0.0093989	0.009836	0.0098482
124	123	406	3.9932865	3.9734368	420.35844	0.0094997	0.0094525	0.009671	0.0096377	0.0099497	0.0099631
125	124	396	4.0224316	4.0505089	423.7173	0.0094932	0.0095595	0.0098021	0.0097875	0.0100197	0.0100374
126	125	420	4.2794383	4.2286162	427.08986	0.01002	0.009901	0.0100617	0.0100543	0.0101174	0.010125

128	127	548	4.4567687	4.4949594	433.87606	0.010272	0.01036	0.0102472	0.010309	0.0101496	0.0101552
129	128	559	4.5896215	4.625554	437.2897	0.0104956	0.0105778	0.0101532	0.0101797	0.0100469	0.0100409
130	129	463	4.3957622	4.4024659	440.71704	0.0099741	0.0099893	0.0100471	0.0100447	0.009823	0.009799
131	130	407	4.437139	4.4291975	444.15808	0.00999	0.0099721	0.0100829	0.0100514	0.0098365	0.0098203
132	131	362	4.5553817	4.55341	447.61282	0.0101771	0.0101727	0.0101052	0.0100625	0.0098754	0.0098444
133	132	405	4.5476342	4.5150512	451.08125	0.0100816	0.0100094	0.0098972	0.0098582	0.009882	0.0098529
134	133	417	4.5714462	4.5480958	454.56338	0.0100568	0.0100054	0.0095128	0.0094831	0.0099608	0.009955
135	134	391	4.3758819	4.3789701	458.0592	0.0095531	0.0095598	0.0095167	0.0095275	0.010007	0.0100202
136	135	419	4.1211503	4.1006651	461.56873	0.0089286	0.0088842	0.0097531	0.0097211	0.010069	0.0100834
137	136	461	4.6826792	4.7153651	465.09195	0.0100683	0.0101386	0.0101846	0.0101705	0.0102692	0.0102874
138	137	472	4.8092735	4.7521591	468.62886	0.0102624	0.0101406	0.0103728	0.0103657	0.0102613	0.0102688
139	138	535	4.8271216	4.8315099	472.17947	0.0102231	0.0102324	0.0104121	0.0104727	0.0101987	0.0102135
140	139	622	5.0585952	5.1019429	475.74378	0.010633	0.0107241	0.0103335	0.0103961		
141	140	606	4.975511	5.0144646	479.32179	0.0103803	0.0104616	0.0102326	0.0102586		
142	141	508	4.8229961	4.8303513	482.91349	0.0099873	0.0100025	0.0101102	0.0101076		
143	142	461	5.0258503	5.0168552	486.51889	0.0103302	0.0103117	0.0100557	0.0100247		
144	143	390	4.9077316	4.9056075	490.13798	0.010013	0.0100086				
145	144	432	4.8508098	4.8160546	493.77077	0.009824	0.0097536				



IRREGULAR VARIATIONS GRAPH:



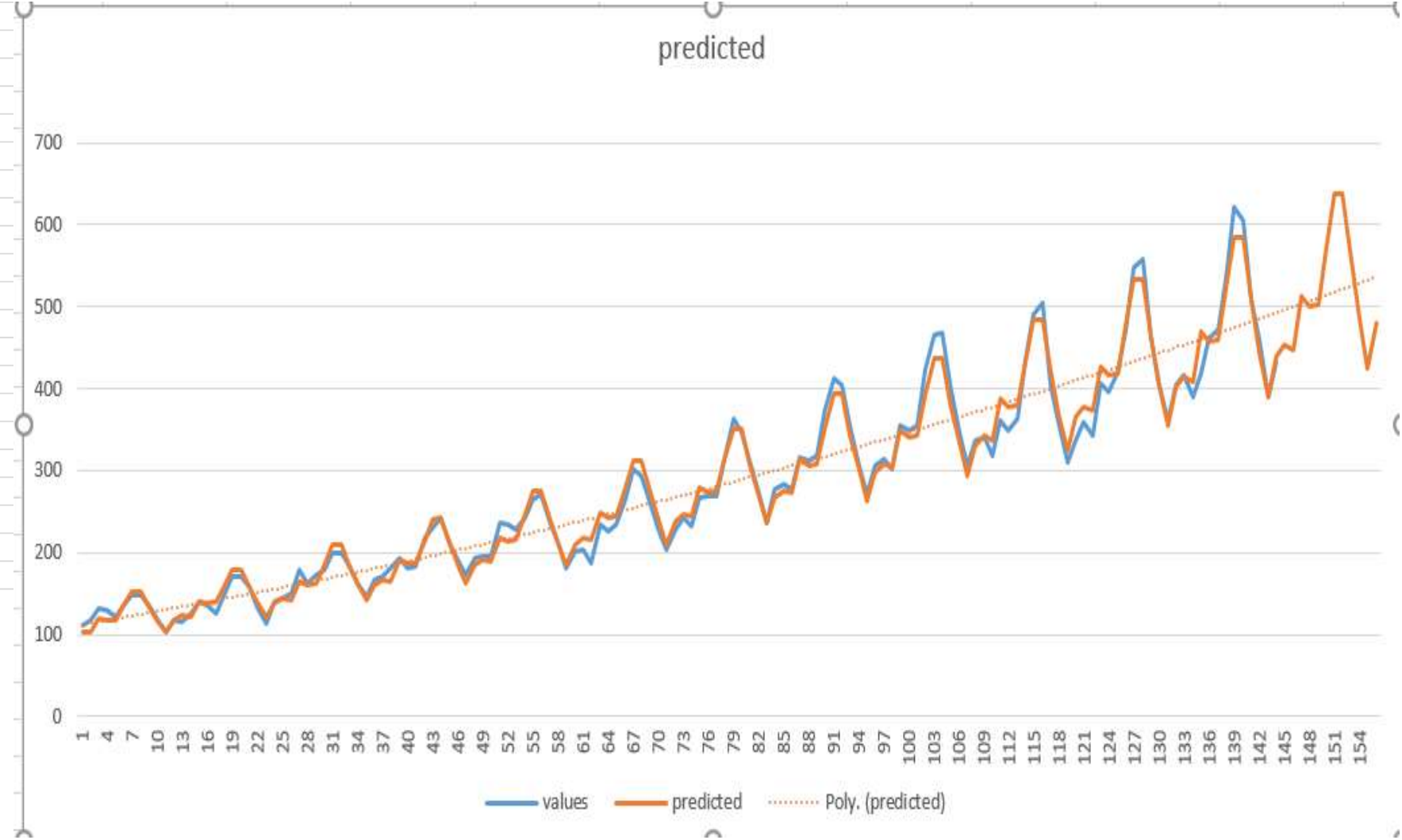


By using the polynomial equation we predict the values  
polynomial equation  $y = ax^2+bx+c$   
 $y = 0.00684833*146^2+1.66732125*146+111.669544$ In the same way, we will predict all the values for every month of the year

▲	A	B	C	D	▲	A	B	C	D	▲	A	B	C	D	▲	A	B	C	D
1	values	adjmean	trend values	predicted	39	180		184.91674	165.2294255	77	269		277.9419131	273.6280185	115	435		390.74506	433.07094
2	112	91.21839898	113.3437136	103.3903209	40	193		187.1113827	190.237345	78	270		280.6570288	275.4472537	116	491		393.98065	484.43482
3	118	89.35341686	115.0315798	102.784647	41	181		189.319722	186.3813191	79	315		283.3858412	314.0824647	117	505		397.22994	483.8123
4	132	101.6706425	116.7331427	118.6833362	42	183		191.541758	187.9862101	80	364		286.1283503	351.8206683	118	404		400.49292	421.83406
5	129	98.44791505	118.4484023	116.6099825	43	218		193.7774906	214.7676524	81	347		288.884556	351.8513824	119	359		403.7696	370.36078
6	121	98.14372183	120.1773585	117.9465324	44	230		196.0269199	241.0328158	82	312		291.6544584	307.1959048	120	310		407.05997	323.4761
7	135	110.832095	121.9200114	135.1265028	45	242		198.2900459	241.5104072	83	274		294.4380574	270.0755804	121	337		410.36405	365.45912
8	148	122.9590385	123.6763609	152.0712642	46	209		200.5668685	211.2545133	84	237		297.2353531	236.2023772	122	360		413.68181	377.35393
9	148	121.796536	125.4464071	152.7893785	47	191		202.8573878	186.0725044	85	278		300.0463455	267.213158	123	342		417.01328	372.61561
10	136	105.328719	127.23015	134.0098871	48	172		205.1616037	163.0346391	86	284		302.8710345	276.2741086	124	406		420.35844	427.38113
11	119	91.72577171	129.0275895	118.3515522	49	194		207.4795163	184.7756442	87	277		305.7094202	273.1618126	125	396		423.7173	417.14085
12	104	79.46644796	130.8387257	103.9728879	50	196		209.8111256	191.3863496	88	317		308.5615025	313.7164622	126	420		427.08986	419.16188
13	118	89.05729467	132.6635585	118.1465762	51	196		212.1564315	189.5690206	89	313		311.4272815	306.5936656	127	472		430.47611	477.10569
14	115		134.502088	122.6906513	52	236		214.5154341	218.0992202	90	318		314.3067572	308.4723494	128	548		433.87606	533.48983
15	126		136.3543142	121.8372388	53	235		216.8881333	213.5218453	91	374		317.1999295	351.5593271	129	559		437.2897	532.60371
16	141		138.220237	140.5294031	54	229		219.2745292	215.204184	92	413		320.1067985	393.6002414	130	463		440.71704	464.20162
17	135		140.0998565	137.9253877	55	243		221.6746218	245.6866273	93	405		323.0273641	393.43614	131	407		444.15808	407.40743
18	125		141.9931726	139.3573843	56	264		224.088411	275.5369555	94	355		325.9616264	343.3312054	132	362		447.61282	355.70201
19	149		143.9001854	159.4875902	57	272		226.5158969	275.888516	95	306		328.9095854	301.6948554	133	405		451.08125	401.72076
20	170		145.8208949	179.2999702	58	237		228.9570794	241.1575587	96	271		331.871241	263.726287	134	417		454.56338	414.64544
21	170		147.755301	179.9608384	59	211		231.4119586	212.2644049	97	306		334.8465933	298.2053173	135	391		458.0592	409.29155
22	158		149.7034038	157.6806774	60	180		233.8805345	185.8565532	98	315		337.8356422	308.168264	136	419		461.56873	469.27989
23	133		151.6652032	139.1160781	61	201		236.362807	210.4983215	99	301		340.8383878	304.5507455	137	461		465.09195	457.87332
24	114		153.6406993	122.0928064	62	204		238.8587762	217.8831515	100	356		343.8548301	349.5994151	138	472		468.62886	459.92981
25	140		155.6298921	138.5997716	63	188		241.368442	215.6709502	101	348		346.884969	341.5010196	139	535		472.17947	523.3264
26	145		157.6327815	143.7900996	64	235		243.8918045	247.9663647	102	355		349.9288046	343.4331526	140	622		475.74378	584.96998
27	150		159.6493676	142.6521649	65	227		246.4288637	242.6040784	103	422		352.9863368	391.2221521	141	606		479.32179	583.79733
28	178		161.6796503	164.3807393	66	234		248.9796195	244.3578652	104	465		356.0575657	437.8049592	142	508		482.91349	508.64659
29	163		163.7236297	161.1824999	67	264		251.544072	278.7915648	105	467		359.1424913	437.4231139	143	461		486.51889	446.2632
30	172		165.7813058	162.7039436	68	302		254.1222211	312.4662396	106	404		362.2411135	381.5439244	144	390		490.13798	389.49525
31	178		167.8526785	186.03464	69	293		256.7140669	312.6688411	107	347		365.3534324	335.1232553	145	432		493.77077	439.73889
32	199		169.9377479	208.9538208	70	259		259.3196094	273.1380226	108	305		368.4794479	292.8175287	146			497.41726	453.73606
33	199		172.0365139	209.5345147	71	229		261.9388485	240.2654302	109	336		371.6191601	330.9539705					
34	184		174.1489766	183.4288862	72	203		264.5717843	210.2457993	110	340		374.772569	341.8615372					
35	162		176.275136	161.6897288	73	229		267.2184167	237.9774928	111	318		377.9396745	337.7020128					
36	146		178.414992	141.7800568	74	242		269.8787458	246.1790711	112	362		381.1204767	387.4876375					
37	166		180.5685447	160.8094609	75	233		272.5527716	243.5352141	113	348		384.3149755	378.3500806					
38	171		182.735794	166.6886657	76	267		275.240494	279.8387788	114	363		387.523171	380.329663					

