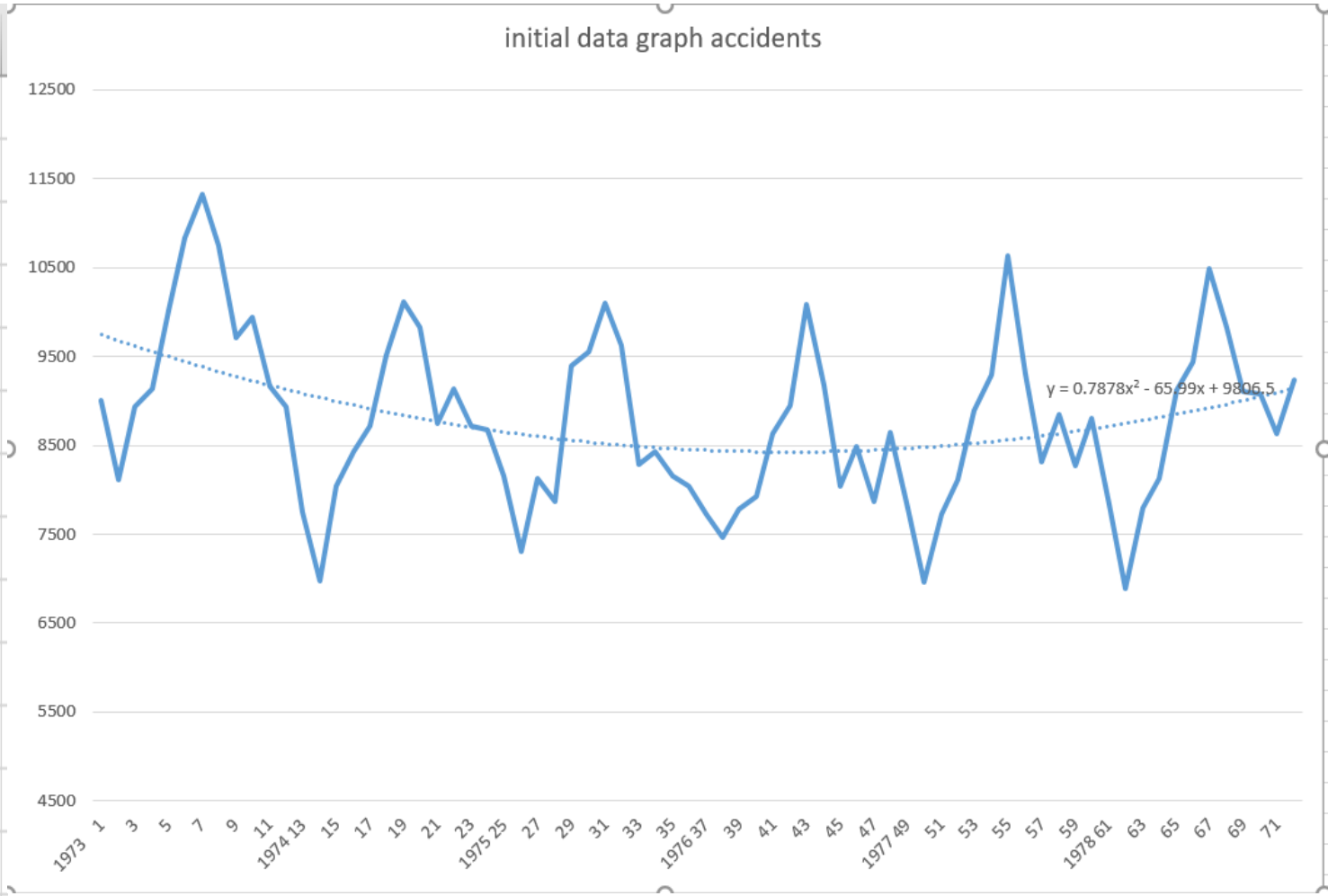
FORECASTING MODELS

By kodavati sai Narayana phanindra

INITIAL DATA AND GRAPH:

	A	B	C	D	E	F	G
1	month	1973	1974	1975	1976	1977	1978
2	jan	9007	7750	8162	7717	7792	7836
3	feb	8106	6981	7306	7461	6957	6892
4	mar	8928	8038	8124	7776	7726	7791
5	apr	9137	8422	7870	7925	8106	8129
6	may	10017	8714	9387	8634	8890	9115
7	jun	10826	9512	9556	8945	9299	9434
8	jul	11317	10120	10093	10078	10625	10484
9	aug	10744	9823	9620	9179	9302	9827
10	sep	9713	8743	8285	8037	8314	9110
11	oct	9938	9129	8433	8488	8850	9070
12	nov	9161	8710	8160	7874	8265	8633
13	dec	8927	8680	8034	8647	8796	9240



PERCENTAGE OR RATIO TO TREND METHOD:

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

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

=average(b2:b13)

=9651.75

In the same way,we calculate average for every year

	A	B	C	D	E	F	G	H	I	J	K
1	month	1973	1974	1975	1976	1977	1978	time	years(aver)		
2	jan	9007	7750	8162	7717	7792	7836	6.5	9651.75		
3	feb	8106	6981	7306	7461	6957	6892	18.5	8718.5		
4	mar	8928	8038	8124	7776	7726	7791	30.5	8585.83333		
5	apr	9137	8422	7870	7925	8106	8129	42.5	8396.75		
6	may	10017	8714	9387	8634	8890	9115	54.5	8576.83333		a=0.87014302
7	jun	10826	9512	9556	8945	9299	9434	66.5	8796.75		b=-75.1611152
8	jul	11317	10120	10093	10078	10625	10484				c=10006.4087
9	aug	10744	9823	9620	9179	9302	9827				
10	sep	9713	8743	8285	8037	8314	9110	sum(x)	sum(y)		
11	oct	9938	9129	8433	8488	8850	9070	36.5	8787.73611		
12	nov	9161	8710	8160	7874	8265	8633				
13	dec	8927	8680	8034	8647	8796	9240				

RAPPORT DÉTAILLÉ

Statistiques de la régression	
Coefficient de	0.96821987
Coefficient de	0.93744972
Coefficient de	0.89574953
Erreur-type	143.636243
Observations	6

ANALYSE DE VARIANCE

	Degré de liberté	*somme des carr*	*yenne des car*	F	*leur critique de F*
Régression	2	927615.631	463807.816	22.4807083	0.01564386
Résidus	3	61894.1105	20631.3702		
Total	5	989509.742			

	Coefficients	Erreur-type	Statistique t	Probabilité	Limite inférieu	Limite supérie	Limite inférieu	Limite supérieure pour seuil de confiance = 95.0%
Constante	10006.4087	191.113469	52.3584694	1.5344E-05	9398.20035	10614.6171	9398.20035	10614.6171
Variable X 1	-75.1611152	12.2559324	-6.13263134	0.00871858	-114.164962	-36.1572684	-114.164962	-36.1572684
Variable X 2	0.87014302	0.16324999	5.33012608	0.01290602	0.3506087	1.38967735	0.3506087	1.38967735

Using data analysis tool in excel we calculate polynomial equation using average(years) and time
We obtain intercept and x variable a=0.87014302 b=-75.1611152 c=10006.4087
Using these values a and b from equation y = ax^2 + bx+c we find y = 0.87014302*1^2-75.1611152 * 1+10006.4087

eq_1973	eq_1974	eq_1975	eq_1976	eq_1977	eq_1978	eq_1979
9932.11773	9176.36837	8671.22021	8416.67323	8412.72745	8659.38285	9156.63944
9859.56704	9124.70112	8640.43639	8406.77284	8423.71049	8691.24933	9209.38935
9788.75664	9074.77415	8611.39285	8398.61274	8436.43382	8724.85609	9263.87955
9719.68653	9026.58747	8584.0896	8392.19292	8450.89744	8760.20314	9320.11003
9652.3567	8980.14107	8558.52664	8387.51339	8467.10134	8797.29047	9378.0808
9586.76716	8935.43496	8534.70396	8384.57415	8485.04553	8836.11809	9437.79185
9522.9179	8892.46914	8512.62157	8383.37519	8504.73	8876.686	9499.24319
9460.80893	8851.2436	8492.27947	8383.91652	8526.15476	8918.99419	9562.43481
9400.44025	8811.75835	8473.67765	8386.19813	8549.31981	8963.04267	9627.36672
9341.81185	8774.01339	8456.81611	8390.22003	8574.22514	9008.83143	9694.03892
9284.92374	8738.00871	8441.69487	8395.98222	8600.87076	9056.36048	9762.4514
9229.77591	8703.74431	8428.31391	8403.48469	8629.25666	9105.62982	9832.60417

We express the all initial data as the percentage of trend on the basis of the following formula
=initial value/poly_eq_value*100
=9007/9932.11773*100=90.6855944
Similarly ,for every month of every year we will find values

	A	B	C	D	E	F
1	%_1973	%_1974	%_1975	%_1976	%_1977	%_1978
2	90.6855944	84.4560689	94.1274677	91.6870572	92.6215671	90.4914373
3	82.2145634	76.5066155	84.5559145	88.7498704	82.5883084	79.2981508
4	91.2066806	88.5752071	94.3401392	92.5867193	91.5789795	89.2966018
5	94.0050893	93.302148	91.6812424	94.4330054	95.918807	92.7946518
6	103.777764	97.0363375	109.680093	102.938733	104.99461	103.611448
7	112.926494	106.452568	111.966391	106.684011	109.592812	106.766341
8	118.839626	113.804162	118.56512	120.214112	124.93048	118.10714
9	113.563228	110.978756	113.279362	109.483437	109.099591	110.180585
10	103.324948	99.2196977	97.7733677	95.8360377	97.2475026	101.639592
11	106.381933	104.045886	99.7183797	101.165404	103.216324	100.678984
12	98.665323	99.6794612	96.6630532	93.7829523	96.0949215	95.3252691
13	96.7195746	99.7271943	95.3215565	102.89779	101.932302	101.475682

we calculate the mean and median
mean = average(A2:F2) =90.6781988
Adjusted mean = percentage of tot_mon of year / sum of mean * mean =1200/1198.95137*90.6781988=90.757508
Median = median(A2:F2)=91.1863258
Adjusted median = percentage of tot_mon of year / sum of median * median=1200/91.1863258*91.1863258=91.3798791
Similarly, we will find remaining values

	A	B	C	D	E	F	G	H	I	J
1	%_1973	%_1974	%_1975	%_1976	%_1977	%_1978	mean	median	adjmean	adjmedian
2	90.6855944	84.4560689	94.1274677	91.6870572	92.6215671	90.4914373	90.6781988	91.1863258	90.757508	91.3798791
3	82.2145634	76.5066155	84.5559145	88.7498704	82.5883084	79.2981508	82.3189038	82.4014359	82.3909018	82.5763423
4	91.2066806	88.5752071	94.3401392	92.5867193	91.5789795	89.2966018	91.2640546	91.39283	91.3438762	91.5868216
5	94.0050893	93.302148	91.6812424	94.4330054	95.918807	92.7946518	93.6891573	93.6536186	93.7711	93.852409
6	103.777764	97.0363375	109.680093	102.938733	104.99461	103.611448	103.673164	103.694606	103.763839	103.914709
7	112.926494	106.452568	111.966391	106.684011	109.592812	106.766341	109.06477	108.179577	109.16016	108.4092
8	118.839626	113.804162	118.56512	120.214112	124.93048	118.10714	119.076773	118.702373	119.180921	118.954332
9	113.563228	110.978756	113.279362	109.483437	109.099591	110.180585	111.097493	110.57967	111.194662	110.814388
10	103.324948	99.2196977	97.7733677	95.8360377	97.2475026	101.639592	99.1735243	98.4965327	99.2602637	98.7056027
11	106.381933	104.045886	99.7183797	101.165404	103.216324	100.678984	102.534485	102.190864	102.624164	102.407776
12	98.665323	99.6794612	96.6630532	93.7829523	96.0949215	95.3252691	96.7018301	96.3789873	96.7864077	96.5835626
13	96.7195746	99.7271943	95.3215565	102.89779	101.932302	101.475682	99.6790167	100.601438	99.7661982	100.814976
14										
15					total_month		total			
16					1200		1198.95137	1197.45826	1200	

DESEASONALIZATION OF DATA:

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

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

Deaseasonalisation using seasonal index of Adjusted mean

Y / S1 = initial_data / Adusted_mean

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

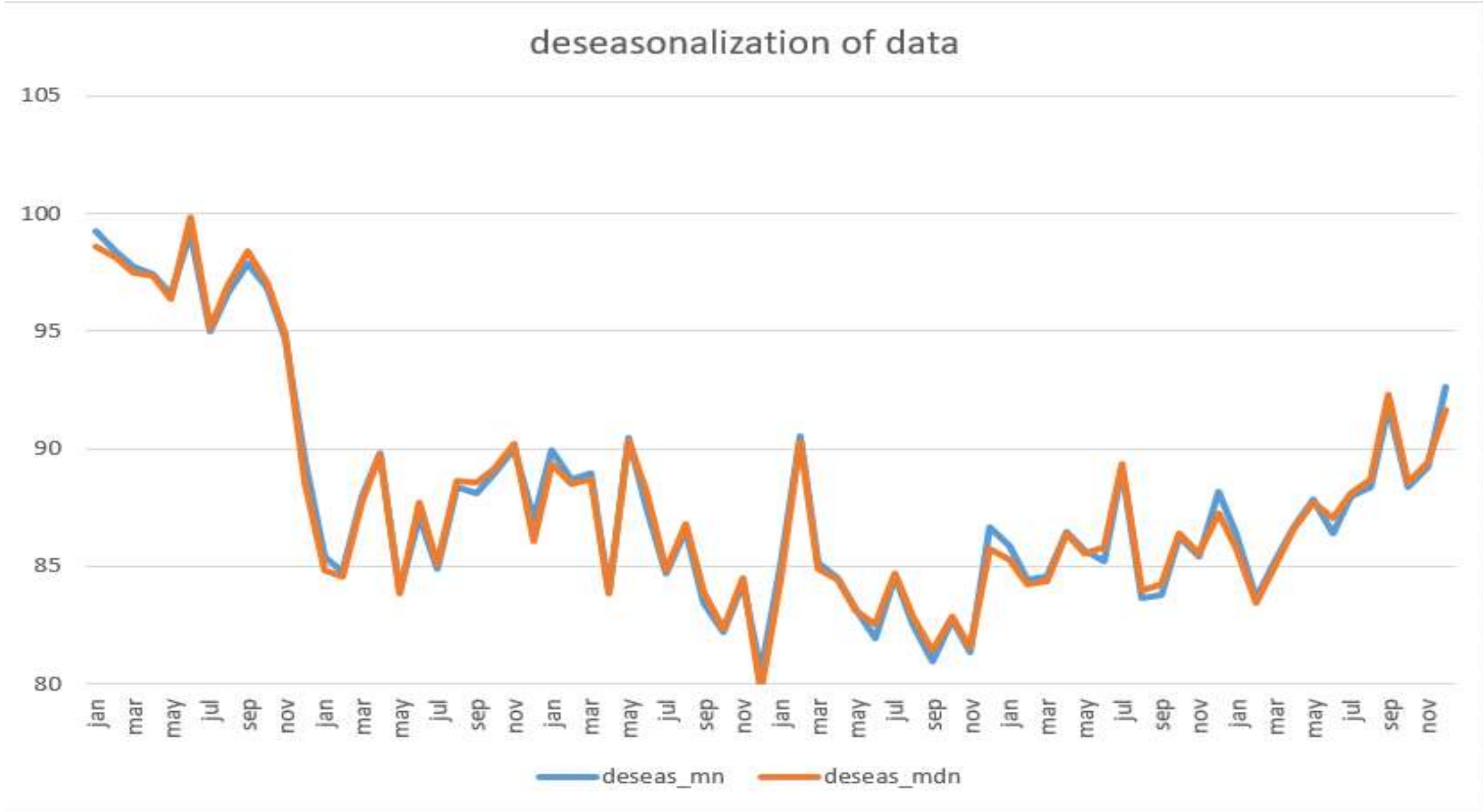
Deaseasonalisation using seasonal index of Adjusted median

