Seasonal Adjustment of Philippine Time Series on Labor and Employment: 1988 - 1993 (April)

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1.0 Introduction

The Integrated Survey of Households (ISH) conducted quarterly by the National Statistics Office (NSO) has been the major source of the labor force and employment statistics in the country. Conducted since 1956, it has depicted the current trends and changes in the labor market and employment situations. The labor force concept has undergone revisions and changes for the past three (3) decades and in 1986, a major revision was effected. The reference period was shifted back from past quarter to past week. It is now conducted every January, April, July and October.

For seasonal adjustment of Philippine Time series on labor and employment, only the following major variables shall be deseasonalized as agreed upon by the Technical Committee of the project:

1. *Labor Force* - the population 15 years old and over who contribute to the production of goods and services in the country. It includes those who are either employed or unemployed.

2. *Employed* - persons in the labor force who were reported either at work or with a job or business although not at work.

3. *Underemployed* - employed persons who expressed the desire to have additional hours of work.

4. *Unemployed* - persons in the labor force who did not work or had no job/business during the reference week but were reported available and actively looking for work but cannot find work.

2.0 Seasonal Adjustment Using X11-ARIMA

Since changes in the concept have been made, data starting 1987 were studied. However, initial findings did not show good results and also the fact that the country has just undergone a major political change. Thus, for consistency of data for all agencies involved in the project, the consultant, Dr. Estela Bee Dagum of Statistics Canada recommended to cut the series from 1988 onwards.

Initially, the group has studied numerous series of labor force statistics, results of which are shown in the attached Appendix. The employment-series were further broken down by sex, age group sector and area. By sex, only the male group has seasonality while by sector, only the service sector did not have identifiable seasonality present. Due to limited time, the group has studied only age groups 15-19 and 20-24 which accounted for the seasonality in the labor force statistics. By area, i.e., urban and rural, further probing was discontinued since there was a change in the definition of urban and rural in 1990.

For underemployment series, though it was rejected at 1.20 level, identifiable seasonality was present at 0.1 percent level. Data series are very irregular which need prior adjustment to smoothen the two measures which failed. For purposes of exercise, results of the test for the underemployed is presented but no analysis was made because of inconclusive results.

Direct seasonal adjustment were done in employed, underemployed and unemployed. On the other hand, for labor force series, it was recommended that an indirect method be used. In determining the rates, the indirect method was also used. Since there was no labor force survey conducted in April 1990 due to the Population Census, imputations were made for the period.

The multiplicative model was chosen for most of the series. For the employed series, multiplicative model (0,1,1)(0,1,1) with log transformation was forced in the analysis to smoothen the data.

Data presented in this paper are still preliminary, pending results of the study to be made on the disaggregates of the variables. Though the group have made partial study on the breakdown, these were limited indicators only. Analysis as well were done on the major variables.

3.0 Analysis of Seasonally Adjusted Series Until Second Quarter, 1993

Unemployment

The country's unemployment rate of 8.6% as of April 1993 was one of the lowest since 1988. The same rate was also recorded in 1989 of the same month. Highest posted were in April and July 1991 at 11.0 percent and 11.1 percent respectively. This could have been due to the aftermath of the various calamities and Gulf War crisis (returning OCWs) felt in 1990 and early part of 1991. Thereafter, unemployment rates gradually tapered off.

The April 1993 unemployment rate was lower by 0.7 percent points from January 1993 rate of 9.3 percent and 1.3 percent points over the same period in 1992. In nominal terms, this translates to some 2.262 million jobless workers or 226

thousand fewer than the January 1993 figure and 314 thousand less than last year's figure of 2.576 million. Efforts of the government in terms of pump priming the economy such as the Special Program for Employment of Students (SPES) and Summer Workshop Appreciation Program (SWAP) could have somehow provided respite for unemployment problem as shown by the decline in the rate of jobless among the youth (15-24 years old).

Labor Force

Labor force participation rate (LFPR) declined to 64.6 in April 1993, the lowest recorded since 1988. The decrease in LFPR has been observed as early as October 1992.

Meanwhile, the labor force shrunk to 26.048 million or by 298 thousand from the January 1993 level. This is a signal that should be monitored as this seems to indicate more people are staying away from the labor market due to the lack of employment opportunities.

Employment

After exhibiting an upward trend since October 1991, the level of employment registered a 0.3 percent decline or a 72 thousand reduction in employment from 24.218 million of January 1993 to 24.146 million in April 1993. Employment declines were also observed in the July rounds of 1990 and 1991 which is the aftermath of the crisis and natural calamities that struck the country.

Peaks in employment were observed in all April rounds of the labor force survey which has been associated by the of vacationing students eager to take temporary jobs. This eventually returned to its normal level in June in time for school openings.

This occurrence is further validated by the initial study on the age groups 15-19 and 20-24 which exhibited strong seasonality among age group bracket during the April rounds of the labor force survey.

The series of natural and man-made calamities (earthquakes, typhoons, wars, coups) that the country experienced from January 1991 to October 1991 employment is reflected by the wild fluctuation in the series during the period.

Table 1   Labor and Employment Indicators (Adjusted Series)
Summary Table

Indicators	1993 April	1993 January	1993 April	Quarter to Quarter Change April 1993/January 1993
Labor Force (000)	26,408	26,706	26,070	-1.1
Labor Force Participation Rate (%)	64.6	65.8	65.7	-1.2
Employed (000)	24,146	24,218	23,494	-0.3
Rate (%)	91.4	90.7	90.1	0.7
Unemployed (000)	2,262	2,488	2,576	-9.1
Rate (%)	8.6	9 3	9.9	-0.7
Underemployed (000)	5,139	5,130	4,822	0.2
Rate (%)	21.3	21.2	20.5	0.1

Table 2   Rates of Labor Force Participation, Employment, Unemployment, Underemployment, Philippines: 1988-1993 (Apr) (Adjusted Series)

Year	Survey Round	LFPR	Employment Rate	Unemployment Rate	Underemployment Rate
1988	Jan	66.8	89.7	10.3	23.9
	Apr	64.5	91.0	9.0	22.9
	Jul	66.7	90.2	9.8	23.9
	Oct	66.7	90.4	9.6	23.5
1989	Jan	66.4	90.8	9.2	23.4
	Apr	66.0	91.4	8.6	22.9
	Jul	66.2	90.6	9.4	23.3
	Oct	61.0	90.3	9.7	23.4
1990	Jan	65.9	90.3	9.7	23.3
	Apr	66.7	90.2	9.8	22.8
	Jul	65.1	90.6	9.4	22.3
	Oct	65.8	90.7	9.3	22.2
1991	Jan	65.9	90.2	9.8	22.5
	Apr	67.4	89.0	11.0	22.7
	Jul	66.2	88.9	11.1	22.7
	Oct	65.8	89.8	10.2	22.2
1992	Jan	65.8	89.8	10.2	20.4
	Apr	65.7	90.1	9.9	20.5
	Jul	66.3	90.4	9.6	21.3
	Oct	66.2	90.2	9.8	20.0
1993	Jan	65.8	90.7	9.3	21.2
	Apr	64.6	91.4	8.6	21.3