PREDICTED GRAPH:

137	461	465.09195	457.87332
138	472	468.62886	459.92981
139	535	472.17947	523.3264
140	622	475.74378	584.96998
141	606	479.32179	583.79733
142	508	482.91349	508.64659
143	461	486.51889	446.2632
144	390	490.13798	389.49525
145	432	493.77077	439.73889
146		497.41726	453.73606
147		501.07745	447.72982
148		504.75133	513.18392
149		508.43891	500.54751
150		512.14018	502.63344
151		515.85516	571.73308
152		519.58383	638.87528
153		523.32619	637.39317
154		527.08225	555.16898
155		530.85201	486.9281
156		534.63547	424.85581
157		538.43262	479.51352



# THE PERCENTAGE MOVING AVERAGE:

By using initial data, we calculate 12 month moving average  
=average(b2:b13)

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	▲	A	B	C	D	E	▲	A	B	C	D	E	127	126	472	448	450.625	1.0474341
1	months	values	12yr mma	2(12yr cma)	ratio to ma	43	42	218	212.33333	213.375	1.0216755	85	84	278	325.91667	327.08333	0.8499363	128	127	548	453.25	456.33333	1.2008766
2	1	112	126.66667	126.79167	0.8833388	44	43	230	214.41667	215.83333	1.0656371	86	85	284	328.25	329.54167	0.861803	129	128	559	459.41667	461.375	1.2115958
3	2	118	126.91667	127.25	0.9273084	45	44	242	217.25	218.5	1.1075515	87	86	277	330.83333	331.83333	0.8347564	130	129	463	463.33333	465.20833	0.995253
4	3	132	127.58333	127.95833	1.0315858	46	45	209	219.75	220.91667	0.9460581	88	87	317	332.83333	334.45833	0.9478012	131	130	407	467.08333	469.33333	0.8671875
5	4	129	128.33333	128.58333	1.0032404	47	46	191	222.08333	222.91667	0.8568224	89	88	313	336.08333	337.54167	0.9272929	132	131	362	471.58333	472.75	0.7657324
6	5	121	128.83333	129	0.9379845	48	47	172	223.75	224.08333	0.7675716	90	89	318	339	340.54167	0.9338064	133	132	405	473.91667	475.04167	0.8525568
7	6	135	129.16667	129.75	1.0404624	49	48	194	224.41667	224.70833	0.8633414	91	90	374	342.08333	344.08333	1.086946	134	133	417	476.16667		
8	7	148	130.33333	131.25	1.127619	50	49	196	225	225.33333	0.8698225	92	91	413	346.08333	348.25	1.1859296	135	134	391			
9	8	148	132.16667	133.08333	1.1120852	51	50	196	225.66667	225.33333	0.8698225	93	92	405	350.41667	353	1.1473088	136	135	419			
10	9	136	134	134.91667	1.0080296	52	51	236	225	224.95833	1.0490832	94	93	355	355.58333	357.625	0.9926599	137	136	461			
11	10	119	135.83333	136.41667	0.8723274	53	52	235	224.91667	224.58333	1.0463822	95	94	306	359.66667	361.375	0.8467658	138	137	472			
12	11	104	137	137.41667	0.7568223	54	53	229	224.25	224.45833	1.0202339	96	95	271	363.08333	364.5	0.7434842	139	138	535			
13	12	118	137.83333	138.75	0.8504505	55	54	243	224.66667	225.54167	1.0774062	97	96	306	365.91667	367.16667	0.833409	140	139	622			
14	13	115	139.66667	140.91667	0.8160852	56	55	264	226.41667	228	1.1578947	98	97	315	368.41667	369.45833	0.8525995	141	140	606			
15	14	126	142.16667	143.16667	0.8800931	57	56	272	229.58333	230.45833	1.1802567	99	98	301	370.5	371.20833	0.8108654	142	141	508			
16	15	141	144.16667	145.70833	0.9676866	58	57	237	231.33333	232.25	1.0204521	100	99	356	371.91667	372.16667	0.9565607	143	142	461			
17	16	135	147.25	148.41667	0.9096013	59	58	211	233.16667	233.91667	0.9020306	101	100	348	372.41667	372.41667	0.9344372	144	143	390			
18	17	125	149.58333	151.54167	0.8248557	60	59	180	234.66667	235.625	0.7639257	102	101	355	372.41667	372.75	0.952381	145	144	432			
19	18	149	153.5	154.70833	0.9631026	61	60	201	236.58333	237.75	0.8454259	103	102	422	373.08333	373.625	1.1294747						
20	19	170	155.91667	157.125	1.0819411	62	61	204	238.91667	240.5	0.8482328	104	103	465	374.16667	375.25	1.2391739						
21	20	170	158.33333	159.54167	1.0655524	63	62	188	242.08333	243.95833	0.7706234	105	104	467	376.33333	377.91667	1.2357222						
22	21	158	160.75	161.83333	0.9763131	64	63	235	245.83333	247.16667	0.9507755	106	105	404	379.5	379.5	1.0645586						
23	22	133	162.91667	164.125	0.810358	65	64	227	248.5	250.25	0.9070929	107	106	347	379.5	380	0.9131579						
24	23	114	165.33333	166.66667	0.684	66	65	234	252	253.5	0.9230769	108	107	305	380.5	380.70833	0.8011382						
25	24	140	168	169.08333	0.8279941	67	66	264	255	257.125	1.026738	109	108	336	380.91667	380.95833	0.8819862						
26	25	145	170.16667	171.25	0.8467153	68	67	302	259.25	261.83333	1.1534055	110	109	340	381	381.83333	0.8904409						
27	26	150	172.33333	173.58333	0.8641383	69	68	293	264.41667	266.66667	1.09875	111	110	318	382.66667	383.66667	0.8288445						
28	27	178	174.83333	175.45833	1.0144859	70	69	259	268.91667	271.125	0.9552789	112	111	362	384.66667	386.5	0.9366106						
29	28	163	176.08333	176.83333	0.9217719	71	70	229	273.33333	275.20833	0.8320969	113	112	348	388.33333	390.33333	0.8915457						
30	29	172	177.58333	178.04167	0.966066	72	71	203	277.08333	278.5	0.7289048	114	113	363	392.33333	394.70833	0.9196664						
31	30	178	178.5	180.16667	0.9879741	73	72	229	279.91667	281.95833	0.8121767	115	114	435	397.08333	398.625	1.0912512						
32	31	199	181.83333	183.125	1.0866894	74	73	242	284	285.75	0.8468941	116	115	491	400.16667	402.54167	1.2197495						
33	32	199	184.41667	186.20833	1.0686955	75	74	233	287.5	289.33333	0.8052995	117	116	505	404.91667	407.16667	1.2402783						
34	33	184	188	189.04167	0.9733304	76	75	267	291.16667	293.25	0.9104859	118	117	404	409.41667	411.875	0.9808801						
35	34	162	190.08333	191.29167	0.8468743	77	76	269	295.33333	297.16667	0.9052159	119	118	359	414.33333	416.33333	0.8622898						
36	35	146	192.5	193.58333	0.7541972	78	77	270	299	301	0.89701	120	119	310	418.33333	420.5	0.7372176						
37	36	166	194.66667	195.83333	0.8476596	79	78	315	303	305.45833	1.0312372	121	120	337	422.66667	425.5	0.7920094						
38	37	171	197	198.04167	0.8634547	80	79	364	307.91667	309.95833	1.1743514	122	121	360	428.33333	430.70833	0.8358324						
39	38	180	199.08333	199.75	0.9011264	81	80	347	312	314.41667	1.1036311	123	122	342	433.08333	435.125	0.785981						
40	39	193	200.41667	202.20833	0.9544612	82	81	312	316.83333	318.625	0.9792075	124	123	406	437.16667	437.70833	0.9275583						
41	40	181	204	206.25	0.8775758	83	82	274	320.41667	321.75	0.8515929	125	124	396	438.25	440.95833	0.898044						
42	41	183	208.5	210.41667	0.869703	84	83	237	323.08333	324.5	0.7303544	126	125	420	443.66667	445.83333	0.9420561						