Y / S2 = initial_data / Adusted_median

Similarly for all records of 72 months from 1973 to 1978 we calculate the values

	A	B	C	D
1	month	accident	deseas_mn	deseas_mdn
2	jan	9007	99.2424781	98.5665564
3	feb	8106	98.3846495	98.1637086
4	mar	8928	97.7405424	97.4812734
5	apr	9137	97.439403	97.3549864
6	may	10017	96.5365207	96.3963625
7	jun	10826	99.1753768	99.8623733
8	jul	11317	94.9564741	95.1373506
9	aug	10744	96.6233436	96.9549187
10	sep	9713	97.8538605	98.4037353
11	oct	9938	96.8387911	97.0434123
12	nov	9161	94.6517204	94.8505082
13	dec	8927	89.479204	88.548352
14	jan	7750	85.3923843	84.8107929
15	feb	6981	84.7302293	84.5399519
16	mar	8038	87.9971415	87.7637182
17	apr	8422	89.8144524	89.7366417
18	may	8714	83.9791596	83.857233
19	jun	9512	87.1380181	87.7416308
20	jul	10120	84.9129202	85.0746653
21	aug	9823	88.3405719	88.6437236
22	sep	8743	88.0815714	88.5765323
23	oct	9129	88.9556575	89.1436216
24	nov	8710	89.9919752	90.1809766
25	dec	8680	87.0034156	86.0983192
26	jan	8162	89.9319536	89.3194441
27	feb	7306	88.6748396	88.4757038
28	mar	8124	88.9386387	88.7027179
29	apr	7870	83.9277773	83.8550665
30	may	9387	90.4650414	90.3336982
31	jun	9556	87.5410956	88.1475004
32	jul	10093	84.6863739	84.8476875
33	aug	9620	86.5149447	86.8118315
34	sep	8285	83.467439	83.9364715
35	oct	8433	82.173629	82.3472626
36	nov	8160	84.3093591	84.4864259
37	dec	8034	80.5282766	79.690541
38	jan	7717	85.028778	84.4496631
39	feb	7461	90.5561153	90.3527548
40	mar	7776	85.1288595	84.9030446
41	apr	7925	84.514312	84.441093
42	may	8634	83.2081781	83.0873708
43	jun	8945	81.9438154	82.5114473
44	jul	10078	84.5605148	84.7215887
45	aug	9179	82.548927	82.8322039
46	sep	8037	80.9689568	81.4239494
47	oct	8488	82.7095652	82.8843312
48	nov	7874	81.3543987	81.5252595
49	dec	8647	86.6726422	85.7709869
50	jan	7792	85.8551559	85.2704127
51	feb	6957	84.438935	84.2493117
52	mar	7726	84.5814774	84.3571145
53	apr	8106	86.4445442	86.369653
54	may	8890	85.6753189	85.5509297
55	jun	9299	85.1867568	85.7768529
56	jul	10625	89.1501756	89.319992
57	aug	9302	83.6550952	83.9421681
58	sep	8314	83.7596002	84.2302744
59	oct	8850	86.2369995	86.4192191
60	nov	8265	85.3942222	85.5735674
61	dec	8796	88.166134	87.2489419
62	jan	7836	86.3399643	85.7519191
63	feb	6892	83.6500129	83.4621613
64	mar	7791	85.2930741	85.0668236
65	apr	8129	86.6898224	86.6147186
66	may	9115	87.8437043	87.7161669
67	jun	9434	86.4234717	87.0221346
68	jul	10484	87.9671003	88.1346632
69	aug	9827	88.3765448	88.67982
70	sep	9110	91.778922	92.2946596
71	oct	9070	88.3807441	88.5674934
72	nov	8633	89.196409	89.3837395
73	dec	9240	92.6165392	91.6530494

DESEASONALIZATION OF DATA GRAPH:



CYCLICAL FLUCTUATIONS:

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

Their study is obtained after the detrading

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

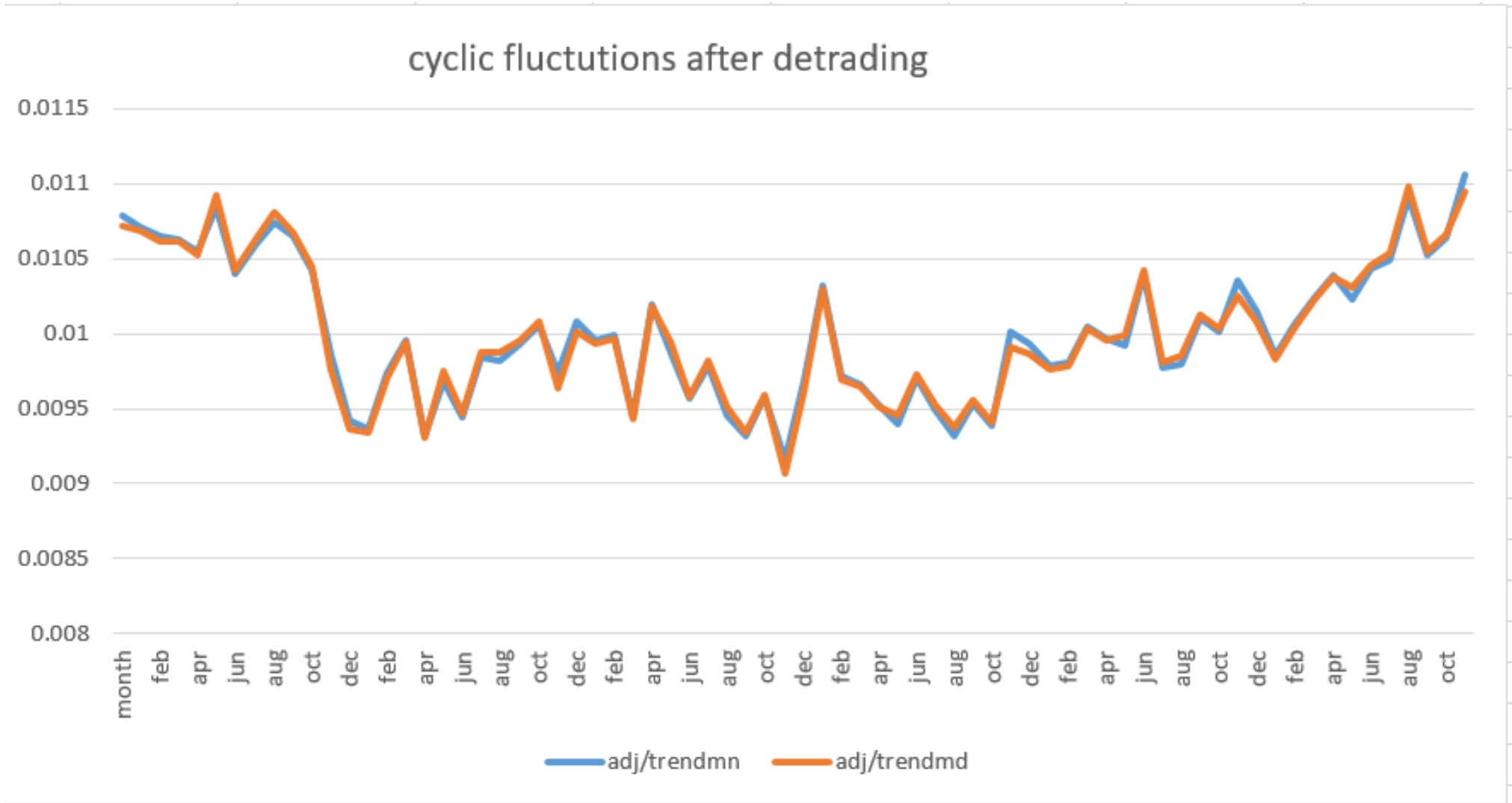
We compute the cyclical fluctuations by

C=deseasionalization data/poly_eq_value

Similarly , we calculate all the values

	A	B	C	D
1	months	accident	adj/trendmn	adj/trendmd
2	jan	9007	0.0107861	0.010713
3	feb	8106	0.0107064	0.010682
4	mar	8928	0.0106498	0.010622
5	apr	9137	0.0106305	0.010621
6	may	10017	0.0105453	0.01053
7	jun	10826	0.0108474	0.010923
8	jul	11317	0.0103992	0.010419
9	aug	10744	0.0105953	0.010632
10	sep	9713	0.0107439	0.010804
11	oct	9938	0.0106461	0.010669
12	nov	9161	0.0104189	0.010441
13	dec	8927	0.0098622	0.00976
14	jan	7750	0.0094239	0.00936
15	feb	6981	0.0093628	0.009342
16	mar	8038	0.0097363	0.009711
17	apr	8422	0.0099502	0.009942
18	may	8714	0.0093158	0.009302
19	jun	9512	0.0096787	0.009746
20	jul	10120	0.0094437	0.009462
21	aug	9823	0.0098377	0.009871
22	sep	8743	0.0098216	0.009877
23	oct	9129	0.0099319	0.009953
24	nov	8710	0.0100607	0.010082
25	dec	8680	0.0097393	0.009638
26	jan	8162	0.0100802	0.010012
27	feb	7306	0.0099523	0.00993
28	mar	8124	0.009995	0.009968
29	apr	7870	0.0094442	0.009436
30	may	9387	0.0101932	0.010178
31	jun	9556	0.0098767	0.009945
32	jul	10093	0.0095672	0.009585
33	aug	9620	0.0097866	0.00982
34	sep	8285	0.0094543	0.009507
35	oct	8433	0.0093201	0.00934
36	nov	8160	0.009575	0.009595
37	dec	8034	0.0091576	0.009062
38	jan	7717	0.0096823	0.009616
39	feb	7461	0.0103253	0.010302
40	mar	7776	0.0097194	0.009694
41	apr	7925	0.0096621	0.009654
42	may	8634	0.0095254	0.009512
43	jun	8945	0.0093932	0.009458
44	jul	10078	0.0097061	0.009725
45	aug	9179	0.0094879	0.00952
46	sep	8037	0.0093188	0.009371
47	oct	8488	0.0095319	0.009552
48	nov	7874	0.0093883	0.009408
49	dec	8647	0.0100155	0.009911
50	jan	7792	0.0099344	0.009867
51	feb	6957	0.0097837	0.009762
52	mar	7726	0.0098134	0.009787
53	apr	8106	0.0100432	0.010034
54	may	8890	0.0099673	0.009953
55	jun	9299	0.0099239	0.009993
56	jul	10625	0.0103997	0.010419
57	aug	9302	0.0097719	0.009805
58	sep	8314	0.0097975	0.009853
59	oct	8850	0.010101	0.010122
60	nov	8265	0.0100159	0.010037
61	dec	8796	0.0103552	0.010247
62	jan	7836	0.0101546	0.010085
63	feb	6892	0.0098517	0.00983
64	mar	7791	0.010059	0.010032
65	apr	8129	0.0102378	0.010229
66	may	9115	0.0103884	0.010373
67	jun	9434	0.0102345	0.010305
68	jul	10484	0.0104317	0.010452
69	aug	9827	0.0104947	0.010531
70	sep	9110	0.0109138	0.010975
71	oct	9070	0.0105243	0.010547
72	nov	8633	0.0106362	0.010659
73	dec	9240	0.0110594	0.010944

CYCLIC FLUCTUATIONS GRAPH:

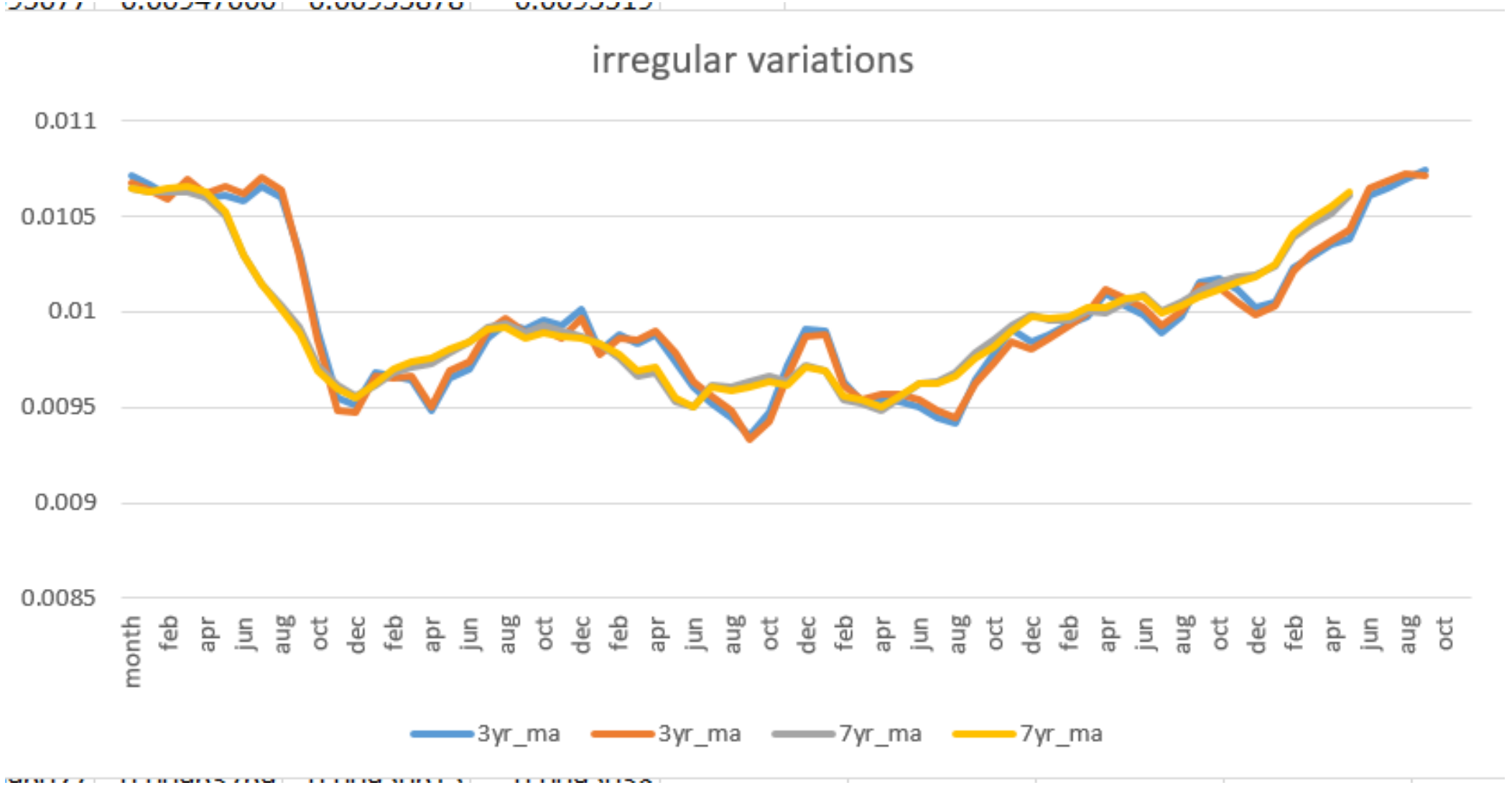


IRREGULAR VARIATIONS:

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
1	months	accident	adj/trendmn	adj/trendm	3yr_ma	3yr_ma	7yr_ma	7yr_ma
2	jan	9007	0.0107861	0.010713	0.01071408	0.01067217	0.01065209	0.01064419
3	feb	8106	0.0107064	0.010682	0.01066221	0.01064171	0.01062483	0.01063262
4	mar	8928	0.0106498	0.010622	0.01060853	0.01059094	0.01063019	0.01065004
5	apr	9137	0.0106305	0.010621	0.0106744	0.01069128	0.01062966	0.01065675
6	may	10017	0.0105453	0.01053	0.01059732	0.01062386	0.01059944	0.01063098
7	jun	10826	0.0108474	0.010923	0.01061395	0.01065772	0.01050185	0.01052092
8	jul	11317	0.0103992	0.010419	0.01057945	0.01061829	0.01029849	0.01029765
9	aug	10744	0.0105953	0.010632	0.01066173	0.01070148	0.01015043	0.01014376
10	sep	9713	0.0107439	0.010804	0.01060297	0.01063788	0.01002773	0.01001218
11	oct	9938	0.0106461	0.010669	0.01030907	0.01028967	0.00991435	0.00988894
12	nov	9161	0.0104189	0.010441	0.00990168	0.00985338	0.00972431	0.00969375
13	dec	8927	0.0098622	0.00976	0.00954963	0.00948703	0.00961856	0.00959445
14	jan	7750	0.0094239	0.00936	0.00950767	0.00947066	0.00955878	0.0095519
15	feb	6981	0.0093628	0.009342	0.00968313	0.00966464	0.00961789	0.00962501
16	mar	8038	0.0097363	0.009711	0.00966745	0.00965145	0.00968343	0.00970143
17	apr	8422	0.0099502	0.009942	0.00964823	0.00966319	0.00971137	0.00973606
18	may	8714	0.0093158	0.009302	0.0094794	0.00950323	0.00972716	0.0097561
19	jun	9512	0.0096787	0.009746	0.00965337	0.00969297	0.00978766	0.00980406
20	jul	10120	0.0094437	0.009462	0.009701	0.00973665	0.00984503	0.00984204
21	aug	9823	0.0098377	0.009871	0.00986373	0.00990038	0.00991768	0.00990893
22	sep	8743	0.0098216	0.009877	0.00993808	0.00997051	0.00994015	0.00992279
23	oct	9129	0.0099319	0.009953	0.00991065	0.00989091	0.00988624	0.00985983
24	nov	8710	0.0100607	0.010082	0.00996008	0.00991047	0.00992357	0.00989204
25	dec	8680	0.0097393	0.009638	0.00992395	0.00985984	0.00989728	0.00987251
26	jan	8162	0.0100802	0.010012	0.01000918	0.00997001	0.00987269	0.009865
27	feb	7306	0.0099523	0.00993	0.00979718	0.00977816	0.00983074	0.00983766
28	mar	8124	0.009995	0.009968	0.00987747	0.00986097	0.0097596	0.0097773
29	apr	7870	0.0094442	0.009436	0.00983803	0.00985318	0.00966319	0.00968748
30	may	9387	0.0101932	0.010178	0.00987902	0.00990297	0.00968186	0.0097102
31	jun	9556	0.0098767	0.009945	0.0097435	0.00978357	0.00953393	0.00955077
32	jul	10093	0.0095672	0.009585	0.00960271	0.00963769	0.00950615	0.0095038
33	aug	9620	0.0097866	0.00982	0.00952035	0.00955581	0.00961446	0.00960619
34	sep	8285	0.0094543	0.009507	0.00944979	0.00948077	0.00960486	0.00958811
35	oct	8433	0.0093201	0.00934	0.00935089	0.0093324	0.00963454	0.009609
36	nov	8160	0.009575	0.009595	0.00947162	0.00942458	0.00966388	0.00963355
37	dec	8034	0.0091576	0.009062	0.00972175	0.00966028	0.00963792	0.00961402
38	jan	7717	0.0096823	0.009616	0.00990901	0.0098707	0.00971627	0.00970862
39	feb	7461	0.0103253	0.010302	0.00990228	0.00988317	0.00968851	0.00969493
40	mar	7776	0.0097194	0.009694	0.00963565	0.00961966	0.00954471	0.00956193
41	apr	7925	0.0096621	0.009654	0.00952692	0.00954121	0.00951792	0.0095417
42	may	8634	0.0095254	0.009512	0.0095416	0.00956484	0.00947881	0.0095066
43	jun	8945	0.0093932	0.009458	0.00952909	0.00956779	0.00954881	0.00956369
44	jul	10078	0.0097061	0.009725	0.00950427	0.00953874	0.00962612	0.00962204
45	aug	9179	0.0094879	0.00952	0.00944619	0.00948121	0.0096372	0.00962734
46	sep	8037	0.0093188	0.009371	0.00941298	0.00944373	0.0096837	0.00966547
47	oct	8488	0.0095319	0.009552	0.00964522	0.00962377	0.00978718	0.00976023
48	nov	7874	0.0093883	0.009408	0.00977938	0.00972867	0.00984938	0.00981748
49	dec	8647	0.0100155	0.009911	0.00991118	0.00984657	0.00992589	0.009901
50	jan	7792	0.0099344	0.009867	0.00984383	0.00980527	0.00998078	0.0099736
51	feb	6957	0.0097837	0.009762	0.00988009	0.00986119	0.00995758	0.00996485
52	mar	7726	0.0098134	0.009787	0.00994128	0.00992488	0.00995955	0.00997782
53	apr	8106	0.0100432	0.010034	0.0099781	0.00999329	0.01000063	0.01002567
54	may	8890	0.0099673	0.009953	0.01009694	0.01012164	0.00999674	0.01002603
55	jun	9299	0.0099239	0.009993	0.01003183	0.01007253	0.01005216	0.01006813
56	jul	10625	0.0103997	0.010419	0.0099897	0.01002583	0.01008512	0.01008139
57	aug	9302	0.0097719	0.009805	0.00989014	0.00992678	0.01000684	0.00999712
58	sep	8314	0.0097975	0.009853	0.00997147	0.01000395	0.01004785	0.01002953
59	oct	8850	0.010101	0.010122	0.01015739	0.0101356	0.01011076	0.0100833
60	nov	8265	0.0100159	0.010037	0.01017525	0.0101233	0.01015181	0.01011915
61	dec	8796	0.0103552	0.010247	0.01012051	0.01005417	0.01018303	0.01015749
62	jan	7836	0.0101546	0.010085	0.01002178	0.00998246	0.01019395	0.01018664
63	feb	6892	0.0098517	0.00983	0.01004951	0.01003029	0.01024254	0.01025025
64	mar	7791	0.010059	0.010032	0.01022839	0.01021151	0.01039426	0.0104139
65	apr	8129	0.0102378	0.010229	0.01028688	0.01030253	0.01046073	0.01048736
66	may	9115	0.0103884	0.010373	0.0103515	0.01037673	0.01051764	0.01054873
67	jun	9434	0.0102345	0.010305	0.01038695	0.01042921	0.0106135	0.01063031
68	jul	10484	0.0104317	0.010452	0.0106134	0.01065247		
69	aug	9827	0.0104947	0.010531	0.01064428	0.01068414		
70	sep	9110	0.0109138	0.010975	0.01069143	0.01072673		
71	oct	9070	0.0105243	0.010547	0.01073994	0.01071645		
72	nov	8633	0.0106362	0.010659				
73	dec	9240	0.0110594	0.010944				

IRREGULAR VARIATIONS GRAPH:



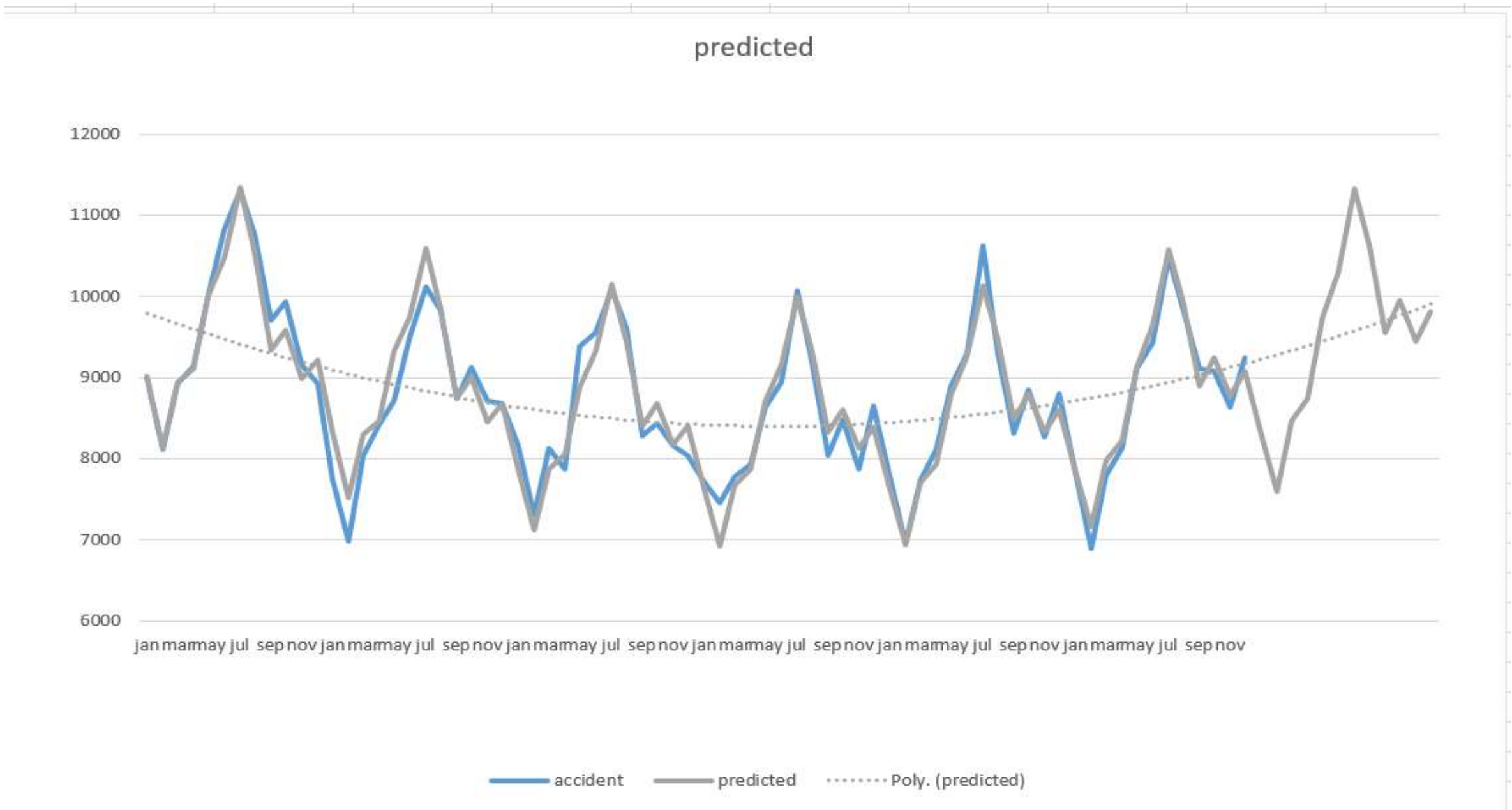
By using the polynomial equation we predict the values for 1979

polynomial equation y = ax^2+bx+c

y = 0.87014302*73^2-75.1611152 * 73+10006.4087

In the same way, we will predict all the values for every month of the year 1979

	A	B	C	D	E
1	month	accident	adjmean	trend value	predicted
2	jan	9007	90.757508	9932.11773	9014.14254
3	feb	8106	82.3909018	9859.56704	8123.3862
4	mar	8928	91.3438762	9788.75664	8941.42975
5	apr	9137	93.7711	9719.68653	9114.25697
6	may	10017	103.763839	9652.3567	10015.6559
7	jun	10826	109.16016	9586.76716	10464.9304
8	jul	11317	119.180921	9522.9179	11349.5012
9	aug	10744	111.194662	9460.80893	10519.9145
10	sep	9713	99.2602637	9400.44025	9330.90178
11	oct	9938	102.624164	9341.81185	9586.95633
12	nov	9161	96.7864077	9284.92374	8986.54414
13	dec	8927	99.7661982	9229.77591	9208.19653
14	jan	7750		9176.36837	8328.24326
15	feb	6981		9124.70112	7517.92354
16	mar	8038		9074.77415	8289.25046
17	apr	8422		9026.58747	8464.33036
18	may	8714		8980.14107	9318.13913
19	jun	9512		8935.43496	9753.93511
20	jul	10120		8892.46914	10598.1266
21	aug	9823		8851.2436	9842.11038
22	sep	8743		8811.75835	8746.57458
23	oct	9129		8774.01339	9004.25791
24	nov	8710		8738.00871	8457.20473
25	dec	8680		8703.74431	8683.3948
26	jan	8162		8671.22021	7869.78337
27	feb	7306		8640.43639	7118.93346
28	mar	8124		8611.39285	7865.98002
29	apr	7870		8584.0896	8049.39524
30	may	9387		8558.52664	8880.65581
31	jun	9556		8534.70396	9316.4965
32	jul	10093		8512.62157	10145.4208
33	aug	9620		8492.27947	9442.96142
34	sep	8285		8473.67765	8410.99478
35	oct	8433		8456.81611	8678.73686
36	nov	8160		8441.69487	8170.41321
37	dec	8034		8428.31391	8408.60835
38	jan	7717		8416.67323	7638.76288
39	feb	7461		8406.77284	6926.41596
40	mar	7776		8398.61274	7671.61842
41	apr	7925		8392.19292	7869.45162
42	may	8634		8387.51339	8703.2059
43	jun	8945		8384.57415	9152.61456
44	jul	10078		8383.37519	9991.38373
45	aug	9179		8383.91652	9322.4676
46	sep	8037		8386.19813	8324.16238
47	oct	8488		8390.22003	8610.39318
48	nov	7874		8395.98222	8126.16958
49	dec	8647		8403.48469	8383.83719
50	jan	7792		8412.72745	7635.18178
51	feb	6957		8423.71049	6940.37104
52	mar	7726		8436.43382	7706.16566
53	apr	8106		8450.89744	7924.49948
54	may	8890		8467.10134	8785.78941
55	jun	9299		8485.04553	9262.28927
56	jul	10625		8504.73	10136.0155
57	aug	9302		8526.15476	9480.62893
58	sep	8314		8549.31981	8486.07738
59	oct	8850		8574.22514	8799.22689
60	nov	8265		8600.87076	8324.47383
61	dec	8796		8629.25666	8609.0813
62	jan	7836		8659.38285	7859.04008
63	feb	6892		8691.24933	7160.7987
64	mar	7791		8724.85609	7969.62174
65	apr	8129		8760.20314	8214.53884
66	may	9115		8797.29047	9128.40633
67	jun	9434		8836.11809	9645.52065
68	jul	10484		8876.686	10579.3161
69	aug	9827		8918.99419	9917.44541
70	sep	9110		8963.04267	8896.73979
71	oct	9070		9008.83143	9245.23796
72	nov	8633		9056.36048	8765.32598
73	dec	9240		9105.62982	9084.34069
74				9156.63944	8310.33777
75				9209.38935	7587.69894
76				9263.87955	8461.98666
77				9320.11003	8739.56969
78				9378.0808	9731.05667
79				9437.79185	10302.3087
80				9499.24319	11321.2855
81				9562.43481	10632.917
82				9627.36672	9556.1496
83				9694.03892	9948.42642
84				9762.4514	9448.72601
85				9832.60417	9809.61536


predicted
12000
11000
10000
9000
8000
7000
6000
jan mar may jul sep nov jan mar may jul sep nov jan mar may jul sep nov jan mar may jul sep nov jan mar may jul sep nov jan mar may jul sep nov
accident
predicted
Poly. (predicted)

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.

Step:1

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

=average(b2:b13)

=9651.75

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

	A	B	C	D
1	month	accident	years(aver)	mean percetg
2	jan	9007	9651.75	0.93319864
3	feb	8106	8718.5	0.8398477
4	mar	8928	8585.83333	0.9250136
5	apr	9137	8396.75	0.9466677
6	may	10017	8576.83333	1.03784288
7	jun	10826	8796.75	1.12166187
8	jul	11317		1.17253348
9	aug	10744		1.11316601
10	sep	9713		1.006346
11	oct	9938		1.02965783
12	nov	9161		0.9491543
13	dec	8927		0.92490999
14	jan	7750		0.88891438
15	feb	6981		0.80071113
16	mar	8038		0.92194758
17	apr	8422		0.96599186
18	may	8714		0.99948386
19	jun	9512		1.09101336
20	jul	10120		1.16075013
21	aug	9823		1.12668464
22	sep	8743		1.00281012
23	oct	9129		1.04708379
24	nov	8710		0.99902506
25	dec	8680		0.9955841
26	jan	8162		0.95063574
27	feb	7306		0.85093662
28	mar	8124		0.94620984
29	apr	7870		0.91662623
30	may	9387		1.09331263
31	jun	9556		1.11299622
32	jul	10093		1.1755411
33	aug	9620		1.12045035
34	sep	8285		0.96496166
35	oct	8433		0.98219936
36	nov	8160		0.9504028
37	dec	8034		0.93572746
38	jan	7717		0.91904606
39	feb	7461		0.88855807
40	mar	7776		0.92607259
41	apr	7925		0.94381755
42	may	8634		1.02825498
43	jun	8945		1.06529312
44	jul	10078		1.20022628
45	aug	9179		1.09316104
46	sep	8037		0.95715604
47	oct	8488		1.0108673
48	nov	7874		0.93774377
49	dec	8647		1.0298032
50	jan	7792		0.90849381
51	feb	6957		0.81113853
52	mar	7726		0.90079866
53	apr	8106		0.94510406
54	may	8890		1.03651309
55	jun	9299		1.08419969
56	jul	10625		1.2388022
57	aug	9302		1.08454947
58	sep	8314		0.96935543
59	oct	8850		1.03184936
60	nov	8265		0.96364237
61	dec	8796		1.02555333
62	jan	7836		0.89078353
63	feb	6892		0.78347117
64	mar	7791		0.885668
65	apr	8129		0.92409128
66	may	9115		1.03617813
67	jun	9434		1.07244153
68	jul	10484		1.19180379
69	aug	9827		1.11711712
70	sep	9110		1.03560974
71	oct	9070		1.03106261
72	nov	8633		0.98138517
73	dec	9240		1.05038793

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=9007/9651.75=0.93319864
Likewise,we calculate percentage for remaining months

	A	B	C	D	E	F	G	H	I	J	K
1	months	1973	1974	1975	1976	1977	1978	mean	adj mean	median	adj median
2	jan	0.93319864	0.88891438	0.95063574	0.91904606	0.90849381	0.89078353	91.5178693	91.5178693	91.3769935	91.4836373
3	feb	0.8398477	0.80071113	0.85093662	0.88855807	0.81113853	0.78347117	82.9110537	82.9110537	82.5493114	82.6456527
4	mar	0.9250136	0.92194758	0.94620984	0.92607259	0.90079866	0.885668	91.7618379	91.7618379	92.3480591	92.4558362
5	apr	0.9466677	0.96599186	0.91662623	0.94381755	0.94510406	0.92409128	94.0383113	94.0383113	94.4460804	94.5563061
6	may	1.03784288	0.99948386	1.09331263	1.02825498	1.03651309	1.03617813	103.859759	103.859759	103.634561	103.75551
7	jun	1.12166187	1.09101336	1.11299622	1.06529312	1.08419969	1.07244153	109.126763	109.126763	108.760652	108.887584
8	jul	1.17253348	1.16075013	1.1755411	1.20022628	1.2388022	1.19180379	118.994283	118.994283	118.367245	118.505388
9	aug	1.11316601	1.12668464	1.12045035	1.09316104	1.08454947	1.11711712	110.91881	110.91881	111.514156	111.644302
10	sep	1.006346	1.00281012	0.96496166	0.95715604	0.96935543	1.03560974	98.9373166	98.9373166	98.6082776	98.7233608
11	oct	1.02965783	1.04708379	0.98219936	1.0108673	1.03184936	1.03106261	102.212004	102.212004	103.036022	103.156273
12	nov	0.9491543	0.99902506	0.9504028	0.93774377	0.96364237	0.98138517	96.3558911	96.3558911	95.7022583	95.81395
13	dec	0.92490999	0.9955841	0.93572746	1.0298032	1.02555333	1.05038793	99.3661001	99.3661001	101.056872	101.174813
14											
15					total			sum		sum	
16					1200			1200		1201.40049	