Annex

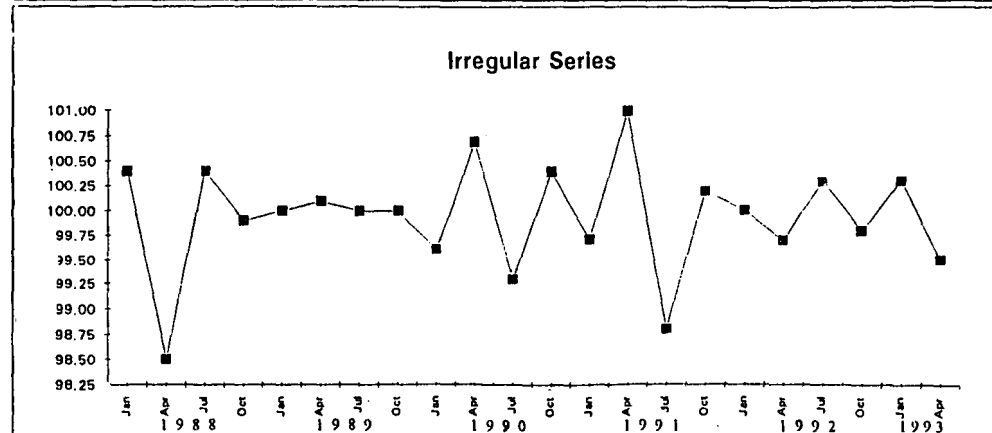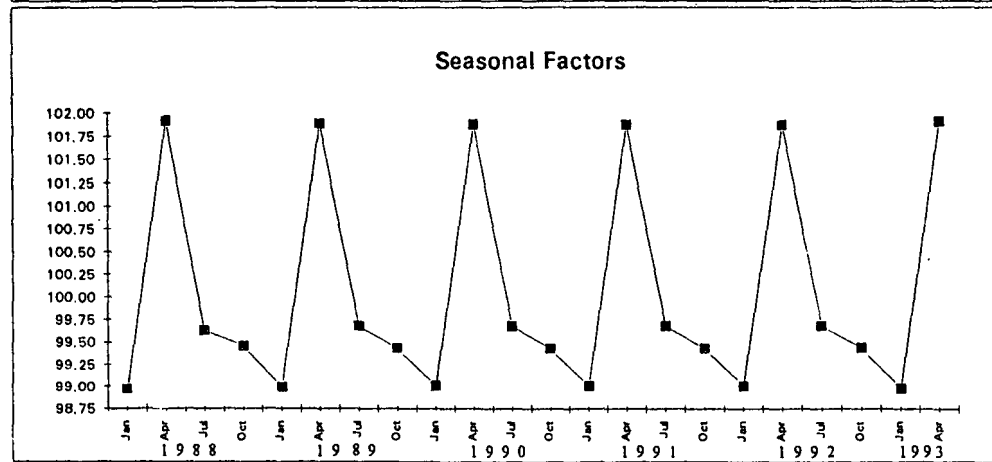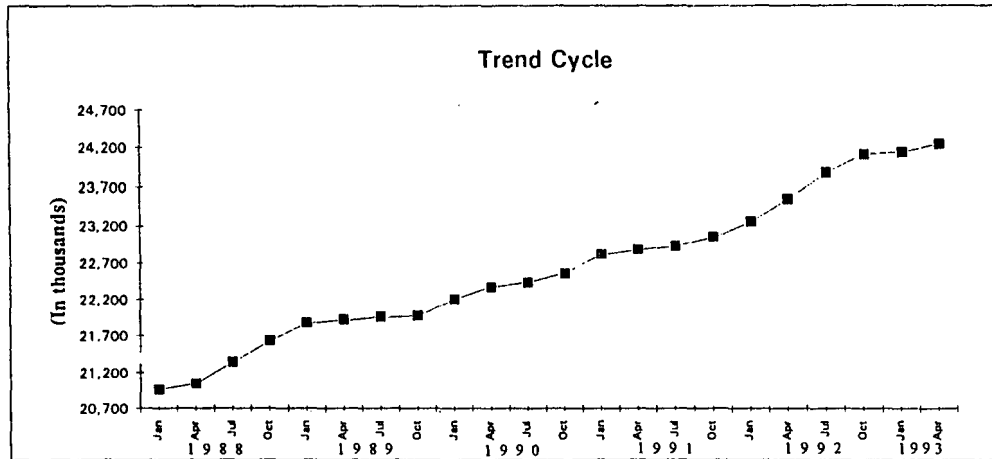| Series	Description	Period Covered	Options	Summary Measures	Remarks
LFPHI	Labor Force, Total Philippines	Jan 1988- Apr 1993	Indirect seasonal adjustment		
EMPPHI	Employed, Total Philippines	Jan 1988- Apr 1993	Multiplicative model: (0,1,1), (0,1,1) with log transformation F value: 26.393 MAVS - 3x9 MAVTC - 5-term	Accepted at level 96 Check M1, M2, & M6	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level
EMPAGR	Employed, Agricultural Sector, Total Philippines	Jan 1988- Apr 1993	Additive model: (0,1,1), (0,1,1) F value: 29.939 MAVS - 3x5 MAVTC - 5-term	Accepted at level .72	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level
EMPIND	Employed, Industry Sector, Total Philippines	Jan 1988- Apr 1993	Additive model; (0,1,1), (0,1,1) F value: 21.852 MAVS - 3x5 MAVTC - 5-term	Accepted at level .74 Check M1 Check M1	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level
EMPSER	Employed, Service Sector, Total Philippines	Jan 1988 Apr 1993	Additive model: (0,1,1), (0,1,1) F value: 6.822 MAVS - 3x9 MAVTC - 5-term	Rejected at level 1.06 Check M1, M2, M6 and M7	Identifiable seasonality not present; no evidence of moving seasonality at 5% level
UNEPHI	Unemployed, Total Philippines	Jan 1988- Apr 1993	Multiplicative model: (0,1,1), (0,1,1) with log transformation F value: 256.808 MAVS - 3x5 MAVTC - 5-term	Accepted at level .33	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level
UNDEREMP	Underemployed, Total Philippines	Jan 1988- Apr 1993	Multiplicative model: (0,1,1), (0,1,1) with log transformation F value: 15.576 MAVS - 3x5 MAVTC - 5-term	Rejected at level 1.20 Check M1 and M2	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level
UNDERURB	Underemployed, Urban, Total Philippines	Jan 1988- Apr 1993	Multiplicative model: (0,1,1), (0,1,1) with log transformation F value: 30.650 MAVS - 3x5 MAVTC - 5-term	Accepted at level .46	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level
UNDERUR	Underemployed, Rural, Total Philippines	Jan 1988- Apr 1993	Additive model: (0,1,1), (0,1,1) F value: 18.419 MAVS - 3x5 MAVTC - 5-term	Rejected at level 1.00 Check M1 & M2	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level
UNEMP15	Unemployed, Aged 15-19, Total Philippines	Jan 1988- Apr 1993	Multiplicative model: (0,1,1), (0,1,1) F value: 166.937 MAVS - 3 x 5 MAVTC - 5-term	Accepted at level .37	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level
UNEMP15	Unemployed, Aged 20-24, Total Philippines	Jan 1988- Apr 1993	Multiplicative model: (0,1,1), (0,1,1) F value: 386.834 MAVS - 3 x 9 MAVTC - 5-term	Accepted at level .27	Identifiable seasonality present at 0.1% level; no evidence of moving seasonality at 5% level