We divide initial data by 12 year moving average then we get ratio moving average  
=initial value/2\*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	M	N	O	P	Q
1	months													mean	median	adjmean	adjmed
2	1	0.88333881	0.81608516	0.84671533	0.86345466	0.86982249	0.84823285	0.84689414	0.86180301	0.85259953	0.89044086	0.83583245		85.5929024	85.2599526	90.8494886	91.0635341
3	2	0.92730845	0.88009313	0.86413826	0.90112641	0.86982249	0.7706234	0.80529954	0.8347564	0.81086542	0.82884448	0.78598104		84.3532638	83.4756404	89.5337191	89.1577651
4	3	1.0315858	0.96768659	1.01448587	0.95446116	1.04908316	0.95077546	0.91048593	0.94780117	0.95656068	0.93661061	0.92755831		96.7917703	95.4461158	102.736122	101.943062
5	4	1.00324044	0.90960135	0.92177191	0.87757576	1.04638219	0.90709291	0.90521593	0.92729293	0.93443723	0.89154569	0.89804403		92.9290942	90.9601348	98.636224	97.1517234
6	5	0.9379845	0.82485565	0.966066	0.86970297	1.0202339	0.92307692	0.89700997	0.93380644	0.95238095	0.91966642	0.94205607		92.6076344	93.3806436	98.295022	99.7369944
7	6	1.04046243	0.96310261	0.9879741	1.02167545	1.07740624	1.02673797	1.03123721	1.08694599	1.12947474	1.09125118	1.04743412		104.579109	104.046243	111.001711	111.128593
8	7	1.12761905	1.08194113	1.08668942	1.06563707	1.15789474	1.15340547	1.17435139	1.18592965	1.23917388	1.21974951	1.20087655		115.393344	115.789474	122.480089	123.671177
9	8	1.11208516	1.06555236	1.06869546	1.10755149	1.18025673	1.09875	1.10363106	1.14730878	1.23572216	1.24027835	1.21159577		114.285703	111.208516	121.304423	118.778397
10	9	1.00802965	0.97631308	0.97333039	0.94605809	1.0204521	0.95527893	0.97920753	0.99265991	1.06455863	0.98088012	0.99525302		99.0183769	98.0880121	105.099473	104.76479
11	10	0.87232743	0.81035796	0.84687432	0.85682243	0.90203064	0.8320969	0.85159285	0.84676582	0.91315789	0.86228983	0.8671875		86.0136688	85.682243	91.296096	91.5145695
12	11	0.75682232	0.684	0.75419716	0.76757159	0.76392573	0.72890485	0.73035439	0.74348422	0.80113823	0.7372176	0.76573242		74.8486227	75.4197159	79.4453618	80.5534798
13	12	0.85045045	0.82799409	0.84765957	0.86334137	0.84542587	0.81217674	0.84993631	0.83340899	0.88198622	0.7920094	0.85255679		84.1540527	84.7659574	89.3222737	90.535913
14																	
15											1200			1130.56754	1123.52265	1200	

DESEASONALIZATION OF DATA:

Deaseasonalisation using seasonal index of Adjusted mean

$Y / S1 = \text{initial\_data} / \text{Adusted\_mean}$  Similarly, for all records of 72 months from to 1995 we calculate the values

Deaseasonalisation using seasonal index of Adjusted median

$Y / S2 = \text{initial\_data} / \text{Adusted\_median}$

Similarly for all records of 144 months we calculate the values

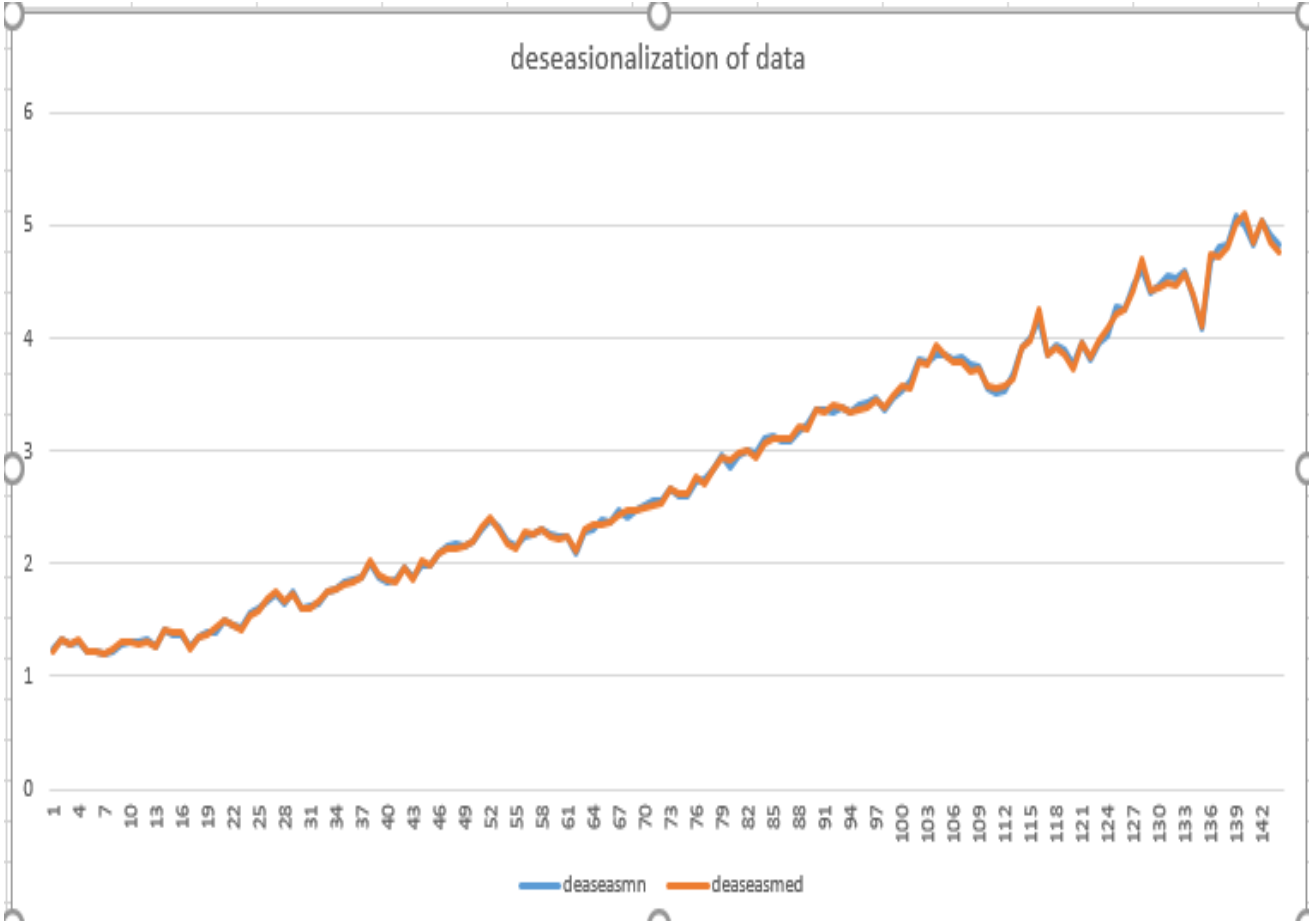
months	values	adjmean	deaseasnm	adjmed	deaseasmed
1	112	90.849489	1.2328083	91.063534	1.2299105
2	118	89.533719	1.3179392	89.157765	1.3234966
3	132	102.73612	1.2848451	101.94306	1.2948404
4	129	98.636224	1.307836	97.151723	1.32782
5	121	98.295022	1.2309881	99.736994	1.2131908
6	135	111.00171	1.2161975	111.12859	1.2148089
7	148	122.48009	1.2083597	123.67118	1.1967219
8	148	121.30442	1.2200709	118.7784	1.2460178
9	136	105.09947	1.2940122	104.76479	1.2981461
10	119	91.296096	1.3034511	91.514569	1.3003394
11	104	79.445362	1.3090758	80.55348	1.2910678
12	118	89.322274	1.3210591	90.535913	1.3033502
13	115		1.2658299		1.2628546
14	126		1.407291		1.4132252
15	141		1.3724481		1.383125
16	135		1.3686655		1.3895791
17	125		1.2716819		1.2532962
18	149		1.3423217		1.340789
19	170		1.3879807		1.3746129
20	170		1.4014328		1.4312367
21	158		1.5033377		1.5081403
22	133		1.4567983		1.4533205
23	114		1.4349485		1.4152089
24	140		1.5673582		1.5463477
25	145		1.5960464		1.5922949
26	150		1.6753465		1.6824109
27	178		1.7325941		1.7460727
28	163		1.6525369		1.677788
29	172		1.7498343		1.7245356
30	178		1.6035789		1.601748
31	199		1.6247539		1.6091057
32	199		1.6405008		1.6753888
33	184		1.7507224		1.7563153
34	162		1.7744461		1.7702099
35	146		1.837741		1.8124605
36	166		1.858439		1.8335265
37	171		1.882234		1.8778098
38	180		2.0104158		2.0188931
39	193		1.8785992		1.8932137
40	181		1.8350256		1.8630653
41	183		1.8617423		1.8348257
42					

months	values	adjmean	deaseasnm	adjmed	deaseasmed
43	218		1.9639337		1.9616914
44	230		1.8778562		1.8597704
45	242		1.9949808		2.0374075
46	209		1.9885923		1.9949451
47	191		2.0920938		2.0870994
48	172		2.16501		2.1352274
49	194		2.1719107		2.1427961
50	196		2.1574145		2.1523434
51	196		2.1891194		2.1983503
52	236		2.2971473		2.3150178
53	235		2.3824919		2.4188969
54	229		2.3297212		2.2960387
55	243		2.1891554		2.186656
56	264		2.1554524		2.134693
57	272		2.2422925		2.2899787
58	237		2.2550066		2.2622104
59	211		2.3111613		2.3056438
60	180		2.2657081		2.2345403
61	201		2.2502786		2.2201135
62	204		2.2454722		2.2401942
63	188		2.0997676		2.1086217
64	235		2.2874136		2.3052084
65	227		2.3013857		2.3365514
66	234		2.3805885		2.3461706
67	264		2.3783417		2.3756262
68	302		2.4657069		2.4419595
69	293		2.4154107		2.4667785
70	259		2.4643321		2.4722046
71	229		2.5083219		2.5023338
72	203		2.5552152		2.5200649
73	229		2.5637502		2.529383
74	242		2.6637464		2.6574853
75	233		2.6023715		2.613345
76	267		2.5988912		2.6191091
77	269		2.7271928		2.7688649
78	270		2.7468329		2.7071199
79	315		2.8377941		2.834554
80	364		2.9719116		2.9432889
81	347		2.8605717		2.9214067
82	312		2.9686162		2.9780998
83	274		3.0012236		2.9940588
84	237		2.9831823		2.9421448

months	values	adjmean	deaseasnm	adjmed	deaseasmed
85	278		3.1123256		3.0706047
86	284		3.1260495		3.1187017
87	277		3.0938065		3.1068522
88	317		3.0855749		3.109579
89	313		3.1732764		3.2217648
90	318		3.2351587		3.1883856
91	374		3.3693174		3.3654705
92	413		3.3719766		3.3395008
93	405		3.3387076		3.4097109
94	355		3.3777524		3.388543
95	306		3.3517315		3.3437299
96	271		3.4111494		3.3642246
97	306		3.4257973		3.3798742
98	315		3.4672732		3.4591234
99	301		3.3618619		3.376038
100	356		3.4651882		3.4921455
101	348		3.5281156		3.582026
102	355		3.6115766		3.5593613
103	422		3.8017432		3.7974025
104	465		3.7965354		3.7599707
105	467		3.8498184		3.9316914
106	404		3.8439774		3.8562574
107	347		3.8008197		3.791746
108	305		3.8391165		3.7863045
109	336		3.7616597		3.7112345
110	340		3.7424536		3.733657
111	318		3.5517345		3.5667112
112	362		3.5235903		3.5510018
113	348		3.5281156		3.582026
114	363		3.6929642		3.6395723
115	435		3.9188585		3.9143841
116	491		4.0088149		3.9702056
117	505		4.1630798		4.2516149
118	404		3.8439774		3.8562574
119	359		3.9322602		3.9228726
120	310		3.9020528		3.848375
121	337		3.7728551		3.7222798
122	360		3.962598		3.9532839
123	342		3.8197899		3.835897
124	406		3.951872		3.9826153
125	396		4.0147522		4.0760986