We compute the mean or median
mean=average(b2:g2) median=median(b2:g2)
=91.5178693 =91.3769935
From mean and median we obtain the adj mean and adjmedian
=1200/1200*91.5178693=91.5178693
In the same way,we calculate all values of mean and median which gives seasonal index

DESEASONALIZATION OF DATA:

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

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

Deaseasonalisation using seasonal index of Adjusted mean

Y / S1 = initial_data / 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 = initial_data / Adusted_median

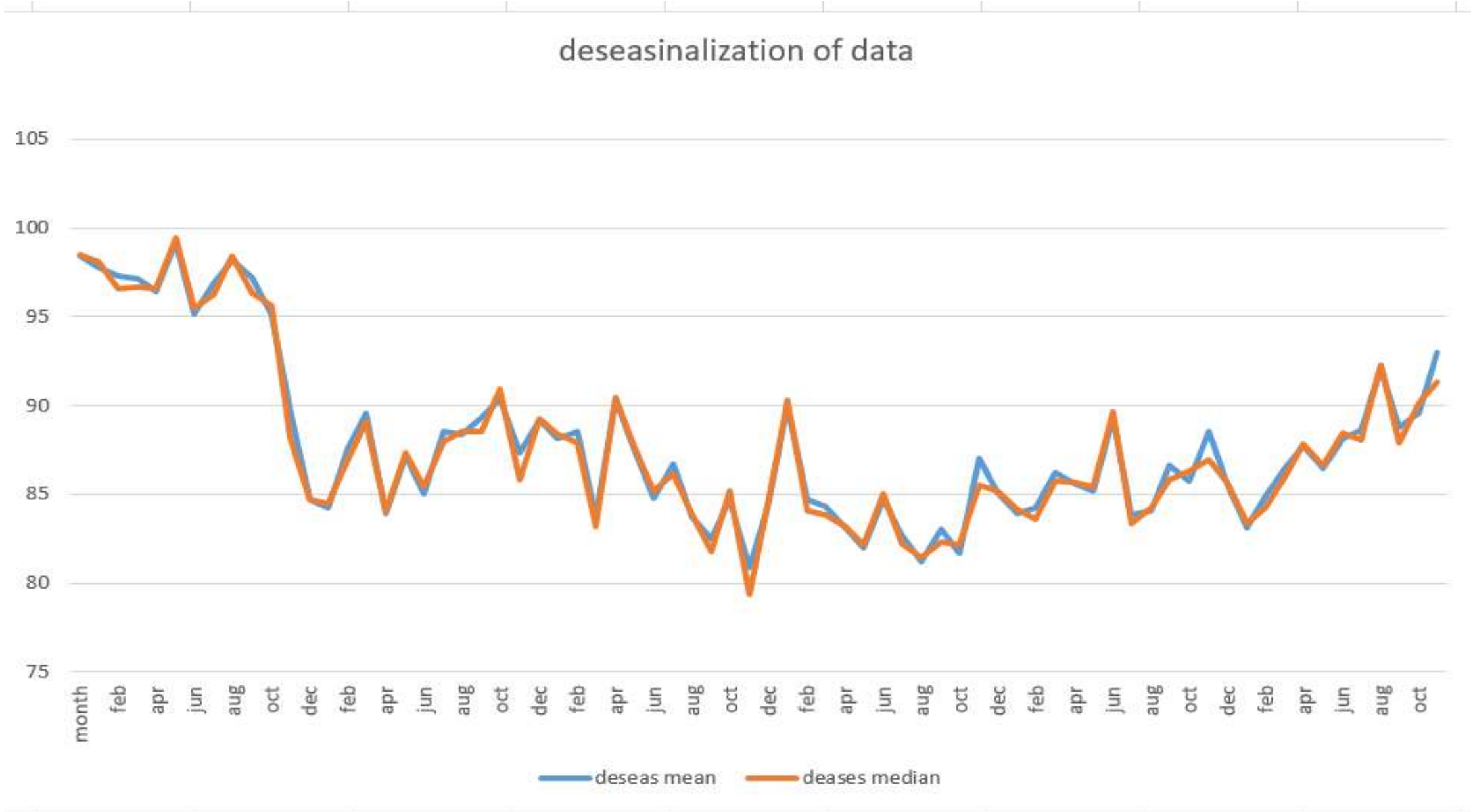
Similarly for all records of 72 months from 1973 to 1978 we calculate the values

	A	B	C	D	E	F
1	month	accident	adj mean	deseas mean	adj median	deases median
2	jan	9007	91.5178693	98.4179382	91.4836373	98.4547648
3	feb	8106	82.9110537	97.7674223	82.6456527	98.0813841
4	mar	8928	91.7618379	97.2953485	92.4558362	96.5650236
5	apr	9137	94.0383113	97.1625274	94.5563061	96.6302553
6	may	10017	103.859759	96.4473638	103.75551	96.5442699
7	jun	10826	109.126763	99.2057282	108.887584	99.4236402
8	jul	11317	118.994283	95.1054094	118.505388	95.4977674
9	aug	10744	110.91881	96.8636425	111.644302	96.2341996
10	sep	9713	98.9373166	98.173271	98.7233608	98.3860347
11	oct	9938	102.212004	97.2292842	103.156273	96.3392697
12	nov	9161	96.3558911	95.0746228	95.81395	95.6123821
13	dec	8927	99.3661001	89.8394924	101.174813	88.2334226
14	jan	7750		84.6829156		84.7146028
15	feb	6981		84.1986646		84.4690528
16	mar	8038		87.5963274		86.9388059
17	apr	8422		89.5592433		89.0686232
18	may	8714		83.9016001		83.9859008
19	jun	9512		87.1646857		87.3561487
20	jul	10120		85.0461026		85.3969608
21	aug	9823		88.5602718		87.9847862
22	sep	8743		88.3690836		88.5605993
23	oct	9129		89.3143626		88.4967995
24	nov	8710		90.3940579		90.9053431
25	dec	8680		87.3537352		85.7921035
26	jan	8162		89.1847687		89.2181404
27	feb	7306		88.1185279		88.4015041
28	mar	8124		88.5335362		87.8689798
29	apr	7870		83.6892953		83.2308317

	A	B	C	D	E	F
30	may	9387		90.3814919		90.4723032
31	jun	9556		87.5678865		87.7602352
32	jul	10093		84.8192009		85.1691231
33	aug	9620		86.7301044		86.1665116
34	sep	8285		83.7398899		83.9213731
35	oct	8433		82.5049862		81.7497547
36	nov	8160		84.6860519		85.1650516
37	dec	8034		80.852524		79.4071151
38	jan	7717		84.3223303		84.3538826
39	feb	7461		89.9880012		90.2769808
40	mar	7776		84.74111		84.1050205
41	apr	7925		84.2741633		83.8124957
42	may	8634		83.1313307		83.2148574
43	jun	8945		81.9688933		82.1489434
44	jul	10078		84.6931444		85.0425466
45	aug	9179		82.7542233		82.2164667
46	sep	8037		81.2332523		81.4093031
47	oct	8488		83.0430835		82.2829263
48	nov	7874		81.7178889		82.1801001
49	dec	8647		87.02163		85.4659353
50	jan	7792		85.1418424		85.1737013
51	feb	6957		83.9091977		84.1786564
52	mar	7726		84.1962211		83.5642218
53	apr	8106		86.1989107		85.7266991
54	may	8890		85.5961929		85.6821962
55	jun	9299		85.2128272		85.4000028
56	jul	10625		89.2900039		89.6583704
57	aug	9302		83.8631425		83.3181799
58	sep	8314		84.0330048		84.2151233

59	oct	8850	86.5847419		85.7921652
60	nov	8265	85.7757622		86.2609255
61	dec	8796	88.5211353		86.9386339
62	jan	7836	85.6226228		85.6546616
63	feb	6892	83.1252251		83.3921662
64	mar	7791	84.9045766		84.2672602
65	apr	8129	86.4434919		85.9699404
66	may	9115	87.7625757		87.8507557
67	jun	9434	86.4499206		86.6398136
68	jul	10484	88.1050731		88.4685511
69	aug	9827	88.5963342		88.0206143
70	sep	9110	92.0785029		92.2780579
71	oct	9070	88.7371309		87.9248517
72	nov	8633	89.5949371		90.1017023
73	dec	9240	92.9894601		91.3270779

DESEASONALIZATION OF DATA GRAPH:



CYCLICAL FLUCTUATIONS:

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

Their study is obtained after the detrading

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

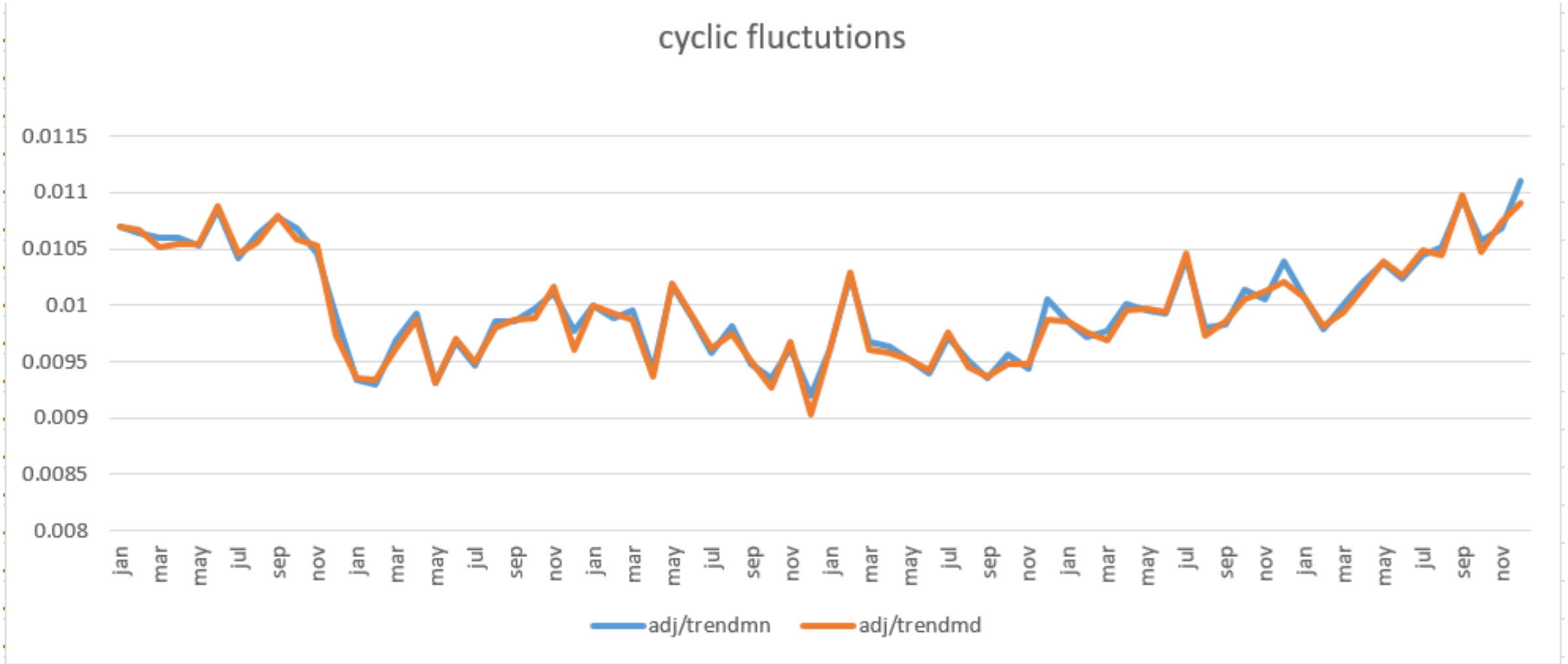
We compute the cyclical fluctuations by

C=deseasionalization data/poly_eq_value

Similarly , we calculate all the values

	A	B	C	D
1	month	accident	adj/trendmn	adj/trendmd
2	jan	9007	0.01069646	0.01070046
3	feb	8106	0.01063922	0.01067339
4	mar	8928	0.01060128	0.0105217
5	apr	9137	0.01060025	0.01054218
6	may	10017	0.01053561	0.01054619
7	jun	10826	0.01085072	0.01087456
8	jul	11317	0.01041551	0.01045848
9	aug	10744	0.0106216	0.01055258
10	sep	9713	0.01077897	0.01080233
11	oct	9938	0.01068898	0.01059114
12	nov	9161	0.0104655	0.0105247
13	dec	8927	0.00990192	0.00972491
14	jan	7750	0.00934557	0.00934906
15	feb	6981	0.00930408	0.00933396
16	mar	8038	0.00969199	0.00961924
17	apr	8422	0.00992195	0.0098676
18	may	8714	0.00930717	0.00931652
19	jun	9512	0.00968164	0.00970291
20	jul	10120	0.00945855	0.00949757
21	aug	9823	0.00986216	0.00979807
22	sep	8743	0.00985364	0.00987499
23	oct	9129	0.00997199	0.0098807
24	nov	8710	0.01010567	0.01016283
25	dec	8680	0.0097785	0.00960369
26	jan	8162	0.00999649	0.01000023
27	feb	7306	0.00988988	0.00992164
28	mar	8124	0.00994946	0.00987478
29	apr	7870	0.00941738	0.00936579
30	may	9387	0.01018378	0.01019401
31	jun	9556	0.00987971	0.00990142
32	jul	10093	0.00958218	0.00962171
33	aug	9620	0.00981096	0.00974721
34	sep	8285	0.0094852	0.00950575
35	oct	8433	0.00935766	0.009272
36	nov	8160	0.00961773	0.00967213
37	dec	8034	0.00919452	0.00903015
38	jan	7717	0.00960181	0.0096054
39	feb	7461	0.01026056	0.01029351
40	mar	7776	0.00967515	0.00960252
41	apr	7925	0.00963464	0.00958186
42	may	8634	0.00951665	0.00952621
43	jun	8945	0.0093961	0.00941674
44	jul	10078	0.00972135	0.00976146
45	aug	9179	0.0095115	0.0094497
46	sep	8037	0.0093492	0.00936946
47	oct	8488	0.00957031	0.00948271
48	nov	7874	0.00943024	0.00948358
49	dec	8647	0.0100558	0.00987603
50	jan	7792	0.00985184	0.00985552
51	feb	6957	0.0097223	0.00975352
52	mar	7726	0.00976873	0.00969541
53	apr	8106	0.01001462	0.00995976
54	may	8890	0.00995806	0.00996807
55	jun	9299	0.0099269	0.00994871
56	jul	10625	0.010416	0.01045897
57	aug	9302	0.00979624	0.00973258
58	sep	8314	0.00982945	0.00985075
59	oct	8850	0.01014174	0.0100489
60	nov	8265	0.0100607	0.0101176
61	dec	8796	0.0103969	0.01021103
62	jan	7836	0.01007024	0.010074
63	feb	6892	0.00978992	0.00982135
64	mar	7791	0.0100132	0.00993804
65	apr	8129	0.01020871	0.01015278
66	may	9115	0.01037876	0.01038918
67	jun	9434	0.01023762	0.0102601
68	jul	10484	0.01044803	0.01049113
69	aug	9827	0.01052081	0.01045244
70	sep	9110	0.01094945	0.01097318
71	oct	9070	0.01056674	0.01047001
72	nov	8633	0.01068369	0.01074412
73	dec	9240	0.01110389	0.01090538

CYCLIC FLUCTUATIONS GRAPH:

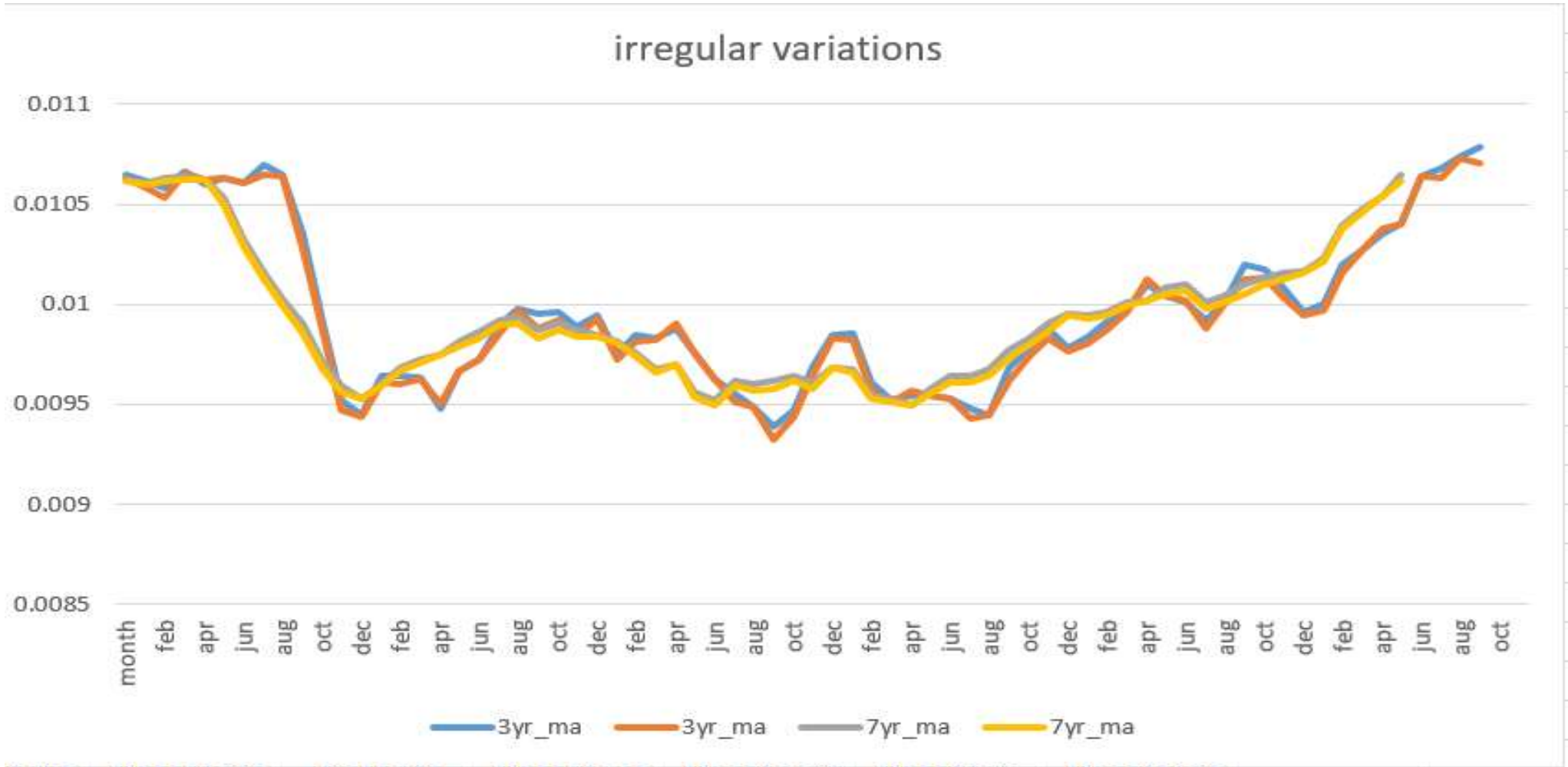


IRREGULAR VARIATIONS:

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

	A	B	C	D	E	F	G	H
1	month	accident	adj/trendmn	adj/trendmd	3yr_ma	3yr_ma	7yr_ma	7yr_ma
2	jan	9007	0.01069646	0.01070046	0.01064565	0.01063185	0.01061986	0.01061671
3	feb	8106	0.01063922	0.01067339	0.01061358	0.01057909	0.01060917	0.01059558
4	mar	8928	0.01060128	0.0105217	0.01057905	0.01053669	0.01062913	0.010614
5	apr	9137	0.01060025	0.01054218	0.01066219	0.01065431	0.01064166	0.01062392
6	may	10017	0.01053561	0.01054619	0.01060061	0.01062641	0.01062241	0.01062142
7	jun	10826	0.01085072	0.01087456	0.01062928	0.01062854	0.01053189	0.0105041
8	jul	11317	0.01041551	0.01045848	0.01060536	0.01060446	0.01031686	0.01028617
9	aug	10744	0.0106216	0.01055258	0.01069652	0.01064868	0.01015809	0.01012552
10	sep	9713	0.01077897	0.01080233	0.01064448	0.01063939	0.01002529	0.00999219
11	oct	9938	0.01068898	0.01059114	0.01035214	0.01028025	0.00990286	0.00985866
12	nov	9161	0.0104655	0.0105247	0.00990433	0.00986622	0.00970545	0.00967657
13	dec	8927	0.00990192	0.00972491	0.00951719	0.00946931	0.00959347	0.00955917
14	jan	7750	0.00934557	0.00934906	0.00944721	0.00943409	0.00953014	0.00952669
15	feb	6981	0.00930408	0.00933396	0.00963934	0.00960693	0.00960393	0.00959084
16	mar	8038	0.00969199	0.00961924	0.00964037	0.00960112	0.00968244	0.00966813
17	apr	8422	0.00992195	0.0098676	0.00963692	0.00962901	0.00972244	0.00970548
18	may	8714	0.00930717	0.00931652	0.00948245	0.00950567	0.00974869	0.00974766
19	jun	9512	0.00968164	0.00970291	0.00966745	0.00966618	0.00981602	0.00978868
20	jul	10120	0.00945855	0.00949757	0.00972478	0.00972355	0.009861	0.00983116
21	aug	9823	0.00986216	0.00979807	0.00989593	0.00985126	0.00992262	0.00989174
22	sep	8743	0.00985364	0.00987499	0.0099771	0.00997284	0.00993509	0.0099027
23	oct	9129	0.00997199	0.0098807	0.00995205	0.00988241	0.00987277	0.00982995
24	nov	8710	0.01010567	0.01016283	0.00996022	0.00992225	0.00990302	0.00987471
25	dec	8680	0.0097785	0.00960369	0.00988829	0.00984186	0.00987074	0.00983737
26	jan	8162	0.00999649	0.01000023	0.00994528	0.00993222	0.0098427	0.00983994
27	feb	7306	0.00988988	0.00992164	0.00975224	0.00972074	0.0098162	0.0098038
28	mar	8124	0.00994946	0.00987478	0.00985021	0.00981153	0.00975838	0.00974438
29	apr	7870	0.00941738	0.00936579	0.00982696	0.00982041	0.00967384	0.00965827
30	may	9387	0.010184	0.01019	0.00988	0.009906	0.0097	0.009702
31	jun	9556	0.00988	0.0099	0.00976	0.009757	0.00956	0.009536
32	jul	10093	0.009582	0.00962	0.00963	0.009625	0.00952	0.009493
33	aug	9620	0.009811	0.00975	0.00955	0.009508	0.00962	0.009589
34	sep	8285	0.009485	0.00951	0.00949	0.009483	0.0096	0.009569
35	oct	8433	0.009358	0.00927	0.00939	0.009325	0.00962	0.00958
36	nov	8160	0.009618	0.00967	0.00947	0.009436	0.00964	0.009616
37	dec	8034	0.009195	0.00903	0.00969	0.009643	0.00961	0.009579
38	jan	7717	0.009602	0.00961	0.00985	0.009834	0.00969	0.009684
39	feb	7461	0.010261	0.01029	0.00986	0.009826	0.00967	0.009662
40	mar	7776	0.009675	0.0096	0.00961	0.00957	0.00954	0.00953
41	apr	7925	0.009635	0.00958	0.00952	0.009508	0.00953	0.009513
42	may	8634	0.009517	0.00953	0.00954	0.009568	0.0095	0.009499
43	jun	8945	0.009396	0.00942	0.00954	0.009543	0.00958	0.009549
44	jul	10078	0.009721	0.00976	0.00953	0.009527	0.00964	0.009611
45	aug	9179	0.009512	0.00945	0.00948	0.009434	0.00964	0.00961
46	sep	8037	0.009349	0.00937	0.00945	0.009445	0.00968	0.009645
47	oct	8488	0.00957	0.00948	0.00969	0.009614	0.00977	0.00973
48	nov	7874	0.00943	0.00948	0.00978	0.009738	0.00983	0.009799
49	dec	8647	0.010056	0.00988	0.00988	0.009828	0.0099	0.009865
50	jan	7792	0.009852	0.00986	0.00978	0.009768	0.00995	0.009949
51	feb	6957	0.009722	0.00975	0.00984	0.009803	0.00994	0.009931
52	mar	7726	0.009769	0.0097	0.00991	0.009874	0.00996	0.009945
53	apr	8106	0.010015	0.00996	0.00997	0.009959	0.01001	0.009995
54	may	8890	0.009958	0.00997	0.0101	0.010125	0.01002	0.010018
55	jun	9299	0.009927	0.00995	0.01005	0.010047	0.01008	0.010053
56	jul	10625	0.010416	0.01046	0.01001	0.010014	0.0101	0.010071
57	aug	9302	0.009796	0.00973	0.00992	0.009877	0.01001	0.009979
58	sep	8314	0.009829	0.00985	0.01001	0.010006	0.01004	0.010009
59	oct	8850	0.010142	0.01005	0.0102	0.010126	0.0101	0.010052
60	nov	8265	0.010061	0.01012	0.01018	0.010134	0.01013	0.010101
61	dec	8796	0.010397	0.01021	0.01009	0.010035	0.01016	0.010121
62	jan	7836	0.01007	0.01007	0.00996	0.009944	0.01016	0.010161
63	feb	6892	0.00979	0.00982	0.01	0.009971	0.01023	0.010215
64	mar	7791	0.010013	0.00994	0.0102	0.01016	0.01039	0.01038
65	apr	8129	0.010209	0.01015	0.01028	0.010267	0.01047	0.010456
66	may	9115	0.010379	0.01039	0.01035	0.01038	0.01054	0.01054
67	jun	9434	0.010238	0.01026	0.0104	0.010401	0.01064	0.010614
68	jul	10484	0.010448	0.01049	0.01064	0.010639		
69	aug	9827	0.010521	0.01045	0.01068	0.010632		
70	sep	9110	0.010949	0.01097	0.01073	0.010729		
71	oct	9070	0.010567	0.01047	0.01078	0.010707		
72	nov	8633	0.010684	0.01074				
73	dec	9240	0.011104	0.01091				

IRREGULAR VARIATIONS GRAPH:



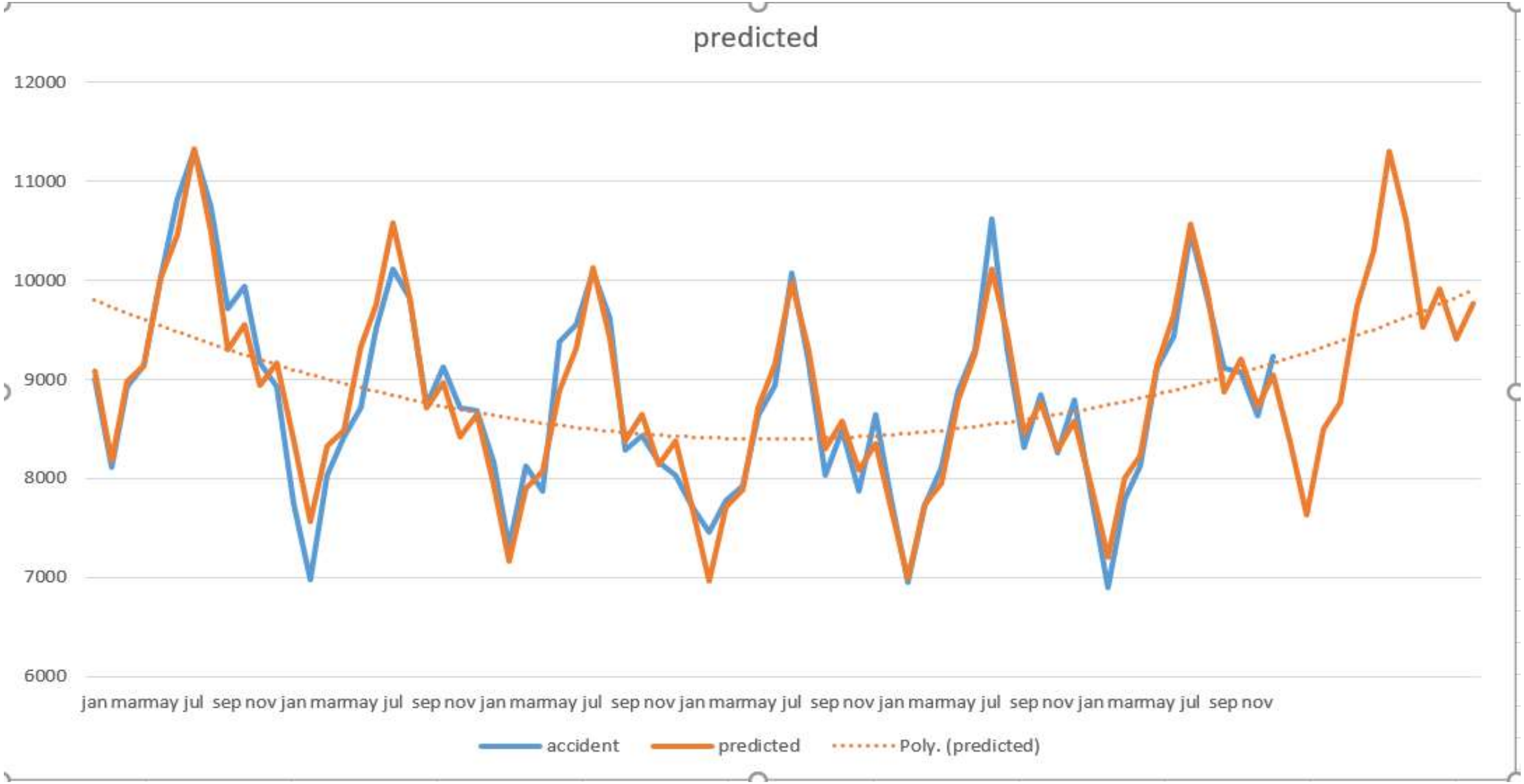
By using the polynomial equation we predict the values for 1979

Linear regression equation y = ax^2+bx+c

y = 0.87014302*73^2-75.1611152 * 73+10006.4087

In the same way, we will predict all the values for every month of the year 1979

	A	B	C	D	E
1	month	accident	adj mean	trend value	predicted
2	jan	9007	91.517869	9932.118	9089.6625
3	feb	8106	82.911054	9859.567	8174.6709
4	mar	8928	91.761838	9788.757	8982.343
5	apr	9137	94.038311	9719.687	9140.2291
6	may	10017	103.85976	9652.357	10024.914
7	jun	10826	109.12676	9586.767	10461.729
8	jul	11317	118.99428	9522.918	11331.728
9	aug	10744	110.91881	9460.809	10493.817
10	sep	9713	98.937317	9400.44	9300.5433
11	oct	9938	102.212	9341.812	9548.4531
12	nov	9161	96.355891	9284.924	8946.571
13	dec	8927	99.3661	9229.776	9171.2684
14	jan	7750		9176.368	8398.0168
15	feb	6981		9124.701	7565.3858
16	mar	8038		9074.774	8327.1796
17	apr	8422		9026.587	8488.4504
18	may	8714		8980.141	9326.7529
19	jun	9512		8935.435	9750.9509
20	jul	10120		8892.469	10581.53
21	aug	9823		8851.244	9817.6941
22	sep	8743		8811.758	8718.1173
23	oct	9129		8774.013	8968.0949
24	nov	8710		8738.009	8419.5862
25	dec	8680		8703.744	8648.5713
26	jan	8162		8671.22	7935.716
27	feb	7306		8640.436	7163.8769
28	mar	8124		8611.393	7901.9724
29	apr	7870		8584.09	8072.3329
30	may	9387		8558.527	8888.8652
31	jun	9556		8534.704	9313.6462
32	jul	10093		8512.622	10129.533
33	aug	9620		8492.279	9419.5354
34	sep	8285		8473.678	8383.6293
35	oct	8433		8456.816	8643.8812
36	nov	8160		8441.695	8134.0703
37	dec	8034		8428.314	8374.8868
38	jan	7717		8416.673	7702.76
39	feb	7461		8406.773	6970.1439
40	mar	7776		8398.613	7706.7214
41	apr	7925		8392.193	7891.8765
42	may	8634		8387.513	8711.2512
43	jun	8945		8384.574	9149.8144
44	jul	10078		8383.375	9975.7372
45	aug	9179		8383.917	9299.3405
46	sep	8037		8386.198	8297.0794
47	oct	8488		8390.22	8575.812
48	nov	7874		8395.982	8090.0235
49	dec	8647		8403.485	8350.215
50	jan	7792		8412.727	7699.1489
51	feb	6957		8423.71	6984.1871
52	mar	7726		8436.434	7741.4267
53	apr	8106		8450.897	7947.0812
54	may	8890		8467.101	8793.9111
55	jun	9299		8485.046	9259.4555
56	jul	10625		8504.73	10120.142
57	aug	9302		8526.155	9457.1094
58	sep	8314		8549.32	8458.4676
59	oct	8850		8574.225	8763.8874
60	nov	8265		8600.871	8287.4457
61	dec	8796		8629.257	8574.5558
62	jan	7836		8659.383	7924.8827
63	feb	6892		8691.249	7206.0064
64	mar	7791		8724.856	8006.0883
65	apr	8129		8760.203	8237.9471
66	may	9115		8797.29	9136.8447
67	jun	9434		8836.118	9642.5697
68	jul	10484		8876.686	10562.749
69	aug	9827		8918.994	9892.8423
70	sep	9110		8963.043	8867.7939
71	oct	9070		9008.831	9208.1072
72	nov	8633		9056.36	8726.3368
73	dec	9240		9105.63	9047.9092
74				9156.639	8379.9613
75				9209.389	7635.6018
76				9263.88	8500.7061
77				9320.11	8764.4741
78				9378.081	9740.0521
79				9437.792	10299.157
80				9499.243	11303.556
81				9562.435	10606.539
82				9627.367	9525.0583
83				9694.039	9908.4715
84				9762.451	9406.697
85				9832.604	9770.2753


predicted
12000
11000
10000
9000
8000
7000
6000
jan mar may jul sep nov jan mar may jul sep nov jan mar may jul sep nov jan mar may jul sep nov jan mar may jul sep nov jan mar may jul sep nov
accident
predicted
Poly. (predicted)

THE PERCENTAGE MOVING AVERAGE:

By using initial data, we calculate 12 month moving average

=average(c2:c13)

We compute a 12-month moving average. Since the results thus obtained are between successive months, we compute a 2-month moving average of this 12-month moving average