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Year	Survey Round	Original Data	Deseasonalized Data
1988	Jan	22,907	23,450
	Apr	23,990	22,799
	Jul	23,447	23,760
	Oct	23,451	23,910
1989	Jan	23,469	23,990
	Apr	25,213	23,997
	Jul	23,939	24,247
	Oct	23,858	24,334
1990	Jan	23,954	24,492
	Apr	26,368	24,987
	Jul	24,252	24,575
	Oct	24,525	24,993
1991	Jan	24,681	25,233
	Apr	27,524	25,977
	Jul	25,073	25,476
	Oct	25,246	25,747
1992	Jan	25,345	25,919
	Apr	27,511	26,070
	Jul	26,122	26,509
	Oct	26,180	26,674
1993	Jan	26,149	26,706
	Apr	27,740	26,408
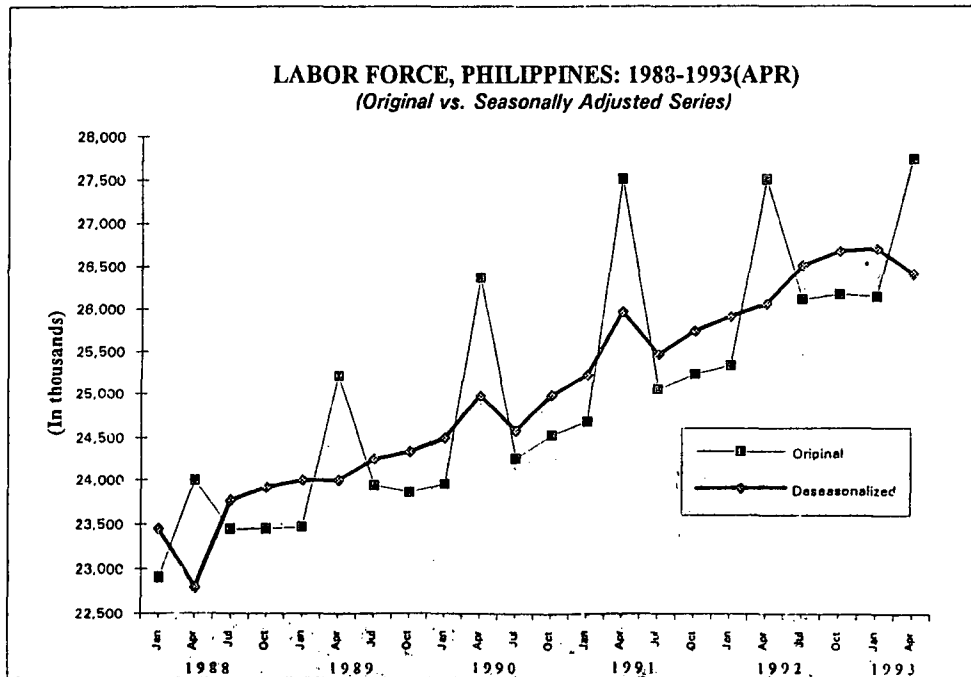
LABOR FORCE, PHILIPPINES: 1988-1993(APR)
(Original vs. Seasonally Adjusted Series)

Year	Survey Round	Original Data	Deseasonalized Series	Trend Cycle	Seasonal Factors	Irregular Series
1988	Jan	20,827	21,043	20,964	98.97	100.40
	Apr	21,141	20,472	21,051	101.92	98.50
	Jul	21,356	21,435	21,339	99.63	100.40
	Oct	21,497	21,613	21,635	99.46	99.90
1989	Jan	21,551	21,772	21,872	98.99	100.00
	Apr	22,344	21,929	21,911	101.89	100.10
	Jul	21,889	21,960	21,957	99.68	100.00
	Oct	21,849	21,974	21,975	99.43	100.00
1990	Jan	21,900	22,119	22,197	99.01	99.60
	Apr	22,952	22,528	22,365	101.88	100.70
	Jul	22,203	22,274	22,438	99.68	99.30
	Oct	22,532	22,661	22,563	99.43	100.40
1991	Jan	22,533	22,759	22,822	99.01	99.70
	Apr	23,560	23,125	22,889	101.88	101.00
	Jul	22,586	22,659	22,941	99.68	98.80
	Oct	22,979	23,110	23,061	99.43	100.20
1992	Jan	23,032	23,263	23,264	99.01	100.00
	Apr	23,936	23,494	23,554	101.88	99.70
	Jul	23,898	23,974	23,891	99.68	100.30
	Oct	23,917	24,054	24,113	99.43	99.80
1993	Jan	23,972	24,218	24,141	98.98	100.30
	Apr	24.61^	24,146	24,255	101.92	99.50

EMPLOYED PERSONS, PHILILIPPINES: 1988-1993 (APR)
(Original vs. Seasonally Adjusted Series)

Trend Cycle

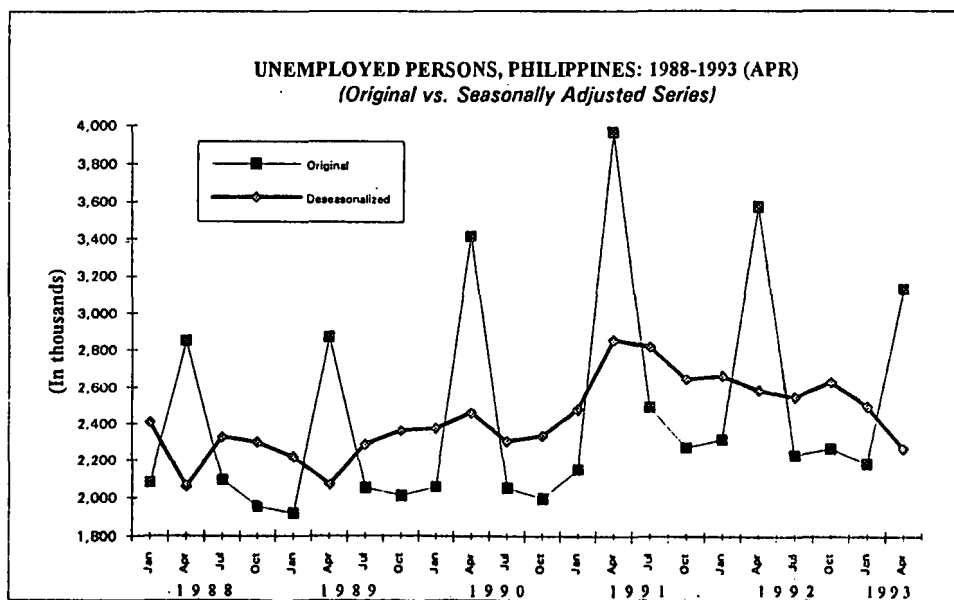## Seasonal Factors
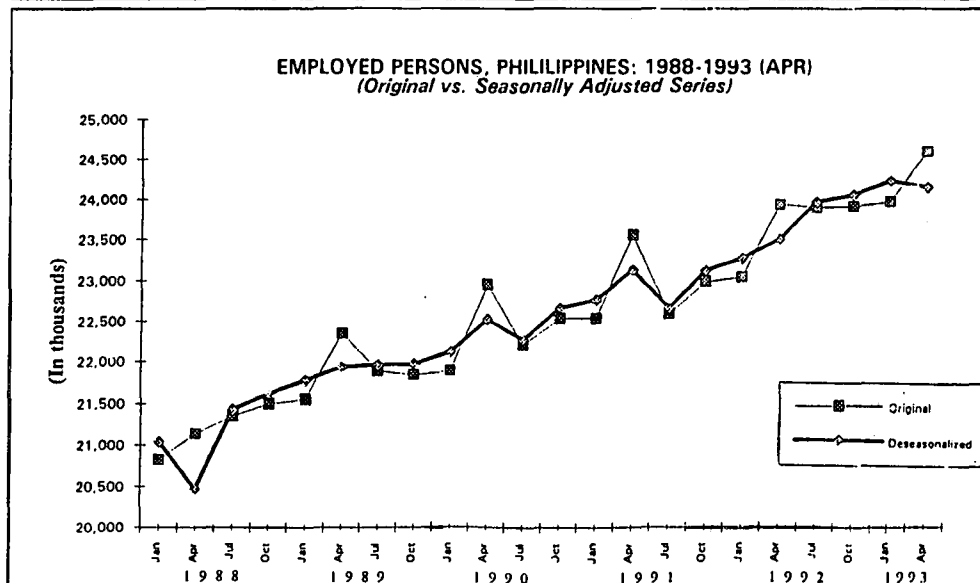
Irregular Series