DEASEASONALISATION OF DATA GRAPH:

127	126	472	4.2521867	4.2473317
128	127	548	4.4741966	4.4311052
129	128	559	4.6082409	4.706243
130	129	463	4.4053504	4.4194237
131	130	407	4.458022	4.4473793
132	131	362	4.5565907	4.4939089
133	132	405	4.5341434	4.473363
134	133	417	4.5900093	4.5792205
135	134	391	4.3670698	4.3854845
136	135	419	4.0784097	4.1101375
137	136	461	4.6737393	4.7451551
138	137	472	4.8018708	4.7324466
139	138	535	4.8197455	4.8142425
140	139	622	5.0783765	5.0294662
141	140	606	4.9956958	5.1019379
142	141	508	4.8335162	4.8489574
143	142	461	5.049504	5.0374493
144	143	390	4.9090342	4.8415041
145	144	432	4.8364197	4.7715872





CYCLICAL FLUCTUATIONS AND IRREGULAR VARIATIONS:

We compute the cyclical fluctuations by  
C=deseasonalization data/poly\_eq\_value

Similarly , we calculate all the values

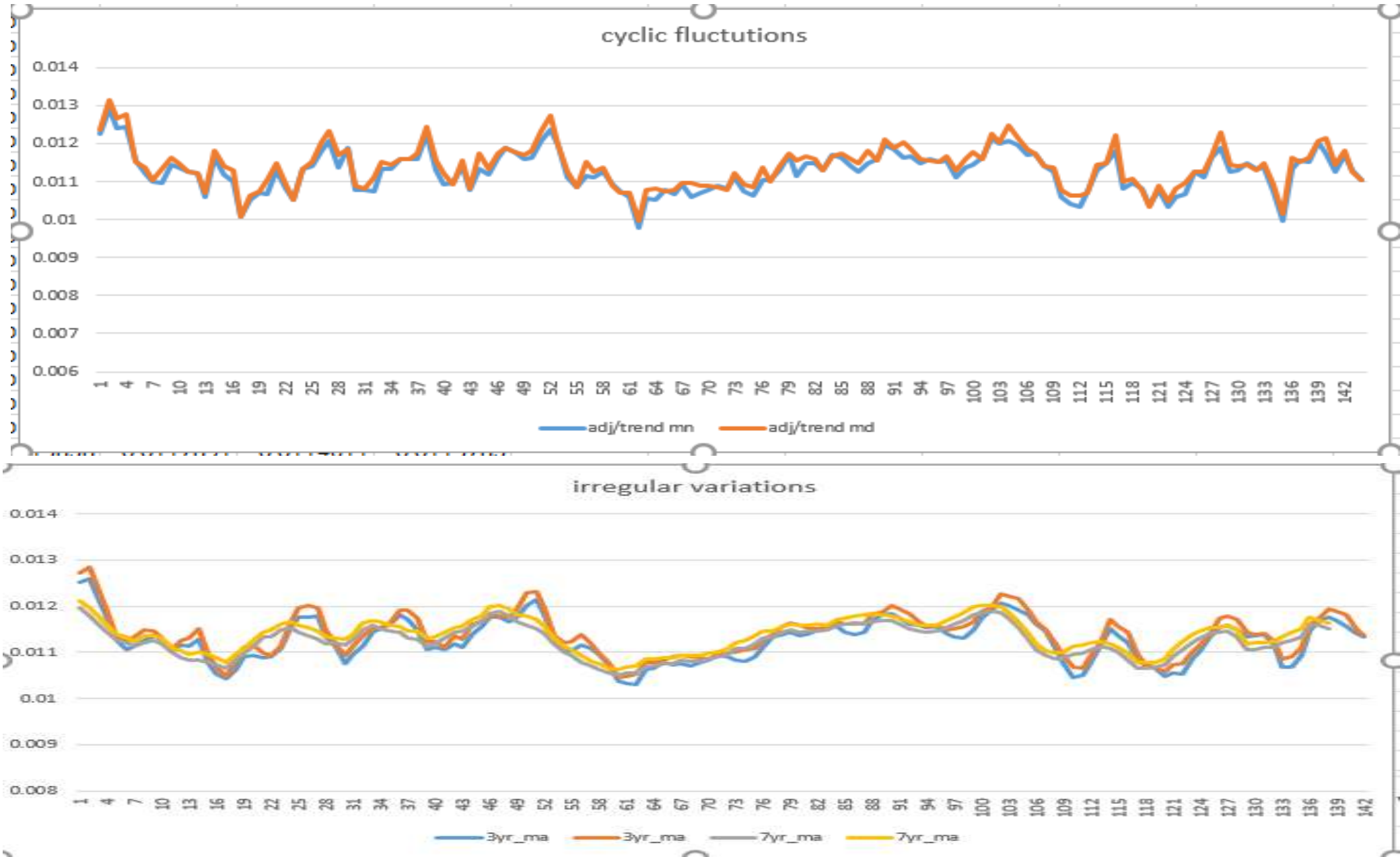
By Using cyclic fluctuations,we calculate the irregular variations of three year moving averages and seven year moving averages