	A	B	C	D	E
1	month	accident	12_mma	2(12_mma	ratio to ma
2	jan	9007	9651.75	9599.375	0.93829025
3	feb	8106	9547	9500.125	0.85325193
4	mar	8928	9453.25	9416.16667	0.94815654
5	apr	9137	9379.08333	9349.29167	0.97729329
6	may	10017	9319.5	9265.20833	1.08114137
7	jun	10826	9210.91667	9156.16667	1.18237254
8	jul	11317	9101.41667	9051.54167	1.25028425
9	aug	10744	9001.66667	8963.29167	1.19866678
10	sep	9713	8924.91667	8884.5	1.09325229
11	oct	9938	8844.08333	8810.375	1.12798831
12	nov	9161	8776.66667	8757.875	1.04603
13	dec	8927	8739.08333	8728.79167	1.02270742
14	jan	7750	8718.5	8735.66667	0.88716755
15	feb	6981	8752.83333	8766.375	0.79633828
16	mar	8038	8779.91667	8783.5	0.91512495
17	apr	8422	8787.08333	8764.08333	0.96096759
18	may	8714	8741.08333	8769.125	0.99371374
19	jun	9512	8797.16667	8799	1.08103194
20	jul	10120	8800.83333	8799.70833	1.15003812
21	aug	9823	8798.58333	8790.125	1.11750402
22	sep	8743	8781.66667	8762.58333	0.99776512
23	oct	9129	8743.5	8714.5	1.0475644
24	nov	8710	8685.5	8662.58333	1.00547373
25	dec	8680	8639.66667	8612.75	1.00780819
26	jan	8162	8585.83333	8567.29167	0.95269314
27	feb	7306	8548.75	8555.20833	0.85398271
28	mar	8124	8561.66667	8547.16667	0.95049042
29	apr	7870	8532.66667	8534.95833	0.92209003
30	may	9387	8537.25	8505.875	1.10359017
31	jun	9556	8474.5	8449.04167	1.13101584
32	jul	10093	8423.58333	8422.95833	1.19827258
33	aug	9620	8422.33333	8403.95833	1.14469868
34	sep	8285	8385.58333	8375.25	0.9892242
35	oct	8433	8364.91667	8367.20833	1.00786304
36	nov	8160	8369.5	8357.58333	0.9763588
37	dec	8034	8345.66667	8371.20833	0.95971808
38	jan	7717	8396.75	8399.875	0.91870415
39	feb	7461	8403	8382	0.89012169
40	mar	7776	8361	8358.91667	0.93026409
41	apr	7925	8356.83333	8364.375	0.94747067
42	may	8634	8371.91667	8382.58333	1.02999274
43	jun	8945	8393.25	8408	1.06386775
44	jul	10078	8422.75	8445.54167	1.19329232
45	aug	9179	8468.33333	8473.45833	1.0832649
46	sep	8037	8478.58333	8490.125	0.94662917
47	oct	8488	8501.66667	8516.75	0.9966243
48	nov	7874	8531.83333	8548.125	0.92113768
49	dec	8647	8564.41667	8570.625	1.00891125
50	jan	7792	8576.83333	8578.66667	0.90829966
51	feb	6957	8580.5	8577.79167	0.81104791
52	mar	7726	8575.08333	8577.79167	0.90069802
53	apr	8106	8580.5	8581.45833	0.94459469
54	may	8890	8582.41667	8591.79167	1.03470852
55	jun	9299	8601.16667	8606.79167	1.08042583
56	jul	10625	8612.41667	8606.54167	1.23452606
57	aug	9302	8600.66667	8622.54167	1.07880024
58	sep	8314	8644.41667	8677.58333	0.95810085
59	oct	8850	8710.75	8719.91667	1.01491796
60	nov	8265	8729.08333	8744.41667	0.94517454
61	dec	8796	8759.75	8778.25	1.00202204
62	jan	7836	8796.75		
63	feb	6892			
64	mar	7791			
65	apr	8129			
66	may	9115			
67	jun	9434			
68	jul	10484			
69	aug	9827			
70	sep	9110			
71	oct	9070			
72	nov	8633			
73	dec	9240			

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
1	months	1973	1974	1975	1976	1977	1978	mean	adj mean	median	adj median
2	jan	0.93829025	0.88716755	0.95269314	0.91870415	0.90829966		92.103095	91.0206659	91.8704147	91.3412672
3	feb	0.85325193	0.79633828	0.85398271	0.89012169	0.81104791		84.0948504	83.1065371	85.3251931	84.8337441
4	mar	0.94815654	0.91512495	0.95049042	0.93026409	0.90069802		92.8946804	91.8029482	93.0264089	92.4906032
5	apr	0.97729329	0.96096759	0.92209003	0.94747067	0.94459469		95.0483254	93.9312829	94.7470672	94.2013509
6	may	1.08114137	0.99371374	1.10359017	1.02999274	1.03470852		104.862931	103.630543	103.470852	102.874889
7	jun	1.18237254	1.08103194	1.13101584	1.06386775	1.08042583		110.774278	109.472418	108.103194	107.48055
8	jul	1.25028425	1.15003812	1.19827258	1.19329232	1.23452606		120.528267	119.111774	119.827258	119.137087
9	aug	1.19866678	1.11750402	1.14469868	1.0832649	1.07880024		112.458692	111.137037	111.750402	111.106751
10	sep	1.09325229	0.99776512	0.9892242	0.94662917	0.95810085		99.6994328	98.5277287	98.9224202	98.3526551
11	oct	1.12798831	1.0475644	1.00786304	0.9966243	1.01491796		103.89916	102.678099	101.491796	100.907232
12	nov	1.04603	1.00547373	0.9763588	0.92113768	0.94517454		97.8834949	96.7331324	97.6358796	97.0735246
13	dec	1.02270742	1.00780819	0.95971808	1.00891125	1.00202204		100.02334	98.847829	100.780819	100.20035
14											
15					total			sum		sum	
16					1200			1214.27055	1200	1206.9517	

DESEASONALIZATION OF DATA:

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

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

Deaseasonalisation using seasonal index of Adjusted mean

Y / S1 = initial_data / Adusted_mean Similarly, for all records of 72 months from to 1995 we calculate the values

Deaseasonalisation using seasonal index of Adjusted median

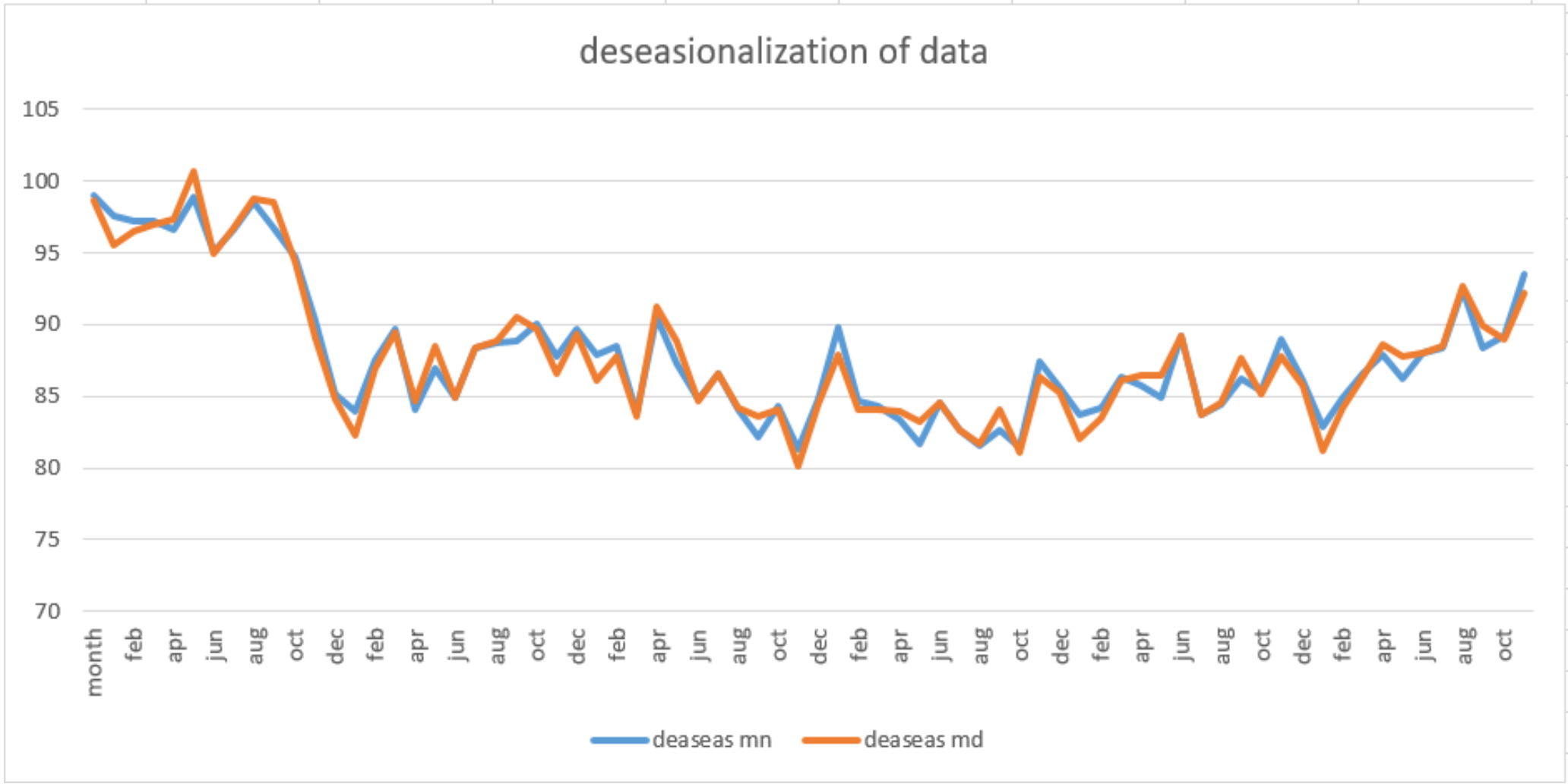
Y / S2 = initial_data / Adusted_median

Similarly for all records of 72 months from 1973 to 1978 we calculate the values

	A	B	C	D	E	F
1	month	accident	adj mean	deaseas mn	adj media	deaseas md
2	jan	9007	91.020666	98.955549	91.3413	98.6082225
3	feb	8106	83.106537	97.537454	84.8337	95.5516002
4	mar	8928	91.802948	97.251779	92.4906	96.528725
5	apr	9137	93.931283	97.273238	94.2014	96.9943627
6	may	10017	103.63054	96.660692	102.875	97.3707007
7	jun	10826	109.47242	98.89249	107.481	100.725201
8	jul	11317	119.11177	95.011598	119.137	94.9914112
9	aug	10744	111.13704	96.673443	111.107	96.6997945
10	sep	9713	98.527729	98.581385	98.3527	98.7568662
11	oct	9938	102.6781	96.787923	100.907	98.4864994
12	nov	9161	96.733132	94.703849	97.0735	94.3717666
13	dec	8927	98.847829	90.310532	100.2	89.091505
14	jan	7750		85.145499		84.8466442
15	feb	6981		84.000612		82.2903677
16	mar	8038		87.557101		86.9061259
17	apr	8422		89.66129		89.404238
18	may	8714		84.087179		84.7048304
19	jun	9512		86.889466		88.4997334
20	jul	10120		84.962213		84.944162
21	aug	9823		88.386377		88.4104693
22	sep	8743		88.736441		88.8943973
23	oct	9129		88.908931		90.4692345
24	nov	8710		90.041538		89.7258036
25	dec	8680		87.811741		86.6264438
26	jan	8162		89.671943		89.3572013
27	feb	7306		87.911255		86.1213904
28	mar	8124		88.49389		87.8359501
29	apr	7870		83.784654		83.5444495

	A	B	C	D	E	F
30	may	9387		90.581403		91.2467573
31	jun	9556		87.291394		88.9091098
32	jul	10093		84.735536		84.7175323
33	aug	9620		86.559803		86.5833976
34	sep	8285		84.088004		84.2376852
35	oct	8433		82.130465		83.5718101
36	nov	8160		84.355792		84.0599951
37	dec	8034		81.276444		80.1793605
38	jan	7717		84.782944		84.4853618
39	feb	7461		89.776331		87.9484936
40	mar	7776		84.703162		84.0734057
41	apr	7925		84.370188		84.1283052
42	may	8634		83.315205		83.9271868
43	jun	8945		81.71008		83.2243603
44	jul	10078		84.609603		84.591627
45	aug	9179		82.591729		82.6142418
46	sep	8037		81.570946		81.7161468
47	oct	8488		82.666119		84.1168652
48	nov	7874		81.399204		81.1137747
49	dec	8647		87.477895		86.2971036
50	jan	7792		85.606933		85.3064583
51	feb	6957		83.711826		82.0074614
52	mar	7726		84.158517		83.5328102
53	apr	8106		86.297129		86.0497214
54	may	8890		85.78552		86.4156463
55	jun	9299		84.943771		86.5179795
56	jul	10625		89.201929		89.1829764
57	aug	9302		83.698471		83.7212853
58	sep	8314		84.382337		84.5325425

59	oct	8850		86.191701		87.7043187
60	nov	8265		85.441253		85.1416494
61	dec	8796		88.985262		87.7841244
62	jan	7836		86.090339		85.7881683
63	feb	6892		82.929698		81.2412569
64	mar	7791		84.866555		84.2355843
65	apr	8129		86.541988		86.2938793
66	may	9115		87.956694		88.602769
67	jun	9434		86.176958		87.7740207
68	jul	10484		88.018167		87.9994659
69	aug	9827		88.422368		88.4464707
70	sep	9110		92.461281		92.6258675
71	oct	9070		88.334319		89.8845391
72	nov	8633		89.245533		88.9325904
73	dec	9240		93.477015		92.2152466


deseasionalization of data
105
100
95
90
85
80
75
70
month
feb
apr
jun
aug
oct
dec
deaseas mn
deaseas md

CYCLICAL FLUCTUATIONS:

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

Their study is obtained after the detrading

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

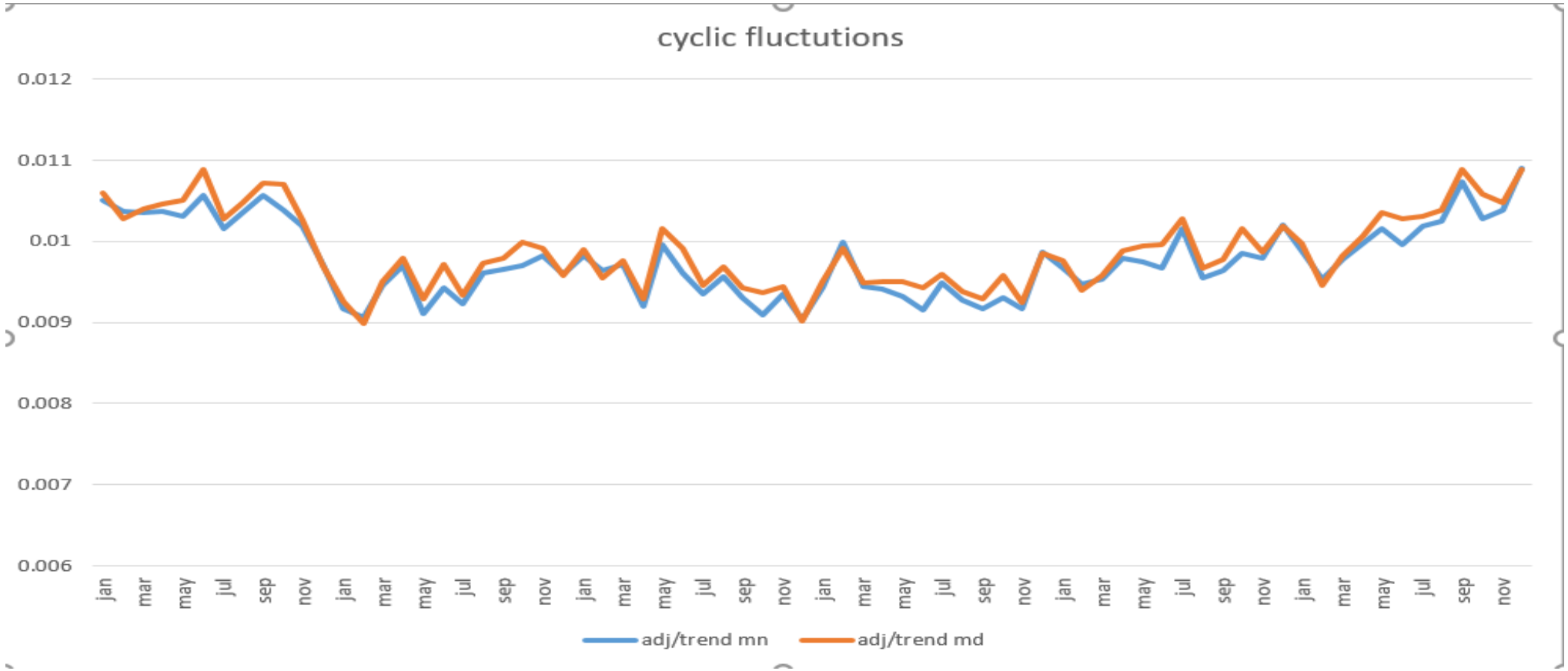
We compute the cyclical fluctuations by

C=deseasionalization data/poly_eq_value

Similarly , we calculate all the values

	A	B	C	D
1	month	accident	adj/trend mn	adj/trend md
2	jan	9007	0.01050359	0.01059404
3	feb	8106	0.01036618	0.01027866
4	mar	8928	0.01034893	0.01039694
5	apr	9137	0.01036436	0.01046036
6	may	10017	0.01031219	0.0105143
7	jun	10826	0.01056372	0.01089037
8	jul	11317	0.0101621	0.01028353
9	aug	10744	0.01035304	0.01048184
10	sep	9713	0.01057086	0.0107185
11	oct	9938	0.01039183	0.01070283
12	nov	9161	0.0101811	0.01026881
13	dec	8927	0.00972125	0.00970669
14	jan	7750	0.00917705	0.00925608
15	feb	6981	0.0090653	0.00898876
16	mar	8038	0.00946128	0.00950518
17	apr	8422	0.00970115	0.00979101
18	may	8714	0.00910979	0.00928834
19	jun	9512	0.00942556	0.00971702
20	jul	10120	0.00922843	0.0093387
21	aug	9823	0.0096128	0.00973239
22	sep	8743	0.0096634	0.00979836
23	oct	9129	0.00969477	0.00998491
24	nov	8710	0.00983104	0.00991574
25	dec	8680	0.00960008	0.0095857
26	jan	8162	0.00981624	0.00990078
27	feb	7306	0.00963607	0.00955472
28	mar	8124	0.00971262	0.00975768
29	apr	7870	0.00920781	0.0092931
30	may	9387	0.00996782	0.01016318
31	jun	9556	0.00961839	0.00991582
32	jul	10093	0.00934905	0.00946077
33	aug	9620	0.0095629	0.00968187
34	sep	8285	0.00930207	0.00943199
35	oct	8433	0.00909752	0.00936978
36	nov	8160	0.00935637	0.00943698
37	dec	8034	0.00902675	0.00901323
38	jan	7717	0.00942867	0.00950987
39	feb	7461	0.00999724	0.00991283
40	mar	7776	0.00944484	0.00948866
41	apr	7925	0.00942023	0.00950749
42	may	8634	0.00931484	0.0094974
43	jun	8945	0.00914757	0.00943043
44	jul	10078	0.00948483	0.00959817
45	aug	9179	0.00927101	0.00938635
46	sep	8037	0.0091687	0.00929675
47	oct	8488	0.00930426	0.00958271
48	nov	7874	0.00917397	0.00925301
49	dec	8647	0.00987232	0.00985754
50	jan	7792	0.00967419	0.0097575
51	feb	6957	0.00947279	0.00939281
52	mar	7726	0.0095362	0.00958044
53	apr	8106	0.00979175	0.00988245
54	may	8890	0.00974689	0.00993792
55	jun	9299	0.00966433	0.00996318
56	jul	10625	0.01016258	0.01028402
57	aug	9302	0.00954855	0.00966734
58	sep	8314	0.00963967	0.00977431
59	oct	8850	0.0098598	0.01015488
60	nov	8265	0.0097873	0.00987162
61	dec	8796	0.0102072	0.01019191
62	jan	7836	0.00988865	0.00997381
63	feb	6892	0.00953867	0.00945813
64	mar	7791	0.00977485	0.0098202
65	apr	8129	0.00998153	0.01007398
66	may	9115	0.01015866	0.01035776
67	jun	9434	0.00996683	0.01027503
68	jul	10484	0.01019383	0.01031564
69	aug	9827	0.01025479	0.01038237
70	sep	9110	0.01073805	0.01088802
71	oct	9070	0.01027298	0.01058043
72	nov	8633	0.01039336	0.0104829
73	dec	9240	0.01090128	0.01088496

CYCLICAL FLUCTUATIONS GRAPH:

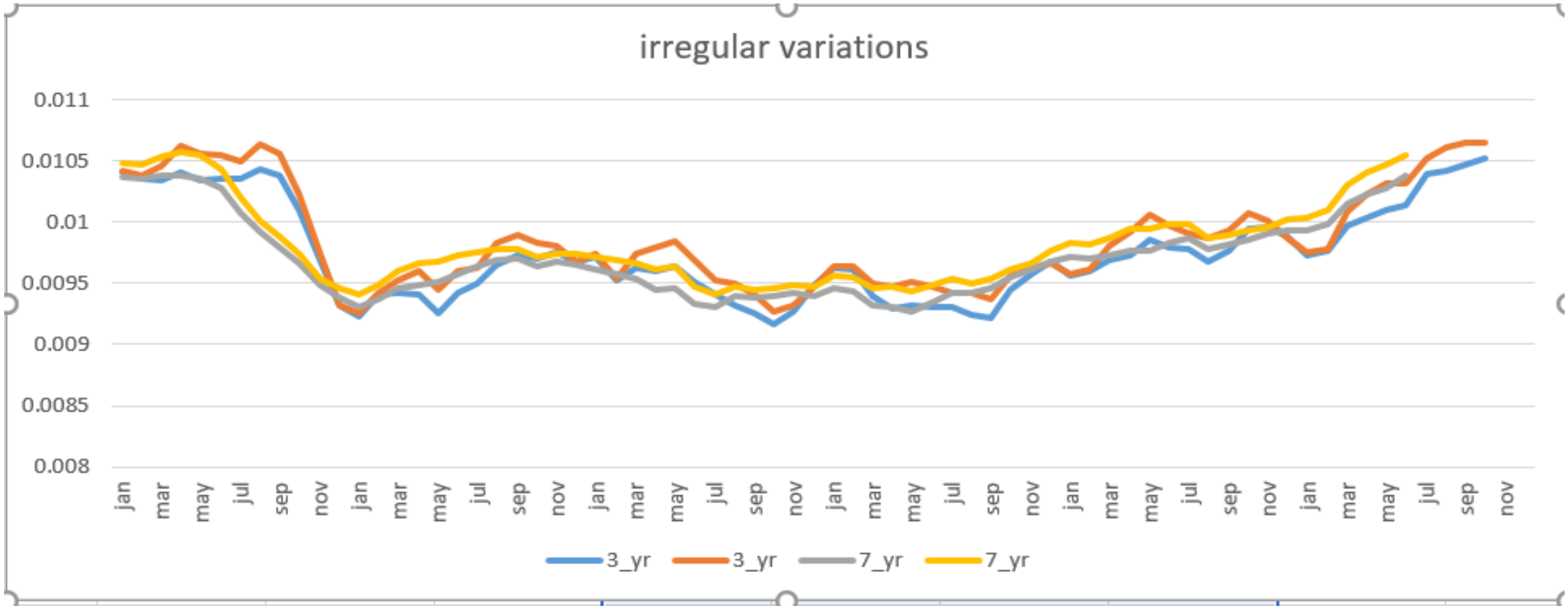


IRREGULAR VARIATIONS:

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

	A	B	C	D	E	F	G	H
1	month	accident	adj/trend	adj/trend n	3_yr	3_yr	7_yr	7_yr
2	jan	9007	0.0105	0.010594	0.01040623	0.010423	0.01037444	0.0104883
3	feb	8106	0.01037	0.010279	0.01035982	0.010379	0.01035293	0.0104723
4	mar	8928	0.01035	0.010397	0.01034182	0.010457	0.01038217	0.0105351
5	apr	9137	0.01036	0.01046	0.01041342	0.010622	0.0103883	0.0105788
6	may	10017	0.01031	0.010514	0.010346	0.010563	0.01036212	0.0105515
7	jun	10826	0.01056	0.01089	0.01035962	0.010552	0.0102777	0.0104361
8	jul	11317	0.01016	0.010284	0.010362	0.010495	0.0100796	0.0102026
9	aug	10744	0.01035	0.010482	0.01043858	0.010634	0.00992292	0.0100176
10	sep	9713	0.01057	0.010718	0.01038126	0.010563	0.00979552	0.0098781
11	oct	9938	0.01039	0.010703	0.01009806	0.010226	0.00967128	0.0097456
12	nov	9161	0.01018	0.010269	0.00969313	0.009744	0.00948813	0.0095436
13	dec	8927	0.00972	0.009707	0.0093212	0.009317	0.0093802	0.0094647
14	jan	7750	0.00918	0.009256	0.00923454	0.00925	0.0093098	0.0094122
15	feb	6981	0.00907	0.008989	0.00940925	0.009428	0.00937204	0.0094802
16	mar	8038	0.00946	0.009505	0.00942408	0.009528	0.00945749	0.0095959
17	apr	8422	0.0097	0.009791	0.00941217	0.009599	0.00949084	0.0096644
18	may	8714	0.00911	0.009288	0.00925459	0.009448	0.0095094	0.0096822
19	jun	9512	0.00943	0.009717	0.00942226	0.009596	0.00957944	0.0097247
20	jul	10120	0.00923	0.009339	0.00950154	0.009623	0.00963525	0.0097509
21	aug	9823	0.00961	0.009732	0.00965699	0.009839	0.00969349	0.0097818
22	sep	8743	0.00966	0.009798	0.00972974	0.0099	0.00970775	0.0097854
23	oct	9129	0.00969	0.009985	0.00970863	0.009829	0.00964266	0.0097132
24	nov	8710	0.00983	0.009916	0.00974912	0.009801	0.00968167	0.0097387
25	dec	8680	0.0096	0.009586	0.00968413	0.00968	0.00965129	0.0097387
26	jan	8162	0.00982	0.009901	0.00972165	0.009738	0.00961543	0.0097209
27	feb	7306	0.00964	0.009555	0.00951884	0.009535	0.00957924	0.0096896
28	mar	8124	0.00971	0.009758	0.00962942	0.009738	0.00953152	0.0096721
29	apr	7870	0.00921	0.009293	0.00959801	0.009791	0.00944365	0.0096166
30	may	9387	0.00997	0.010163	0.00964509	0.009847	0.00946487	0.0096372
31	jun	9556	0.00962	0.009916	0.00951011	0.009686	0.00933044	0.0094729
32	jul	10093	0.00935	0.009461	0.00940467	0.009525	0.00930333	0.0094149
33	aug	9620	0.00956	0.009682	0.00932083	0.009495	0.00939593	0.0094795
34	sep	8285	0.0093	0.009432	0.00925198	0.009413	0.00937907	0.0094519
35	oct	8433	0.0091	0.00937	0.00916021	0.009273	0.00939595	0.0094627
36	nov	8160	0.00936	0.009437	0.0092706	0.00932	0.00942699	0.0094809
37	dec	8034	0.00903	0.009013	0.00948422	0.009479	0.00939716	0.00948
38	jan	7717	0.00943	0.00951	0.00962358	0.009637	0.0094626	0.0095636
39	feb	7461	0.01	0.009913	0.00962077	0.009636	0.00944008	0.0095459
40	mar	7776	0.00944	0.009489	0.0093933	0.009498	0.00932172	0.0094579
41	apr	7925	0.00942	0.009507	0.00929421	0.009478	0.00930163	0.0094713
42	may	8634	0.00931	0.009497	0.00931575	0.009509	0.00926645	0.009435
43	jun	8945	0.00915	0.00943	0.00930114	0.009472	0.0093461	0.0094864
44	jul	10078	0.00948	0.009598	0.00930818	0.009427	0.00942133	0.0095331
45	aug	9179	0.00927	0.009386	0.00924799	0.009422	0.00941961	0.0095038
46	sep	8037	0.00917	0.009297	0.00921564	0.009377	0.00945749	0.0095315
47	oct	8488	0.0093	0.009583	0.00945019	0.009564	0.0095465	0.0096152
48	nov	7874	0.00917	0.009253	0.0095735	0.009623	0.00960973	0.009666
49	dec	8647	0.00987	0.009858	0.0096731	0.009669	0.00967978	0.0097674
50	jan	7792	0.00967	0.009758	0.00956106	0.009577	0.00972125	0.0098283
51	feb	6957	0.00947	0.009393	0.00960025	0.009619	0.0097033	0.0098155
52	mar	7726	0.00954	0.00958	0.00969161	0.0098	0.00972714	0.00987
53	apr	8106	0.00979	0.009882	0.00973432	0.009928	0.00977337	0.009952
54	may	8890	0.00975	0.009938	0.00985793	0.010062	0.00977273	0.0099505
55	jun	9299	0.00966	0.009963	0.00979182	0.009972	0.00983849	0.0099867
56	jul	10625	0.01016	0.010284	0.0097836	0.009909	0.00987054	0.0099883
57	aug	9302	0.00955	0.009667	0.00968267	0.009866	0.00978141	0.0098703
58	sep	8314	0.00964	0.009774	0.00976226	0.009934	0.00981373	0.0098921
59	oct	8850	0.00986	0.010155	0.00995143	0.010073	0.00986257	0.0099349
60	nov	8265	0.00979	0.009872	0.00996105	0.010012	0.00990526	0.0099639
61	dec	8796	0.01021	0.010192	0.00987817	0.009875	0.00993091	0.0100215
62	jan	7836	0.00989	0.009974	0.00973406	0.009751	0.009929	0.0100392
63	feb	6892	0.00954	0.009458	0.00976501	0.009784	0.00998131	0.0100976
64	mar	7791	0.00977	0.00982	0.00997168	0.010084	0.01015265	0.0103019
65	apr	8129	0.00998	0.010074	0.01003567	0.010236	0.01022381	0.0104105
66	may	9115	0.01016	0.010358	0.01010644	0.010316	0.01028264	0.0104689
67	jun	9434	0.00997	0.010275	0.01013848	0.010324	0.01038873	0.0105442
68	jul	10484	0.01019	0.010316	0.01039556	0.010529		
69	aug	9827	0.01025	0.010382	0.01042194	0.010617		
70	sep	9110	0.01074	0.010888	0.01046813	0.01065		
71	oct	9070	0.01027	0.01058	0.01052254	0.010649		
72	nov	8633	0.01039	0.010483				
73	dec	9240	0.0109	0.010885				

IRREGULAR VARIATIONS GRAPH:



By using the polynomial equation we predict the values for 1979

polynomial equation y = ax^2+bx+c

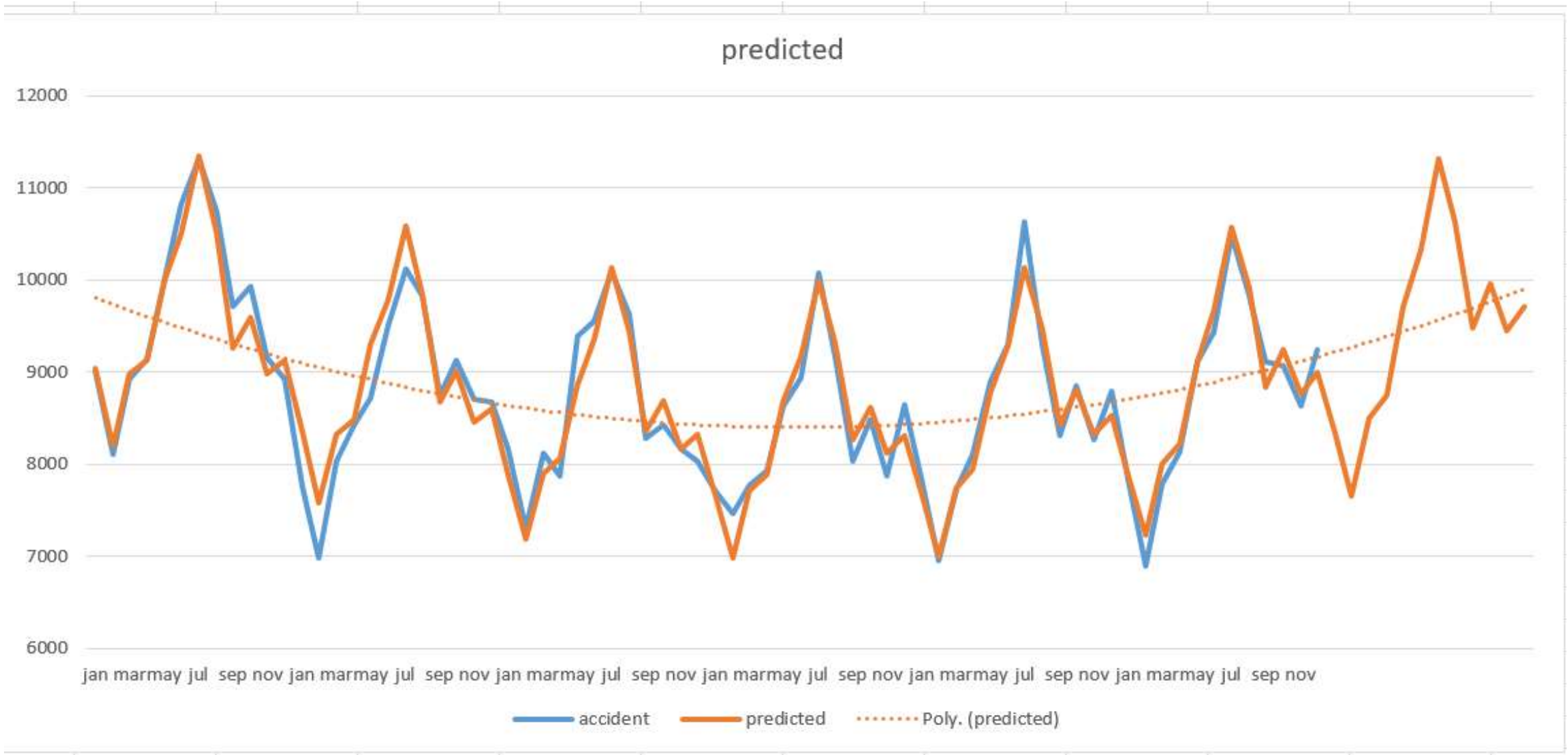
y = 0.87014302*73^2-75.1611152 * 73+10006.4087