Year	Survey Round	Original Data	Descasonalized Series	Trend Cycle	Seasonal Factors	Irregular Series
1988	Jan	4,968	5,023	4,967	98.91	101.10
	Apr	4,979	4,740	4,983	105.04	95.10
	Jul	4,983	5,117	5,048	97.39	101.40
	Oct	5,009	5,070	5,106	98.79	99.30
1989	Jan	5,022	5,091	5,060	98.65	100.60
	Apr	5,282	5,019	5,056	105.24	99.30
	Jul	4,979	5,114	5,091	97.36	100.40
	Oct	5,080	5,138	5,148	98.86	99.80
1990	Jan	5,075	5,164	5,165	98.27	100.00
	Apr	5,421	5,131	5,099	105.66	100.60
	Jul	4,832	4,969	5,011	97.25	99.20
	Oct	4,986	5,041	5,024	98.92	100.30
1991	Jan	5,020	5,128	5,147	97.89	99.60
	Apr	5,560	5,240	5,199	106.10	100.80
	Jul	4,987	5,133	5,187	97.15	99.00
	Oct	5,077	5,134	5,053	98.90	101.60
1992	Jan	4,636	4,749	4,880	97.61	97.30
	Apr	5,134	4,822	4,811	106.47	100.20
	Jul	4,948	5,098	4,890	97.06	104.30
	Oct	4,748	4,801	4,998	98.89	96.10
1993	Jan	5,000	5,130	5,105	97.46	100.50
	Apr	5,479	5,139	5,153	106.61	99.70
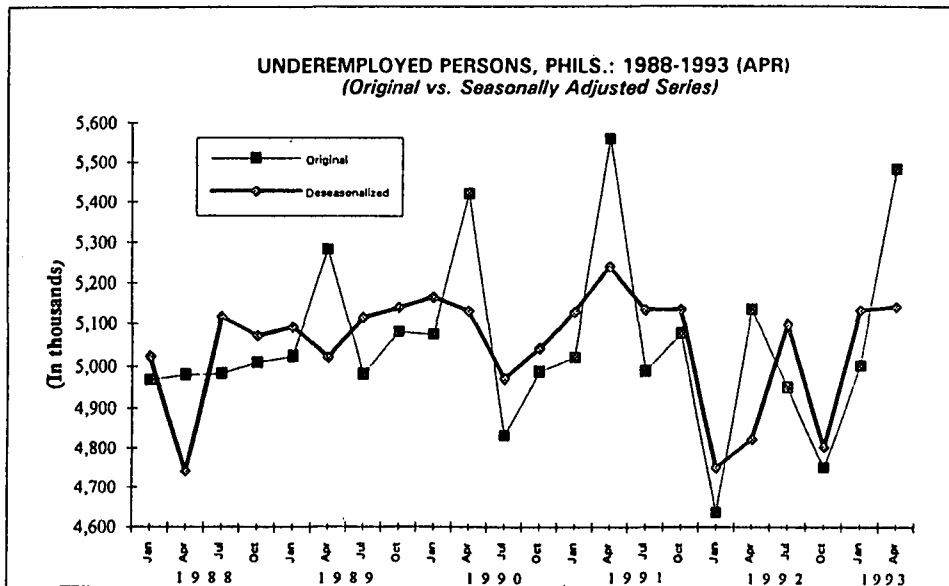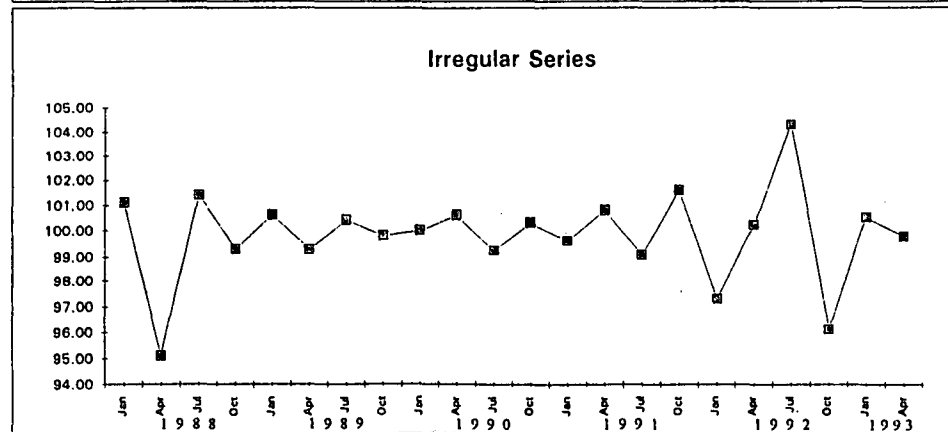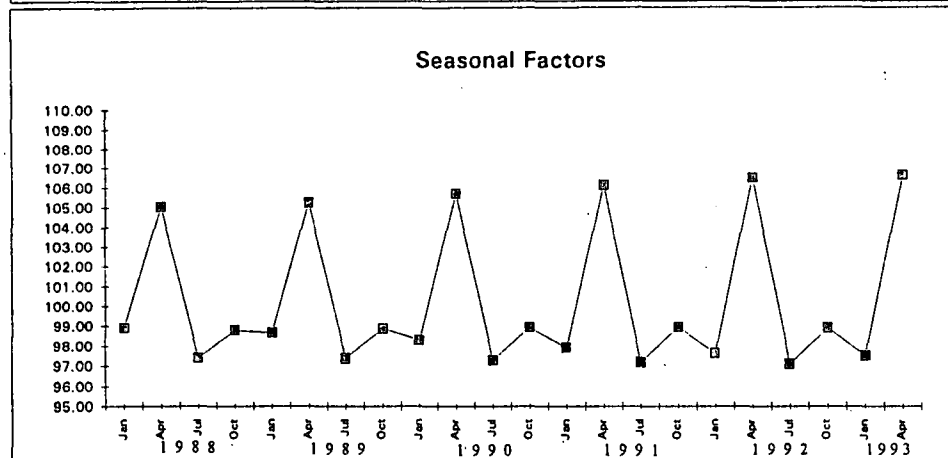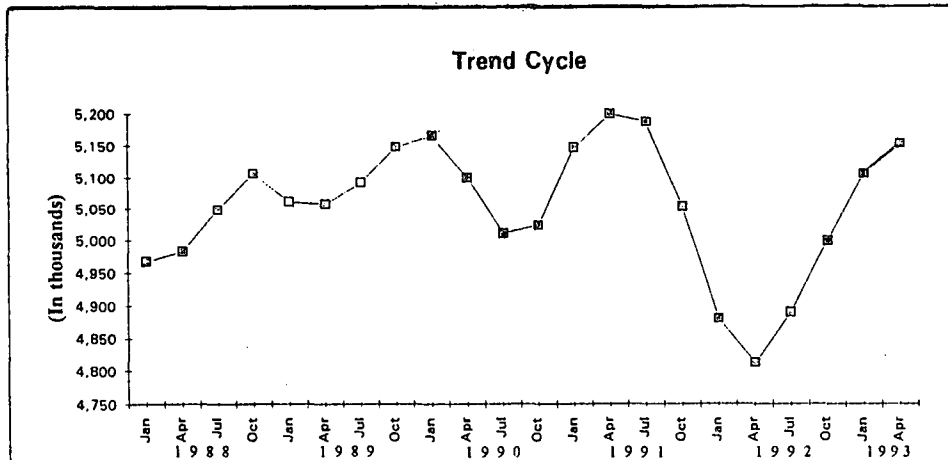
UNDEREMPLOYED PERSONS, PHILS.: 1988-1993 (APR)
(Original vs. Seasonally Adjusted Series)