▲	A	B	C	D	E	F	G	H	I	J	K	▲	A	B	C	D	E	F	G	H	I	J	K
1	months	values	deaseasmn	deaseasmed	trend values	adj/trend mr	adj/trend mc	3yr_ma	3yr_ma	7yr_ma	7yr_ma	43	42	218	2.2125663	2.2378424	193.77749	0.0114181	0.0115485	0.0111817	0.0113642	0.0114308	0.0115472
2	1	112	1.3888809	1.4030474	113.34371	0.0122537	0.0123787	0.0125205	0.0127192	0.0119694	0.0121238	44	43	230	2.1155915	2.1215739	196.02692	0.0107924	0.0108229	0.0110999	0.011297	0.0114546	0.0115692
3	2	118	1.4847894	1.5098078	115.03158	0.0129077	0.0131252	0.0125823	0.0128557	0.0117842	0.0119742	45	44	242	2.247544	2.3242173	198.29005	0.0113346	0.0117213	0.0113745	0.0116016	0.0115735	0.0117118
4	3	132	1.4475055	1.4771176	116.73314	0.0124001	0.0126538	0.0121264	0.0123194	0.0115772	0.0117619	46	45	209	2.2403466	2.2757773	200.56687	0.0111701	0.0113467	0.0115592	0.0116521	0.0116777	0.011796
5	4	129	1.473407	1.5147398	118.4484	0.0124392	0.0127882	0.0117391	0.0118903	0.0114316	0.0115966	47	46	191	2.3569514	2.3809044	202.85739	0.0116188	0.0117368	0.0117669	0.011797	0.01185	0.0119926
6	5	121	1.3868303	1.383974	120.17736	0.0115399	0.0115161	0.0112618	0.011307	0.0112648	0.0113778	48	47	172	2.4390987	2.4358075	205.1616	0.0118887	0.0118726	0.0117555	0.0117856	0.0119001	0.0120223
7	6	135	1.3701672	1.3858199	121.92001	0.0112382	0.0113666	0.0110675	0.0112453	0.0112189	0.0113338	49	48	194	2.446873	2.4444416	207.47952	0.0117933	0.0117816	0.0116675	0.0117683	0.0117911	0.0119338
8	7	148	1.3613371	1.3651867	123.67636	0.0110073	0.0110384	0.0111409	0.0113362	0.0111281	0.0112401	50	49	196	2.4305416	2.455333	209.81113	0.0115844	0.0117026	0.0117578	0.0119447	0.0116544	0.0118032
9	8	148	1.374531	1.4214222	125.44641	0.0109571	0.0113309	0.0112655	0.011489	0.0112167	0.0113522	51	50	196	2.4662603	2.5078163	212.15643	0.0116247	0.0118206	0.0120215	0.0122848	0.0115927	0.0117789
10	9	136	1.4578332	1.4808886	127.23015	0.0114582	0.0116394	0.0113704	0.0114643	0.0112495	0.0113643	52	51	236	2.5879644	2.6409073	214.51543	0.0120642	0.012311	0.0121365	0.0123263	0.0115171	0.0117004
11	10	119	1.4684671	1.4833907	129.02759	0.011381	0.0114967	0.0112905	0.0113203	0.0111849	0.0113179	53	52	235	2.6841136	2.7594097	216.88813	0.0123756	0.0127227	0.0118237	0.0119736	0.0114011	0.0115654
12	11	104	1.4748038	1.4728139	130.83873	0.0112719	0.0112567	0.0110311	0.0110583	0.0110004	0.0111139	54	53	229	2.6246623	2.6192565	219.27453	0.0119698	0.0119451	0.0113107	0.011355	0.0111922	0.0113049
13	12	118	1.4883042	1.4868253	132.66356	0.0112186	0.0112075	0.0111496	0.0112472	0.0108914	0.0110243	55	54	243	2.4663009	2.4944757	221.67462	0.0111258	0.0112529	0.0110382	0.0112176	0.0110145	0.0111292
14	13	115	1.4260831	1.440629	134.50209	0.0106027	0.0107108	0.0111389	0.0113165	0.0108207	0.0109594	56	55	264	2.4283311	2.4351979	224.08841	0.0108365	0.0108671	0.0110282	0.0112237	0.0109381	0.0110501
15	14	126	1.5854531	1.6121676	136.35431	0.0116275	0.0118234	0.0112733	0.0115178	0.0108325	0.0110079	57	56	272	2.5261651	2.6123434	226.5159	0.0111523	0.0115327	0.0111666	0.011139	0.0107902	0.0109213
16	15	141	1.5461991	1.5778302	138.22024	0.0111865	0.0114153	0.0107607	0.010933	0.0107877	0.0109606	58	57	237	2.5404888	2.5806662	228.95708	0.0110959	0.0112714	0.0110871	0.0111788	0.0107064	0.0108141
17	16	135	1.5419376	1.5851928	140.09986	0.011006	0.0113147	0.0105349	0.0106709	0.0107355	0.0108915	59	58	211	2.6037526	2.6302137	231.41196	0.0112516	0.0113659	0.0109637	0.0109934	0.0106243	0.0107491
18	17	125	1.4326759	1.4297252	141.99317	0.0100898	0.010069	0.0104407	0.0104839	0.0106664	0.0107762	60	59	180	2.5525451	2.5491009	233.88053	0.0109139	0.0108992	0.0107435	0.0107711	0.0105558	0.0106611
19	18	149	1.5122586	1.4853345	143.90019	0.0105091	0.0106291	0.0106394	0.010811	0.0108459	0.010957	61	60	201	2.5351622	2.5326431	236.36281	0.0107257	0.0107151	0.0103725	0.010406	0.0105184	0.0106431
20	19	170	1.5636981	1.5681199	145.82089	0.0107234	0.0107537	0.0109075	0.0110987	0.0109741	0.0110848	62	61	204	2.5297473	2.5555507	238.85878	0.010591	0.010699	0.0103193	0.0104824	0.0105477	0.0106784
21	20	170	1.5788532	1.6327147	147.7553	0.0106856	0.0110501	0.0109401	0.0111579	0.0111311	0.0112659	63	62	188	2.3655966	2.4054565	241.36844	0.0098008	0.0099659	0.0102961	0.0105215	0.010549	0.010716
22	21	158	1.6936592	1.7204441	149.7034	0.0113134	0.0114924	0.0108856	0.0109772	0.0113293	0.0114473	64	63	235	2.5769985	2.629717	243.8918	0.0105662	0.0107823	0.0106197	0.0107828	0.0106784	0.0108459
23	22	133	1.6412279	1.6579072	151.6652	0.0108214	0.0109314	0.0108965	0.0109247	0.0113376	0.0114756	65	64	227	2.5927395	2.6654723	246.42886	0.0105212	0.0108164	0.0106484	0.0107799	0.0107101	0.0108624
24	23	114	1.6166119	1.6144306	153.6407	0.010522	0.0105078	0.0110917	0.011122	0.0114904	0.0116092	66	65	234	2.6819693	2.6764455	248.97962	0.0107718	0.0107497	0.010785	0.0108285	0.0107615	0.0108695
25	24	140	1.7657846	1.76403	155.62989	0.0113461	0.0113348	0.0115251	0.0116266	0.0115248	0.0116632	67	66	264	2.6794381	2.7100477	251.54407	0.010652	0.0107736	0.0107278	0.0108992	0.0107667	0.0108764
26	25	145	1.7981047	1.8164453	157.63278	0.0114069	0.0115233	0.0117674	0.0119549	0.0114427	0.0115871	68	67	302	2.7778636	2.7857188	254.12222	0.0109312	0.0109621	0.0107458	0.0109331	0.0108336	0.0109421
27	26	150	1.8874441	1.9192472	159.64937	0.0118224	0.0120216	0.0117555	0.0120106	0.0113479	0.011528	69	68	293	2.7211999	2.8140317	256.71407	0.0106001	0.0109617	0.0106982	0.0109117	0.0108087	0.0109386
28	27	178	1.9519393	1.9918708	161.67965	0.0120729	0.0123199	0.0117785	0.011959	0.0112769	0.0114541	70	69	259	2.7763147	2.8202217	259.31961	0.0107062	0.0108755	0.0107917	0.0108798	0.010814	0.0109234
29	28	163	1.8617469	1.9139735	163.72363	0.0113713	0.0116903	0.0113419	0.011481	0.0111723	0.0113307	71	70	229	2.8258737	2.8545922	261.93885	0.0107883	0.0108979	0.0108259	0.010854	0.0108638	0.0109933
30	29	172	1.971362	1.9673018	165.78131	0.0118913	0.0118668	0.0111419	0.0111848	0.0112056	0.0113162	72	71	203	2.8787036	2.8748194	264.57178	0.0108806	0.0108659	0.0109364	0.0109657	0.0108977	0.0110084
31	30	178	1.8065908	1.8272291	167.85268	0.010763	0.0108859	0.0107591	0.0109324	0.0111633	0.0112758	73	72	229	2.8883192	2.8854491	267.21842	0.0108088	0.0107981	0.0108952	0.0109898	0.010955	0.0110862
32	31	199	1.8304465	1.8356227	169.93775	0.0107713	0.0108017	0.0109467	0.0111387	0.0112835	0.0113953	74	73	242	3.0009748	3.0315846	269.87875	0.0111197	0.0112331	0.0108381	0.0110089	0.0110826	0.0112199
33	32	199	1.848187	1.9112366	172.03651	0.010743	0.0111095	0.0111365	0.0113568	0.0114945	0.0116314	75	74	233	2.9318299	2.9812306	272.55277	0.0107569	0.0109382	0.0108163	0.0110526	0.0110877	0.0112633
34	33	184	1.9723626	2.0035552	174.14898	0.0113257	0.0115048	0.0114236	0.0115165	0.0115757	0.0116933	76	75	267	2.9279089	2.9878061	275.24049	0.0106376	0.0108553	0.0110906	0.0110744	0.0111892	0.0113647
35	34	162	1.9990897	2.0194058	176.27514	0.0113407	0.011456	0.0115134	0.0115428	0.0115177	0.0116535	77	76	269	3.0274534	3.1586434	277.94191	0.0110543	0.0113644	0.0111207	0.0112595	0.011131	0.0114712
36	35	146	2.0703977	2.0676041	178.41499	0.0116044	0.0115887	0.0116013	0.0116317	0.0114619	0.011578	78	77	270	3.09458	3.0882064	280.65703	0.0110262	0.0110035	0.0113365	0.0113829	0.0113461	0.0114608
37	36	166	2.0937161	2.0916356	180.56854	0.0115951	0.0115836	0.0118159	0.0119204	0.0114353	0.0115723	79	78	315	3.1970568	3.2335797	283.38584	0.0112816	0.0114105	0.0113796	0.0115605	0.0114404	0.0115566
38	37	171	2.1205235	2.1421528	182.73579	0.0116043	0.0117227	0.0117213	0.0119066	0.0113206	0.0114636	80	79	364	3.3481535	3.3576213	286.12835	0.0117016	0.0117347	0.0114415	0.0116398	0.0114899	0.0116046
39	38	180	2.2649329	2.3030966	184.91674	0.0122484	0.0124548	0.0114931	0.0117411	0.0112821	0.0114634	81	80	347	3.222718	3.3326587	288.88456	0.0111557	0.0115363	0.0113688	0.011595	0.011447	0.0115845
40	39	193	2.1164285	2.159725	187.11138	0.0113111	0.0115425	0.0110604	0.0112321	0.0111128	0.0113051	82	81	312	3.3444409	3.3973327	291.65446	0.0114671	0.0116485	0.0114192	0.0115135	0.0114627	0.0115787
41	40	181	2.0673386	2.1253326	189.31972	0.0109198	0.0112262	0.0110961	0.0112341	0.0111172	0.0113329	83	82	274	3.3811764</								