In the same way, we will predict all the values for every month of the year 1979

	A	B	C	D	E
1	month	accident	adj mean	trend valu	predicted
2	jan	9007	91.02067	9932.118	9040.2797
3	feb	8106	83.10654	9859.567	8193.9447
4	mar	8928	91.80295	9788.757	8986.3672
5	apr	9137	93.93128	9719.687	9129.8262
6	may	10017	103.6305	9652.357	10002.79
7	jun	10826	109.4724	9586.767	10494.866
8	jul	11317	119.1118	9522.918	11342.916
9	aug	10744	111.137	9460.809	10514.463
10	sep	9713	98.52773	9400.44	9262.0403
11	oct	9938	102.6781	9341.812	9591.9948
12	nov	9161	96.73313	9284.924	8981.5976
13	dec	8927	98.84783	9229.776	9123.4331
14	jan	7750		9176.368	8352.3916
15	feb	6981		9124.701	7583.2231
16	mar	8038		9074.774	8330.9102
17	apr	8422		9026.587	8478.7894
18	may	8714		8980.141	9306.169
19	jun	9512		8935.435	9781.8367
20	jul	10120		8892.469	10591.978
21	aug	9823		8851.244	9837.0099
22	sep	8743		8811.758	8682.0254
23	oct	9129		8774.013	9008.9902
24	nov	8710		8738.009	8452.5495
25	dec	8680		8703.744	8603.4623
26	jan	8162		8671.22	7892.6024
27	feb	7306		8640.436	7180.7675
28	mar	8124		8611.393	7905.5125
29	apr	7870		8584.09	8063.1455

	A	B	C	D	E
30	may	9387		8558.527	8869.2476
31	jun	9556		8534.704	9343.1468
32	jul	10093		8512.622	10139.535
33	aug	9620		8492.279	9438.0678
34	sep	8285		8473.678	8348.9221
35	oct	8433		8456.816	8683.298
36	nov	8160		8441.695	8165.9159
37	dec	8034		8428.314	8331.2053
38	jan	7717		8416.673	7660.912
39	feb	7461		8406.773	6986.5778
40	mar	7776		8398.613	7710.1741
41	apr	7925		8392.193	7882.8945
42	may	8634		8387.513	8692.0257
43	jun	8945		8384.574	9178.7961
44	jul	10078		8383.375	9985.5869
45	aug	9179		8383.917	9317.6364
46	sep	8037		8386.198	8262.7305
47	oct	8488		8390.22	8614.9185
48	nov	7874		8395.982	8121.6966
49	dec	8647		8403.485	8306.6622
50	jan	7792		8412.727	7657.3205
51	feb	6957		8423.71	7000.6541
52	mar	7726		8436.434	7744.895
53	apr	8106		8450.897	7938.0364
54	may	8890		8467.101	8774.5031
55	jun	9299		8485.046	9288.7845
56	jul	10625		8504.73	10130.135
57	aug	9302		8526.155	9475.7158
58	sep	8314		8549.32	8423.4506

59	oct	8850		8574.225	8803.8514
60	nov	8265		8600.871	8319.8917
61	dec	8796		8629.257	8529.8329
62	jan	7836		8659.383	7881.8279
63	feb	6892		8691.249	7222.9963
64	mar	7791		8724.856	8009.6751
65	apr	8129		8760.203	8228.5712
66	may	9115		8797.29	9116.6799
67	jun	9434		8836.118	9673.1121
68	jul	10484		8876.686	10573.178
69	aug	9827		8918.994	9912.3059
70	sep	9110		8963.043	8831.0824
71	oct	9070		9008.831	9250.0969
72	nov	8633		9056.36	8760.5012
73	dec	9240		9105.63	9000.7174
74				9156.639	8334.4342
75				9209.389	7653.6046
76				9263.88	8504.5145
77				9320.11	8754.4989
78				9378.081	9718.5561
79				9437.792	10331.779
80				9499.243	11314.717
81				9562.435	10627.407
82				9627.367	9485.6258
83				9694.039	9953.6549
84				9762.451	9443.525
85				9832.604	9719.3158


predicted
12000
11000
10000
9000
8000
7000
6000
jan marmay jul sep nov jan marmay jul sep nov jan marmay jul sep nov jan marmay jul sep nov jan marmay jul sep nov jan marmay jul sep nov
accident
predicted
Poly. (predicted)

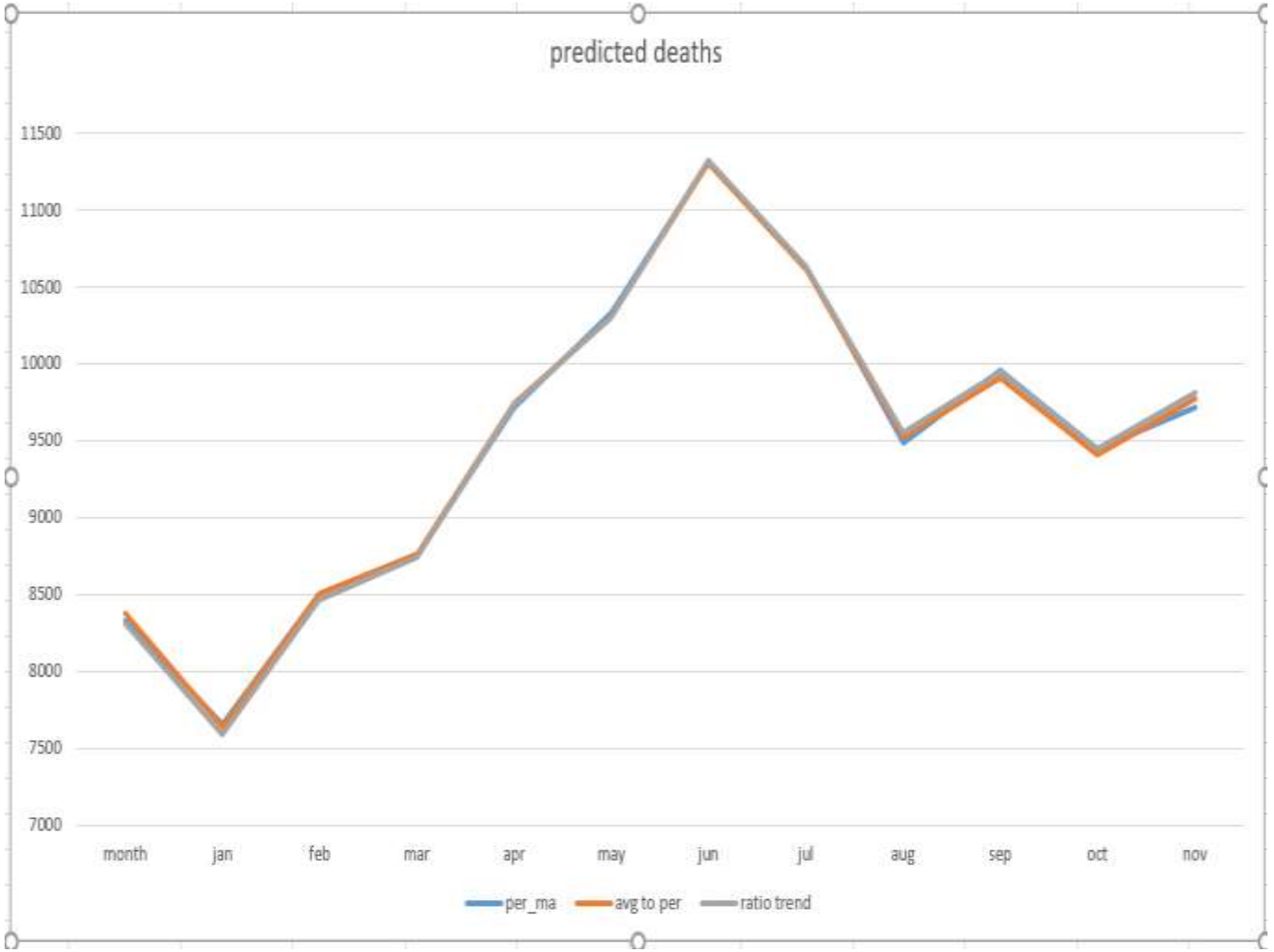
COMPARISION OF PREDICTED VALUES FOR THREE SEASONAL INDEX METHODS:

1.The average percentage method

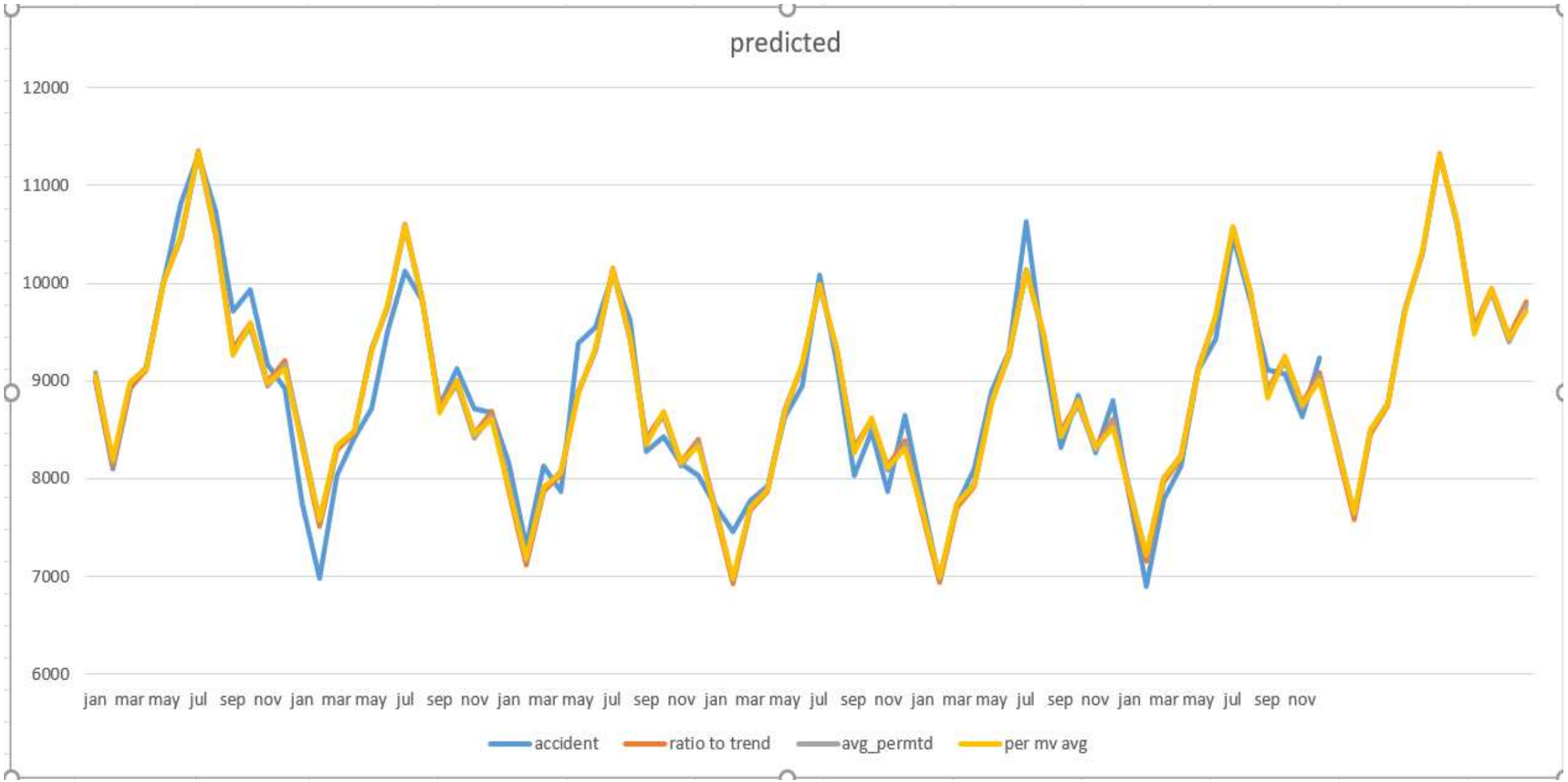
2.The percentage or ratio to trend method

3. The percentage moving average

per_ma	avg to per	ratio trend
8334.43419	8379.96132	8310.33777
7653.60458	7635.60175	7587.69894
8504.51454	8500.70614	8461.98666
8754.49891	8764.47408	8739.56969
9718.55607	9740.05215	9731.05667
10331.7789	10299.1567	10302.3087
11314.7171	11303.5563	11321.2855
10627.4067	10606.5389	10632.917
9485.62577	9525.0583	9556.1496
9953.65491	9908.47147	9948.42642
9443.52504	9406.69704	9448.72601
9719.31576	9770.27531	9809.61536



PREDICTED GRAPH:



ARMA MODEL:

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

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

or, in lag operator form,

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

Provided that the roots of

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

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

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

where

$$\psi(L) = \frac{(1 + \theta_1 L + \theta_2 L^2 + \cdots + \theta_q L^q)}{(1 - \phi_1 L - \phi_2 L^2 - \cdots - \phi_p L^p)}$$

$$\sum_{j=0}^{\infty} |\psi_j| < \infty$$

$$\mu = c/(1 - \phi_1 - \phi_2 - \cdots - \phi_p).$$

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

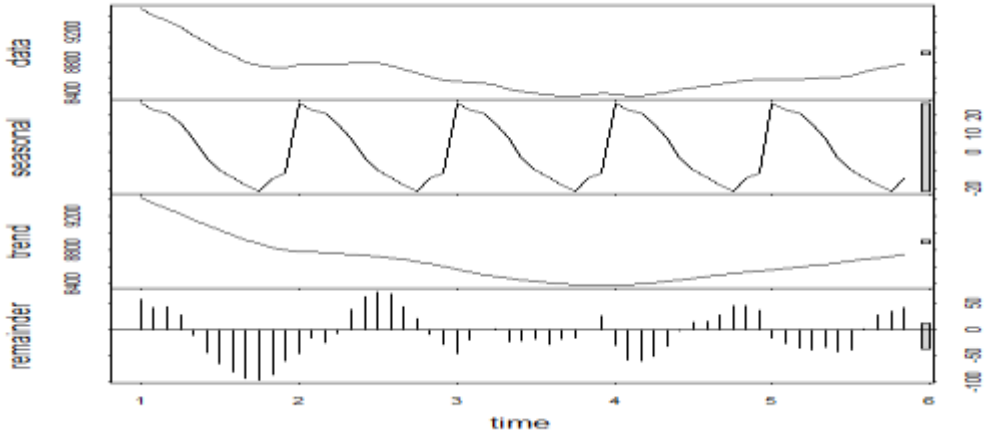
It is often convenient to write the *ARMA* process [3.5.1] in terms of deviations from the mean:

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

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 seasoinality

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**.



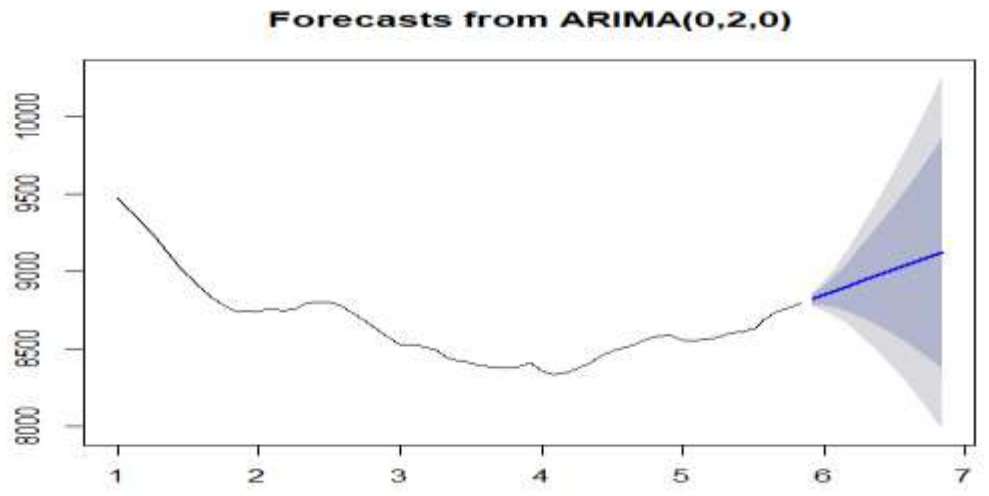

```
arima(x = deseasonal_cnt, order = c(0, 2, 0))
sigma^2 estimated as 530.3:  log likelihood = -259.67,  aic = 521.35
```

```
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 = -1.469, Lag order = 3, p-value = 0.7892
alternative hypothesis: stationary
```



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.

arima(x = y, order = c(0, 2, 0))

Coefficients:

	ma1	intercept
	0.7847	8801.7167
s.e.	0.1102	149.9583

sigma^2 estimated as 514529: log likelihood = -576.08, aic = 1158.16