Trend Cycle

Seasonal Factors

Irregular Series

	Survey Round	Original Data	Deseasonalized Series	Trend Cycle	Seasonal Factors	Irregular Series
1988	Jan	2,080	2,407	2,273	86.42	105.90
	Apr	2,849	2,057	2,277	138.52	90.30
	Jul	2,091	2,325	2,302	89.95	101.00
	Oct	1,954	2,297	2,303	85.05	99.80
1989	Jan	1,918	2,218	2,185	86.47	101.50
	Apr	2,869	2,068	2,138	138.71	96.70
	Jul	2,050	2,287	2,243	89.65	102.00
	Oct	2,009	2,360	2,356	85.14	100.10
1990	Jan	2,054	2,373	2,406	86.57	98.60
	Apr	3,416	2,459	2,404	138.92	102.30
	Jul	2,049	2,301	2,339	89.04	98.40
	Oct	1,993	2,332	2,318	85.47	100.60
1991	Jan	2,148	2,474	2,527	86.81	97.90
	Apr	3,964	2,852	2,778	138.98	102.70
	Jul	2,487	2,817	2,808	88.28	100.30
	Oct	2,267	2,637	2,685	85.98	98.20
1992	Jan	2,313	2,656	2,624	87.10	101.20
	Apr	3,575	2,576	2,579	138.80	99.90
	Jul	2,224	2,535	2,566	87.73	98.80
	Oct	2,263	2,620	2,586	86.39	101.30
1993	Jan	2,177	2,488	2,477	87.50	100.40
	Apr	3,130	2,262	2,284	138.37	99.10
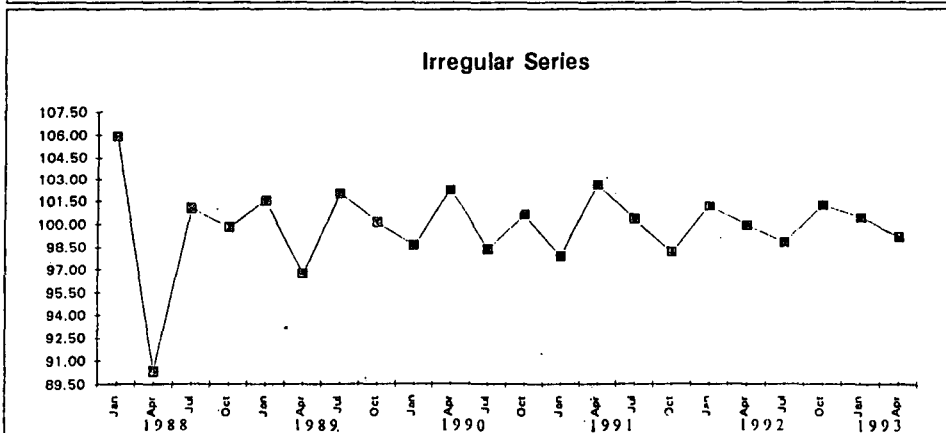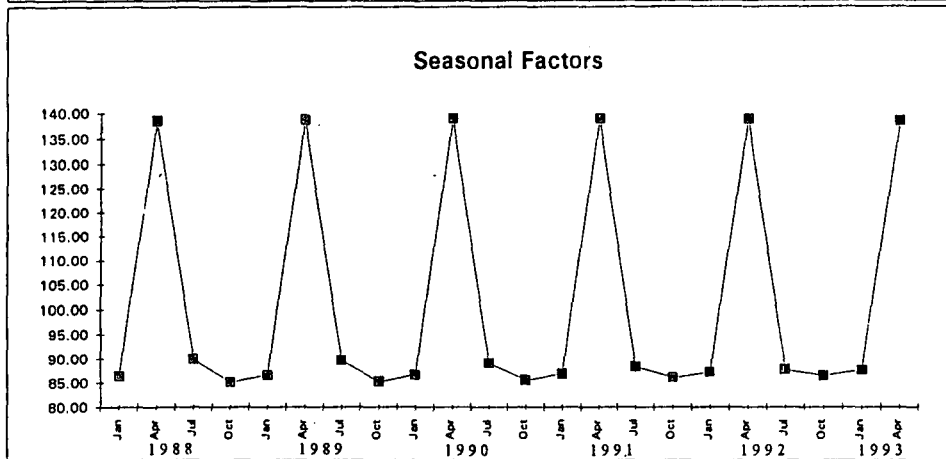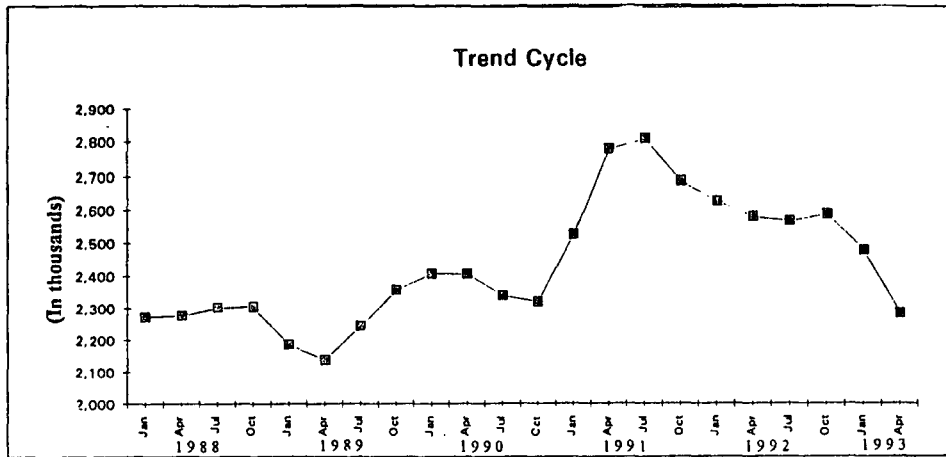
UNEMPLOYED PERSONS, PHILIPPINES: 1988-1993 (APR)
(Original vs. Seasonally Adjusted Series)