	A	B	C	D	E	F	G	H	I	J	K	127	126	472	4.7905105	4.8452368	430.47611	0.0111284	0.0112555	0.0115395	0.0117278	0.0114257	0.0115445
85	84	278	3.5063438	3.5028597	300.04635	0.011686	0.0116744	0.0115718	0.0116715	0.0115748	0.0117126	128	127	548	5.0406267	5.0548805	433.87606	0.0116177	0.0116505	0.0115838	0.0117891	0.0114611	0.0115783
86	85	284	3.5218051	3.5577274	302.87103	0.0116281	0.0117467	0.0114317	0.0116121	0.0116007	0.0117449	129	128	559	5.1916408	5.3687499	437.2897	0.0118723	0.0122773	0.0114804	0.0117131	0.0113358	0.0114742
87	86	277	3.4854801	3.5442098	305.70942	0.0114013	0.0115934	0.0113822	0.0116304	0.011603	0.0117871	130	129	463	4.9630645	5.0415546	440.71704	0.0112613	0.0114394	0.0113458	0.0114384	0.0110619	0.0111715
88	87	317	3.4762065	3.5473204	308.5615	0.0112658	0.0114963	0.0114471	0.0116233	0.011642	0.011825	131	130	407	5.0224043	5.0734455	444.15808	0.0113077	0.0114226	0.0113668	0.0113962	0.0110704	0.0111999
89	88	313	3.5750109	3.6752988	311.42728	0.0114794	0.0118015	0.0116808	0.0118257	0.0116727	0.0118394	132	131	362	5.1334518	5.1265252	447.61282	0.0114685	0.011453	0.0113896	0.0114194	0.0111042	0.0112139
90	89	318	3.6447275	3.6372208	314.30676	0.0115961	0.0115722	0.0118101	0.0118589	0.011687	0.0118055	133	132	405	5.1081627	5.1030869	451.08125	0.0113243	0.011313	0.011147	0.0112423	0.0111086	0.0112393
91	90	374	3.7958706	3.8392343	317.19993	0.0119668	0.0121035	0.0118262	0.0120153	0.011677	0.0117973	134	133	417	5.1711012	5.2238462	454.56338	0.011376	0.011492	0.0106905	0.0108574	0.0112089	0.011346
92	91	413	3.7988664	3.8096088	320.1068	0.0118675	0.0119011	0.0117287	0.0119338	0.0116193	0.0117368	135	134	391	4.9199377	5.0028377	458.0592	0.0107408	0.0109218	0.0106722	0.0109063	0.0112612	0.0114389
93	92	405	3.7613856	3.8897026	323.02736	0.0116442	0.0120414	0.0115997	0.0118325	0.0115114	0.0116509	136	135	419	4.5947335	4.6887295	461.56873	0.0099546	0.0101582	0.0109399	0.0111057	0.0113376	0.011515
94	93	355	3.8053735	3.8655548	325.96163	0.0116743	0.0118589	0.0115782	0.0116734	0.0114698	0.0115858	137	136	461	5.2654314	5.4131398	465.09195	0.0113213	0.0116389	0.0114549	0.0115967	0.011586	0.0117512
95	94	306	3.7760583	3.8144332	328.90959	0.0114805	0.0115972	0.0115288	0.0115587	0.011439	0.0115745	138	137	472	5.4097842	5.3986423	468.62886	0.0115439	0.0115201	0.0116899	0.0117371	0.0115806	0.0116983
96	95	271	3.8429985	3.837813	331.87124	0.0115798	0.0115642	0.0115562	0.0115864	0.01146	0.0115754	139	138	535	5.4299218	5.4919528	472.17947	0.0114997	0.0116311	0.0117559	0.0119445	0.0115079	0.0116274
97	96	306	3.8595007	3.8556657	334.84659	0.0115262	0.0115147	0.0114003	0.0114982	0.0115391	0.0116766	140	139	622	5.7212952	5.7374738	475.74378	0.012026	0.01206	0.0116814	0.0118857		
98	97	315	3.9062275	3.9460709	337.83564	0.0115625	0.0116804	0.0113427	0.0115218	0.0116086	0.0117525	141	140	606	5.6281473	5.8201475	479.32179	0.0117419	0.0121425	0.0115703	0.0118029		
99	98	301	3.7874712	3.8512894	340.83839	0.0111122	0.0112995	0.011308	0.011555	0.011682	0.011868	142	141	508	5.4454358	5.5315545	482.91349	0.0112762	0.0114545	0.0114175	0.0115115		
100	99	356	3.9038786	3.9837415	343.85483	0.0113533	0.0115855	0.0114798	0.0116563	0.0118025	0.0119887	143	142	461	5.6887675	5.7465807	486.51889	0.0116928	0.0118116	0.0113371	0.011368		
101	100	348	3.9747725	4.0862747	346.88497	0.0114585	0.0117799	0.0117399	0.0118853	0.0118549	0.0120249	144	143	390	5.5305144	5.523052	490.13798	0.0112836	0.0112684				
102	101	355	4.0687996	4.0604195	349.9288	0.0116275	0.0116036	0.0119246	0.0119742	0.0118948	0.0120166	145	144	432	5.4487069	5.4432927	493.77077	0.0110349	0.0110239				
103	102	422	4.2830411	4.3319702	352.98634	0.0121337	0.0122723	0.0120743	0.0122691	0.0118628	0.0119865												
104	103	465	4.2771741	4.289269	356.05757	0.0120126	0.0120466	0.0120147	0.0122264	0.0117366	0.0118568												
105	104	467	4.3372026	4.4851632	359.14249	0.0120766	0.0124885	0.0119173	0.0121573	0.011533	0.0116739												
106	105	404	4.3306222	4.3991102	362.24111	0.0119551	0.0121441	0.0118044	0.0119018	0.0112957	0.0114082												
107	106	347	4.2820007	4.3255174	365.35343	0.0117202	0.0118393	0.0116206	0.0116513	0.0110654	0.0111923												
108	107	305	4.3251459	4.3193099	368.47945	0.0117378	0.011722	0.0114639	0.0114931	0.0109248	0.0110315												
109	108	336	4.2378831	4.2336721	371.61916	0.0114038	0.0113925	0.0110804	0.0111744	0.0108621	0.0109895												
110	109	340	4.2162456	4.2592511	374.77257	0.0112501	0.0113649	0.0107511	0.0109198	0.0108706	0.0110043												
111	110	318	4.0013815	4.068804	377.93967	0.0105874	0.0107657	0.0104485	0.0106757	0.0109501	0.011125												
112	111	362	3.9696743	4.0508832	381.12048	0.0104158	0.0106289	0.0104981	0.0106585	0.0109824	0.0111562												
113	112	348	3.9747725	4.0862747	384.31498	0.0103425	0.0106326	0.0107925	0.0109249	0.0110618	0.0112211												
114	113	363	4.1604908	4.1519219	387.52317	0.0107361	0.010714	0.0111661	0.0112126	0.0111271	0.0112429												
115	114	435	4.4149832	4.4654195	390.74506	0.0112989	0.011428	0.0115231	0.0117112	0.0110731	0.0111905												
116	115	491	4.5163279	4.5290991	393.98065	0.0114633	0.0114957	0.0113612	0.0115633	0.0110006	0.0111153												
117	116	505	4.6901227	4.8501229	397.22994	0.0118071	0.0122099	0.0111974	0.0114258	0.0108372	0.0109721												
118	117	404	4.3306222	4.3991102	400.49292	0.0108132	0.0109842	0.0108615	0.0109508	0.0106635	0.0107719												
119	118	359	4.4300814	4.475103	403.7696	0.0109718	0.0110833	0.0107097	0.0107386	0.0106437	0.0107704												
120	119	310	4.3960499	4.3901182	407.05997	0.0107995	0.0107849	0.0106496	0.010678	0.0106865	0.0107939												
121	120	337	4.2504959	4.2462723	410.36405	0.0103579	0.0103476	0.0104896	0.0105809	0.0107335	0.0108612												
122	121	360	4.46426	4.5097953	413.68181	0.0107915	0.0109016	0.0105675	0.0107343	0.0109135	0.0110473												
123	122	342	4.3033726	4.3758836	417.01328	0.0103195	0.0104934	0.0105285	0.0107585	0.0110679	0.0112438												
124	123	406	4.4521761	4.5432558	420.35844	0.0105914	0.0108081	0.0108457	0.01101	0.0112024	0.011379												
125	124	396	4.523017	4.6498988	423.7173	0.0106746	0.0109741	0.0110247	0.0111592	0.0113047	0.0114668												
126	125	420	4.813791	4.8038766	427.08986	0.0112711	0.0112479	0.0113391	0.0113847	0.0114182	0.0115352												



Cyclic fluctuations and irregular variations graph:

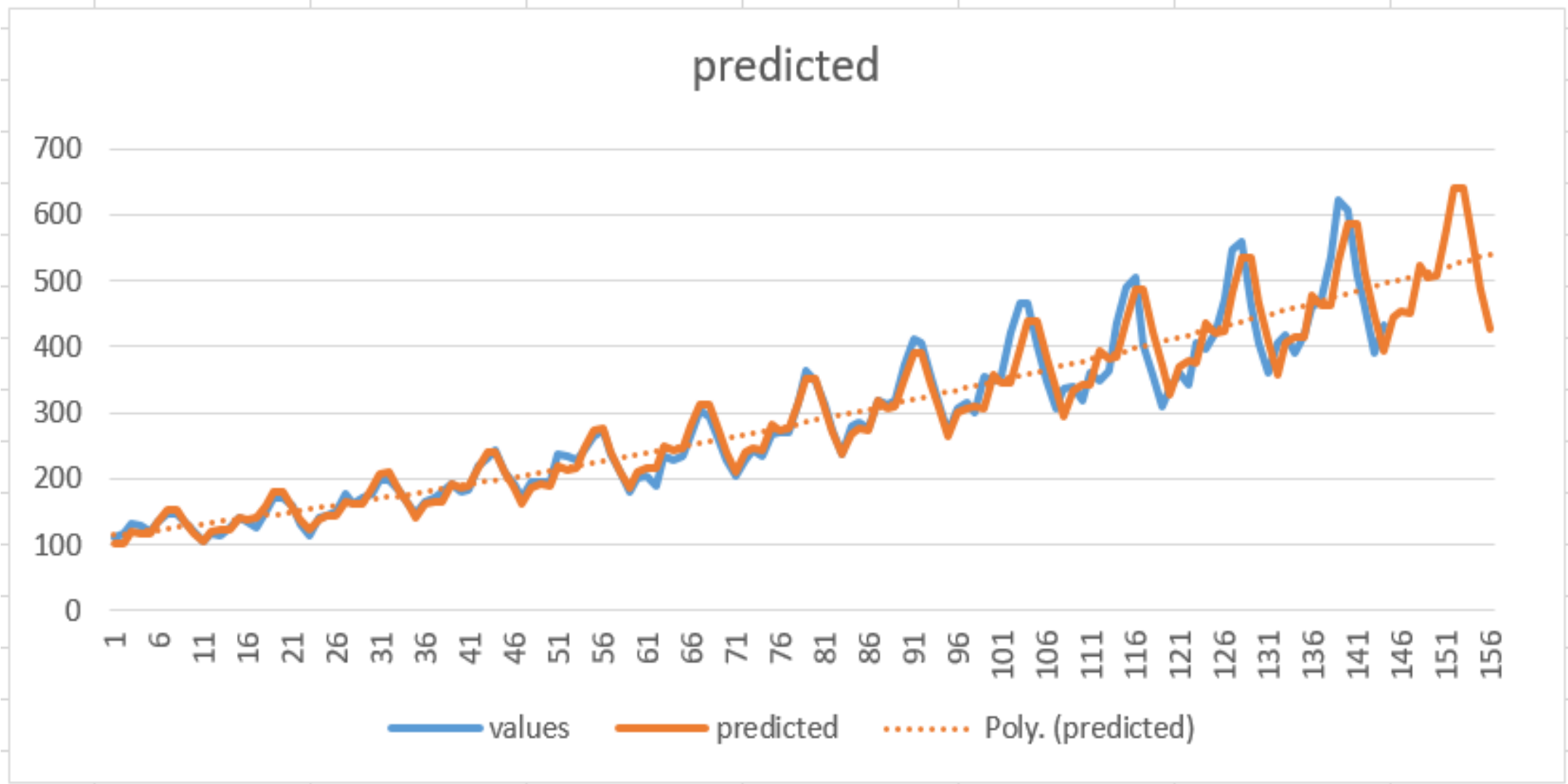




By using the polynomial equation we predict the values  
polynomial equation  $y = ax^2+bx+c$   
 $y = 0.00684833*146^2+1.66732125*146+111.669544$ In the same way, we will predict all the values for every month of the year

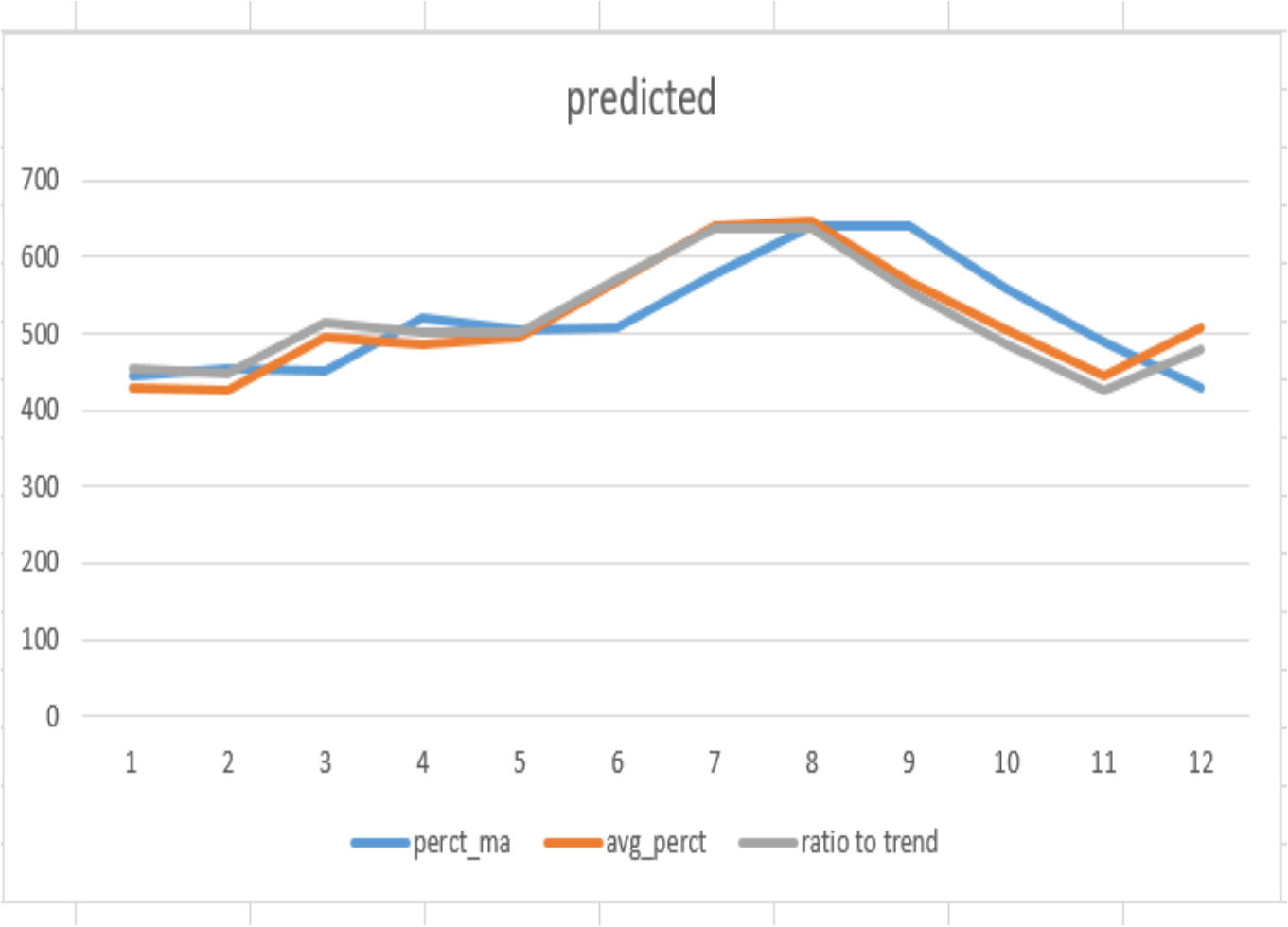
▲	A	B	C	D	▲	A	B	C	D	▲	A	B	C	D	127	472		430.47611	423.13659
1	values	adjmean	trend values	predicted	43	218		193.77749	215.09633	85	278		300.04635	268.00822	128	548		433.87606	481.60985
2	112	90.849489	113.34371	102.97218	44	230		196.02692	240.09395	86	284		302.87103	275.15679	129	559		437.2897	535.59282
3	118	89.533719	115.03158	102.99205	45	242		198.29005	240.5346	87	277		305.70942	273.71301	130	463		440.71704	534.60927
4	132	102.73612	116.73314	119.9271	46	209		200.56687	210.79472	88	317		308.5615	317.00412	131	407		444.15808	466.8078
5	129	98.636224	118.4484	116.83303	47	191		202.85739	185.20088	89	313		311.42728	307.18011	132	362		447.61282	408.65303
6	121	98.295022	120.17736	118.12836	48	172		205.1616	162.99138	90	318		314.30676	308.9479	133	405		451.08125	358.36313
7	135	111.00171	121.92001	135.3333	49	194		207.47952	185.32542	91	374		317.19993	352.09735	134	417		454.56338	406.02635
8	148	122.48009	123.67636	151.47892	50	196		209.81113	190.61233	92	413		320.1068	392.06709	135	391		458.0592	416.14445
9	148	121.30442	125.44641	152.17204	51	196		212.15643	189.95154	93	405		323.02736	391.84648	136	419		461.56873	413.25965
10	136	105.09947	127.23015	133.71822	52	236		214.51543	220.38484	94	355		325.96163	342.58395	137	461		465.09195	477.81743
11	119	91.296096	129.02759	117.79715	53	235		216.88813	213.93026	95	306		328.90959	300.28161	138	472		468.62886	462.23781
12	104	79.445362	130.83873	103.9453	54	229		219.27453	215.53595	96	271		331.87124	263.65631	139	535		472.17947	464.12892
13	118	89.322274	132.66356	118.49811	55	243		221.67462	246.06262	97	306		334.84659	299.09259	140	622		475.74378	528.08374
14	115		134.50209	122.19446	56	264		224.08841	274.46369	98	315		337.83564	306.92195	141	606		479.32179	587.07375
15	126		136.35431	122.08309	57	272		226.5159	274.7738	99	301		340.83839	309.64993	142	508		482.91349	585.79542
16	141		138.22024	142.00211	58	237		228.95708	240.63268	100	356		343.85483	307.86602	143	461		486.51889	511.32879
17	135		140.09986	138.18921	59	211		231.41196	211.27008	101	348		346.88497	356.37616	144	390		490.13798	447.47684
18	125		141.99317	139.57222	60	180		233.88053	185.80724	102	355		349.9288	345.15656	145	432		493.77077	392.27798
19	149		143.90019	159.73167	61	201		236.36281	211.12463	103	422		352.98634	346.968	146			497.41726	444.30441
20	170		145.82089	178.60156	62	204		238.85878	217.00198	104	465		356.05757	395.22999	147			501.07745	455.2263
21	170		147.7553	179.23372	63	188		241.36844	216.10614	105	467		359.14249	439.87804	148			504.75133	451.92264
22	158		149.7034	157.33749	64	235		243.8918	250.56498	106	404		362.24111	439.41449	149			508.43891	522.35042
23	133		151.6652	138.46441	65	227		246.42886	243.06813	107	347		365.35343	383.98453	150			512.14018	505.15574
24	114		153.6407	122.06041	66	234		248.97962	244.73457	108	305		368.47945	336.40735	151			515.85516	507.05994
25	140		155.62989	139.01216	67	264		251.54407	279.21822	109	336		371.61916	295.23419	152			519.58383	576.74694
26	145		157.63278	143.20858	68	302		254.12222	311.24912	110	340		374.77257	334.75538	153			523.32619	640.97038
27	150		159.64937	142.94002	69	293		256.71407	311.40552	111	318		377.93967	343.35626	154			527.08225	639.37409
28	178		161.67965	166.1034	70	259		259.31961	272.54354	112	362		381.12048	341.23134	155			530.85201	557.92266
29	163		163.72363	161.49081	71	229		261.93885	239.13994	113	348		384.31498	394.8303	156			534.63547	488.10131
30	172		165.78131	162.95477	72	203		264.57178	210.19001	114	363		387.52317	382.23822	157			538.43262	427.75974
31	178		167.85268	186.31935	73	229		267.21842	238.68557	115	435		390.74506	384.08295					
32	199		169.93775	208.1399	74	242		269.87875	245.18346	116	491		393.98065	437.32526					
33	199		172.03651	208.6879	75	233		272.55277	244.02663	117	505		397.22994	486.52758					
34	184		174.14898	183.02966	76	267		275.24049	282.77141	118	404		400.49292	485.81563					
35	162		176.27514	160.93232	77	269		277.94191	274.15141	119	359		403.7696	424.35972					
36	146		178.41499	141.74244	78	270		280.65703	275.87189	120	310		407.05997	371.62986					
37	166		180.56854	161.28793	79	315		283.38584	314.56313	121	337		410.36405	326.0152					
38	171		182.73579	166.01453	80	364		286.12835	350.45026	122	360		413.68181	369.51					
39	180		184.91674	165.56283	81	347		288.88456	350.42975	123	342		417.01328	378.85443					
40	193		187.11138	192.23098	82	312		291.65446	306.5273	124	406		420.35844	376.36255					
41	181		189.31972	186.73782	83	274		294.43806	268.81045	125	396		423.7173	435.31072					
42	183		191.54176	188.27601	84	237		297.23535	236.1397	126	420		427.08986	421.26531					

Percentage moving average predicted:



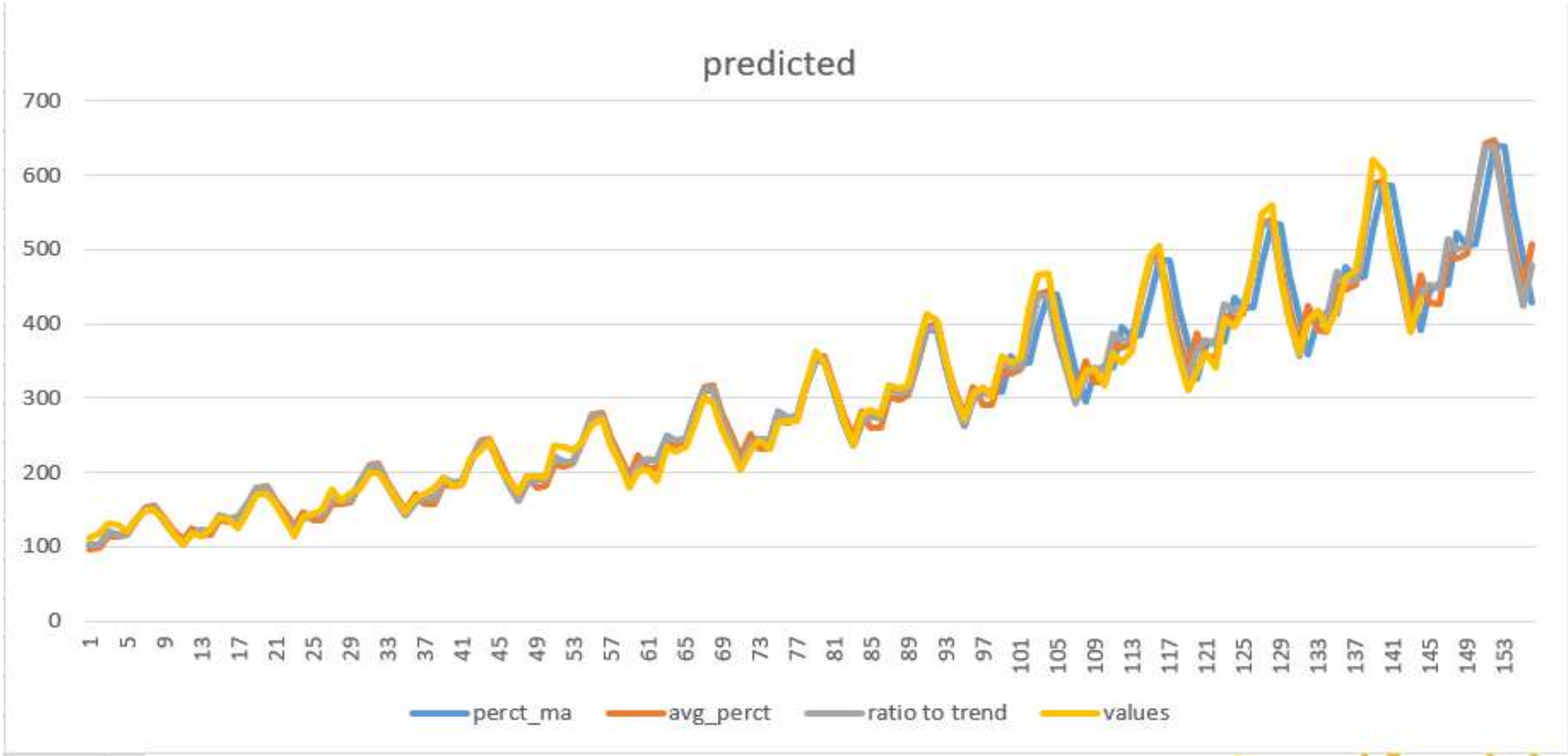
The following table and graph shows the predictd values of three methods for last year