Trend Cycle
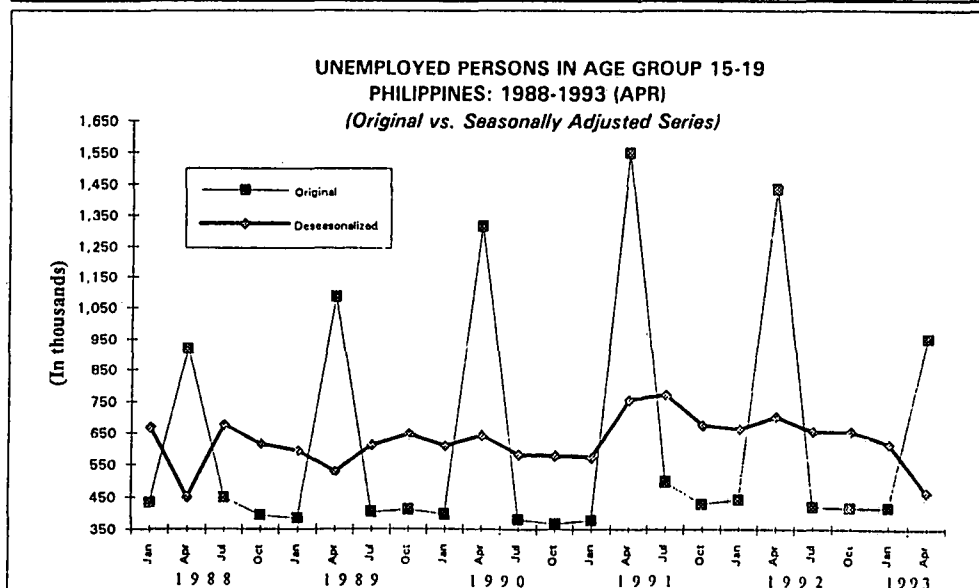
Seasonal Factors

Irregular Series

Year	Survey Round	Original Data	Deseasonalized Series	Trend Cycle	Seasonal Factors	Irregular Series
1988	Jan	435	669	607	65.01	110.30
	Apr	919	450	589	204.12	76.40
	Jul	˙450	676	589	66.59	114.80
	Oct	395	615	608	64.20	101.30
1989	Jan	385	593	580	64.96	102.10
	Apr	1,085	530	559	204.65	95.10
	Jul	404	610	598	66.21	102.00
	Oct	413	646	633	63.97	102.00
1990	Jan	398	609	632	65.32	96.40
	Apr	1,31f	643	620	204.98	103.70
	Jul	382	582	593	65.61	98.20
	Oct	369	578	579	63.82	99.90
1991	Jan	379	574	649	66.03	88.40
	Apr	1,551	756	745	205.12	101.50
	Jul	500	772	757	64.78	101.90
	Oct	432	677	693	63.81	97.60
1992	Jan	446	664	672	67.15	98.80
	Apr	1,437	703	683	204.46	102.90
	Jul	422	656	672	64.28	97.60
	Oct	419	655	653	63.93	100.30
1993	Jan	419	615	597	68.17	103.00
	Apr	952	467	496	203.6f	94.20
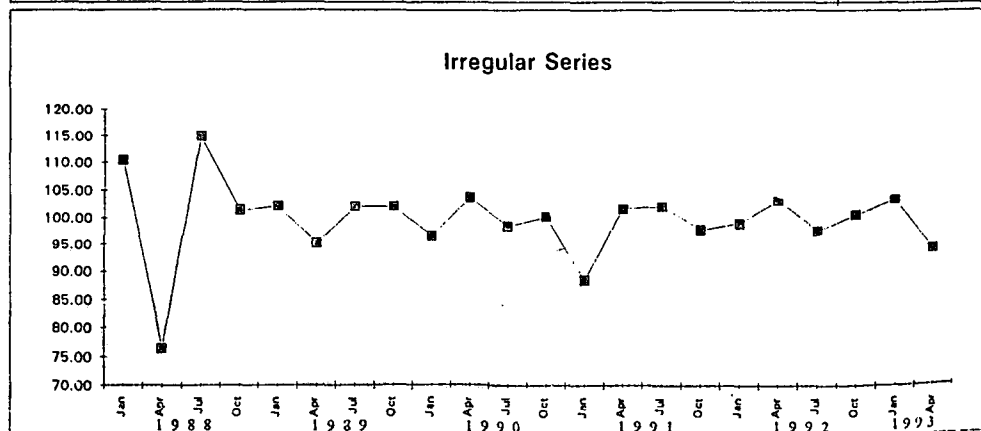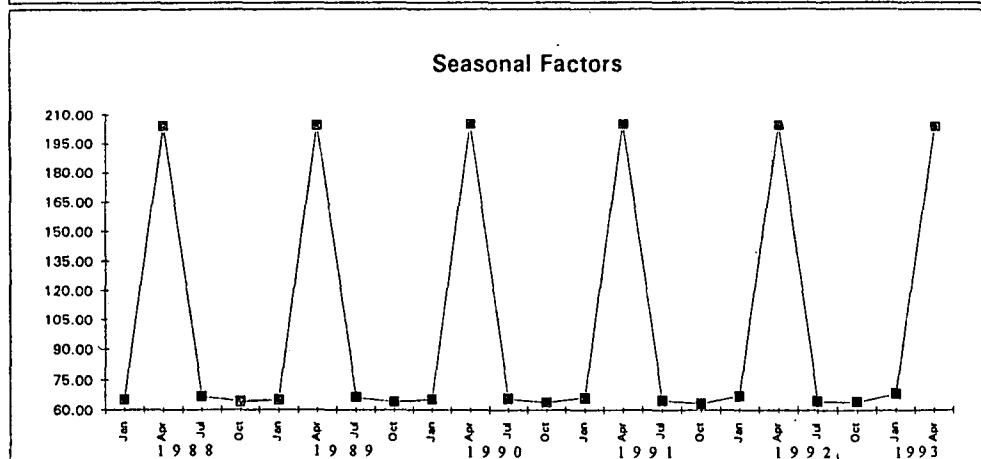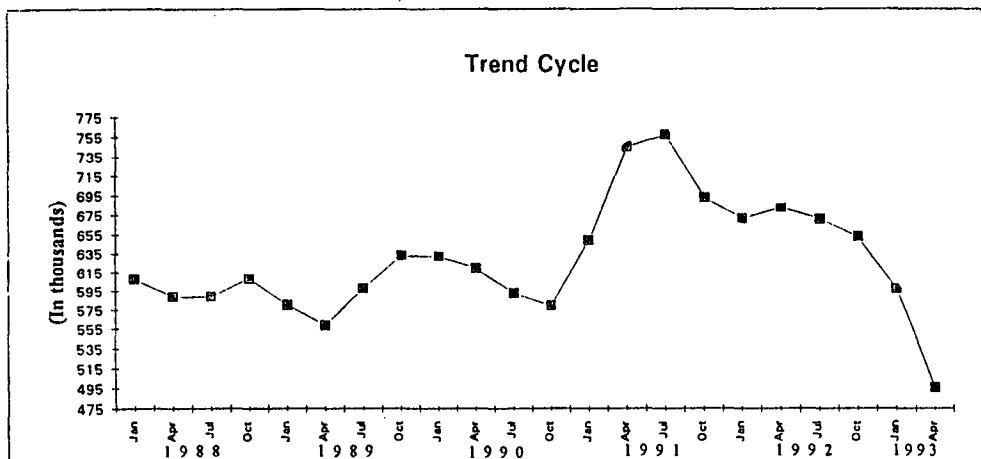
UNEMPLOYED PERSONS IN AGE GROUP 15-19
PHILIPPINES: 1988-1993 (APR)
(Original vs. Seasonally Adjusted Series)