	A	B	C
1	perct_ma	avg_perct	ratio to trend
2	444.304409	428.342883	453.736064
3	455.2263	426.853229	447.729822
4	451.922639	494.655317	513.183921
5	522.350417	487.575795	500.547506
6	505.155739	494.84559	502.633438
7	507.05994	568.792295	571.733077
8	576.746936	642.392817	638.875275
9	640.970384	647.404447	637.393172
10	639.374087	569.660503	555.168984
11	557.922664	504.709164	486.928104
12	488.101308	444.80864	424.855814
13	427.759741	507.314056	479.513523





PREDICTED GRAPH:



## ARMA MODEL:

An ARMA(p,q) process includes both autoregressive and moving average terms:

$$Y_t = c + \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \dots + \phi_p Y_{t-p} + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \dots + \theta_q \varepsilon_{t-q},$$

or, in lag operator form,

$$(1 - \phi_1 L - \phi_2 L^2 - \dots - \phi_p L^p) Y_t = c + (1 + \theta_1 L + \theta_2 L^2 + \dots + \theta_q L^q) \varepsilon_t.$$

Provided that the roots of

$$1 - \phi_1 z - \phi_2 z^2 - \dots - \phi_p z^p = 0$$

lie outside the unit circle, both sides of [3.5.2] can be divided by  $(1 - \phi_1 L - \phi_2 L^2 - \dots - \phi_p L^p)$  to obtain

$$Y_t = \mu + \psi(L) \varepsilon_t$$

where

$$\psi(L) = \frac{(1 + \theta_1 L + \theta_2 L^2 + \dots + \theta_q L^q)}{(1 - \phi_1 L - \phi_2 L^2 - \dots - \phi_p L^p)}$$
$$\sum_{j=0}^{\infty} |\psi_j| < \infty$$
$$\mu = c / (1 - \phi_1 - \phi_2 - \dots - \phi_p).$$

Thus, stationarity of an ARMA process depends entirely on the autoregressive parameters  $(\phi_1, \phi_2, \dots, \phi_p)$  and not on the moving average parameters  $(\theta_1, \theta_2, \dots, \theta_q)$ .

It is often convenient to write the ARMA process [3.5.1] in terms of deviations from the mean:

$$Y_t - \mu = \phi_1 (Y_{t-1} - \mu) + \phi_2 (Y_{t-2} - \mu) + \dots + \phi_p (Y_{t-p} - \mu) + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \dots + \theta_q \varepsilon_{t-q}. \quad [3.5.4]$$

I did arma model in r studio, calculated different values for p,d and q from that the  $p=0, d=2$  and  $q=0$  are the best values to predict the seasonality

The part of the series that can't be attributed to seasonal, cycle, or trend components is referred to as residual or error. The process of extracting these components is referred to as decomposition.

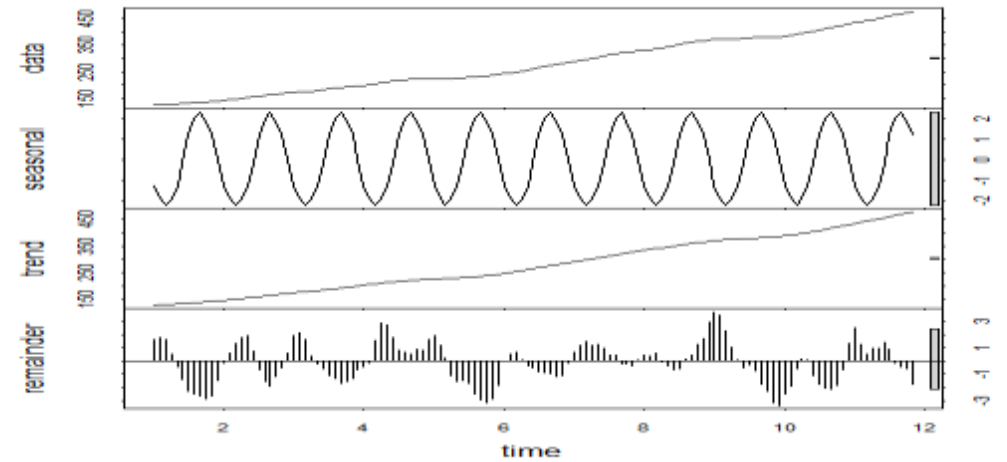
```
> auto.arima(deseasonal_cnt, seasonal=FALSE)
Series: deseasonal_cnt
ARIMA(0,2,0)
```

$\sigma^2$  estimated as 533.6: log likelihood=-259.67  
AIC=521.35 AICc=521.42 BIC=523.39

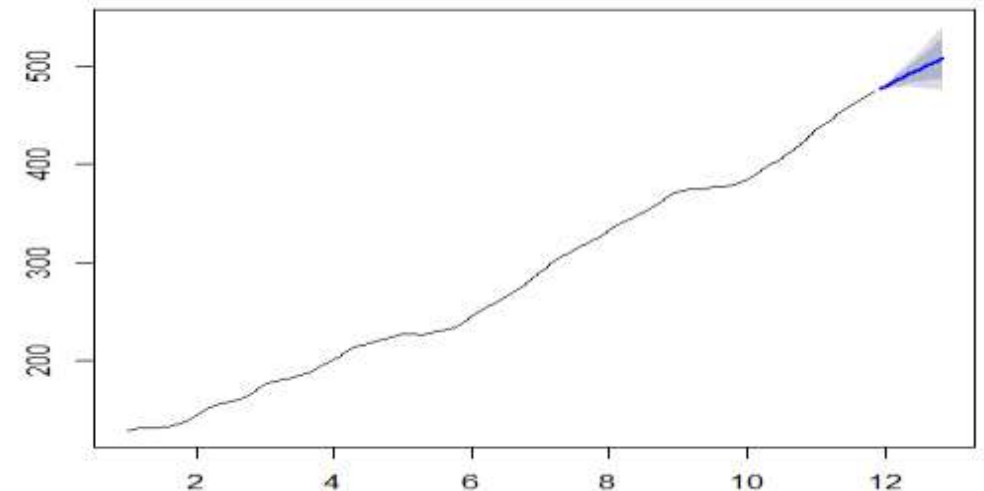
```
adf.test(count_ma, alternative = "stationary")
```

Augmented Dickey-Fuller Test

data: count\_ma  
Dickey-Fuller = -2.3317, Lag order = 5, p-value = 0.4386  
alternative hypothesis: stationary



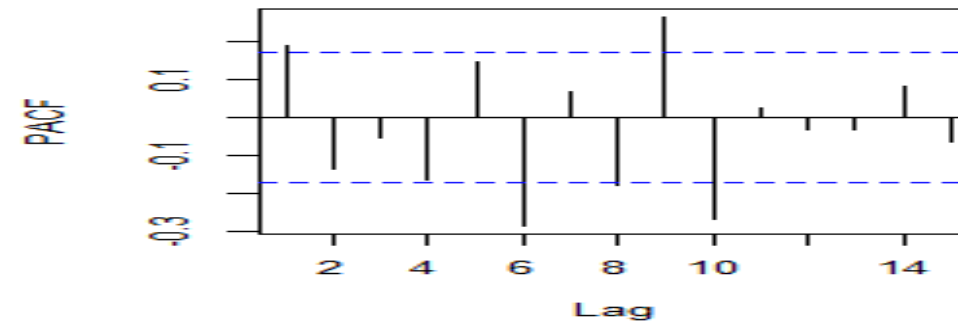
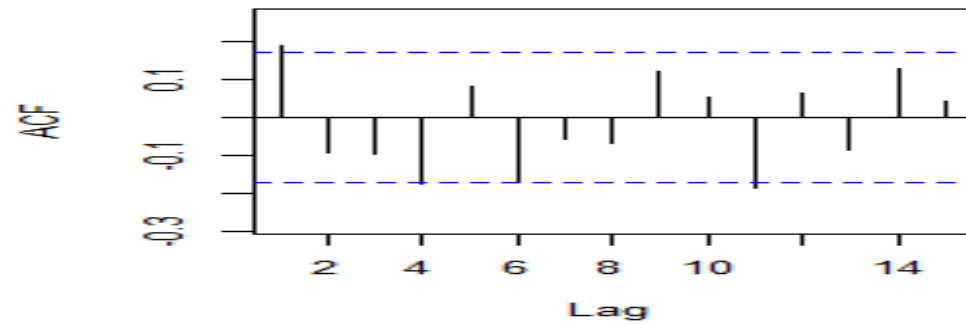
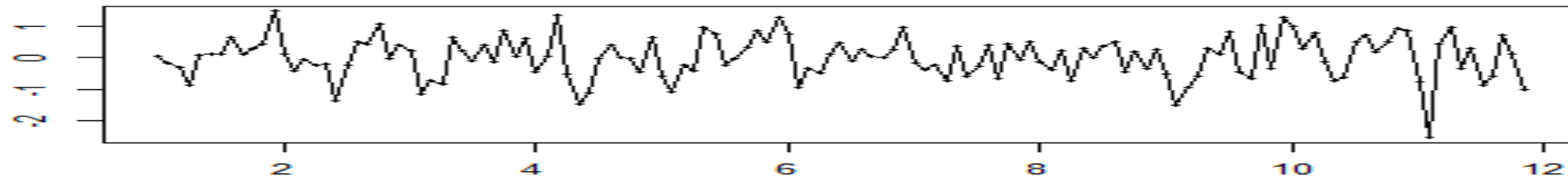
Forecasts from ARIMA(0,2,0)





the autocorrelation function (ACF) and partial autocorrelation (PACF) plots of the differenced series, you can tentatively identify the numbers of AR and MA terms that are needed. The PACF plot is a plot of the partial correlation coefficients between the series and lags of itself.

Seasonal Model Residuals



```
fit2 = arima(deseasonal_cnt, order=c(0,2,0))  
> fit2
```

Call:  
arima(x = deseasonal\_cnt, order = c(0, 2, 0))

sigma<sup>2</sup> estimated as 530.3: log likelihood = -259.67, aic = 521.35