Trend Cycle
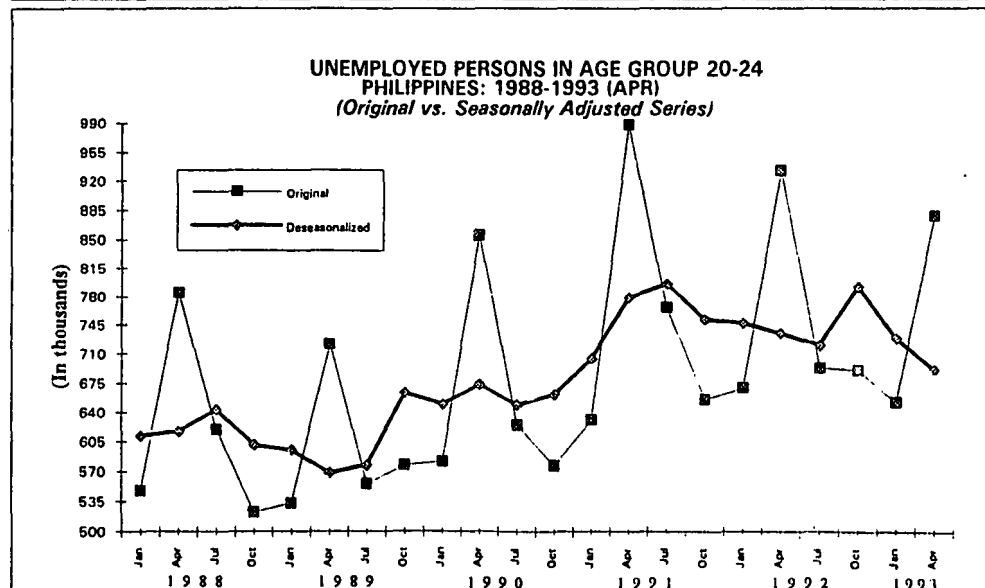

Seasonal Factors

Irregular Series

Year	Survey Round	Original Data	Deseasonalized Series	Trend Cycle	Seasonal Factors	Irregular Series
1988	Jan	548	612	612	89.55	100.00
	Apr	785	617	624	127.27	98.80
	Jul	619	643	629	96.33	102.20
	Oct	522	601	613	86.87	98.10
1989	Jan	533	595	587	89.59	101.40
	Apr	722	568	571	127.14	99.40
	Jul	556	578	586	96.25	98.50
	Oct	578	663	627	87.19	105.70
1990	Jan	582	650	659	89.54	98.60
	Apr	856	674	663	126.96	101.70
	Jul	625	649	656	96.30	98.90
	Oct	577	662	661	87.21	100.10
1991	Jan	631	705	711	89.54	99.10
	Apr	989	779	773	126.96	100.80
	Jul	767	796	789	96.30	101.00
	Oct	656	752	763	87.21	98.50
1992	Jan	670	748	744	89.54	100.60
	Apr	933	735	732	126.96	100.40
	Jul	694	721	732	96.31	98.40
	Oct	691	792	744	87.22	106.50
1993	Jan	652	729	728	89.47	100.10
	Apr	878	691	701	127.02	98.60

UNEMPLOYED PERSONS IN AGE GROUP 20-24
PHILIPPINES: 1988-1993 (APR)
(Original vs. Seasonally Adjusted Series)

Trend Cycle

Seasonal Factors

Irregular Series

Quarter to Quarter Changes of Employed Persons
Philippines: 1988-1993 (Apr)

Quarter to Quarter Changes of Unemployed Persons
Philippines: 1988-1993 (Apr)

Quarter to Quarter Changes of Underemployed
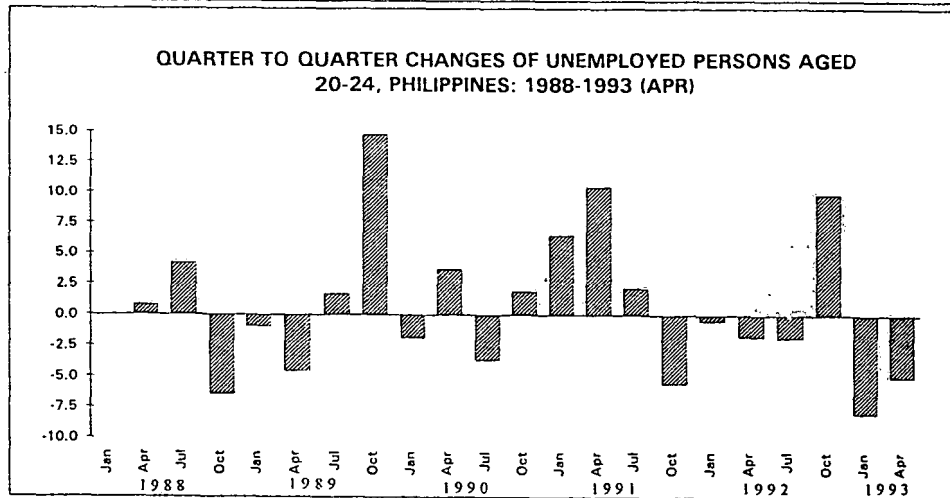Persons, Philippines: 1988-1993 (Apr)
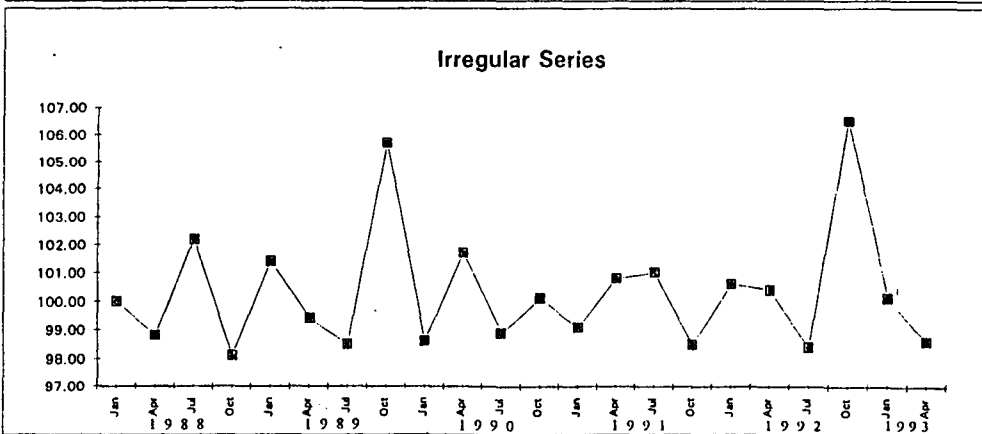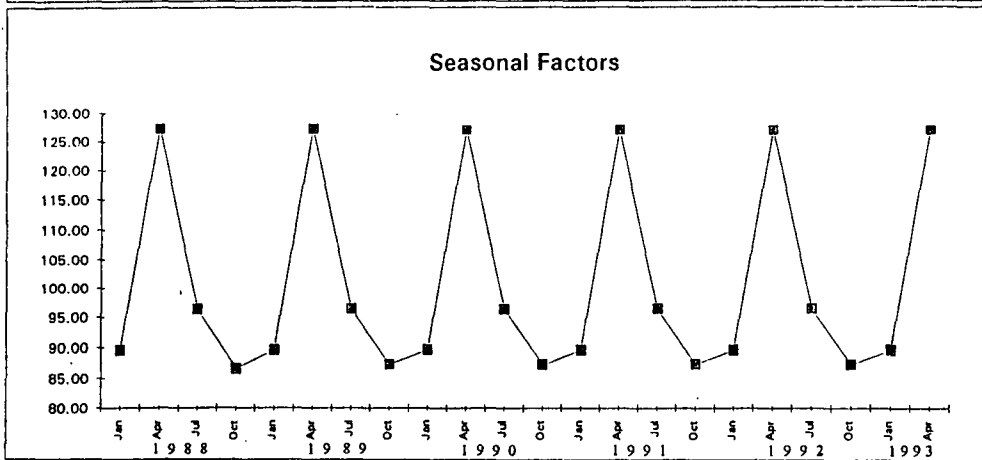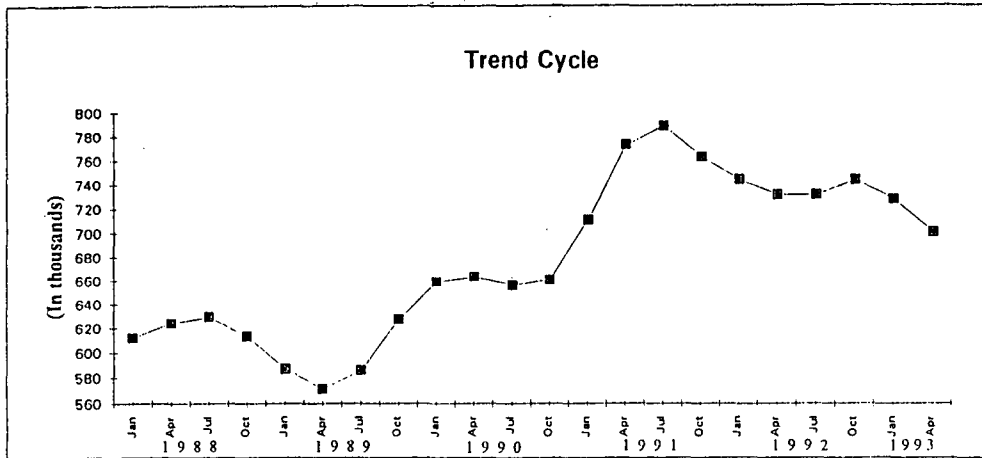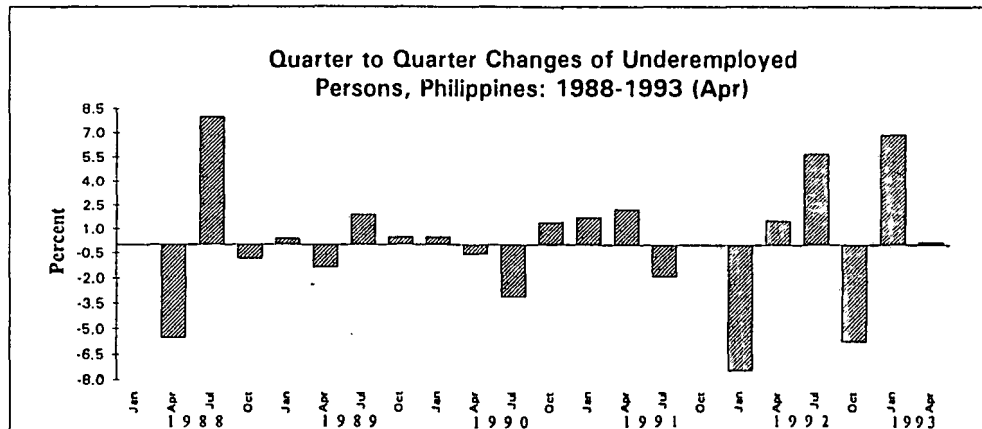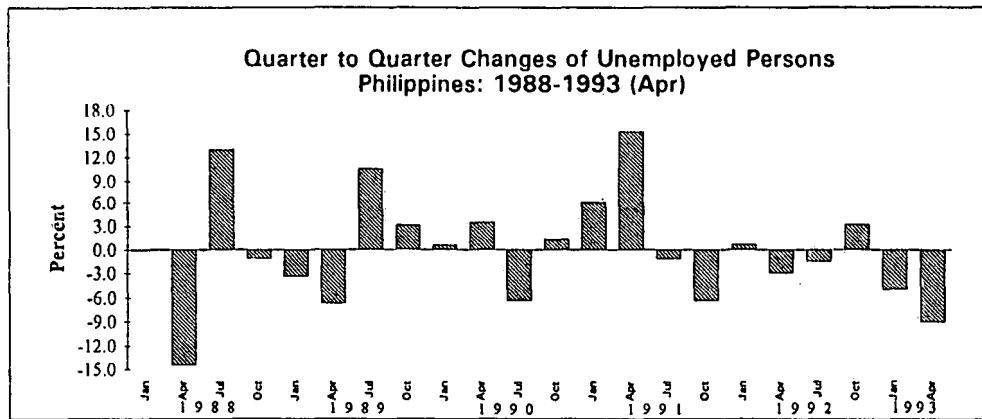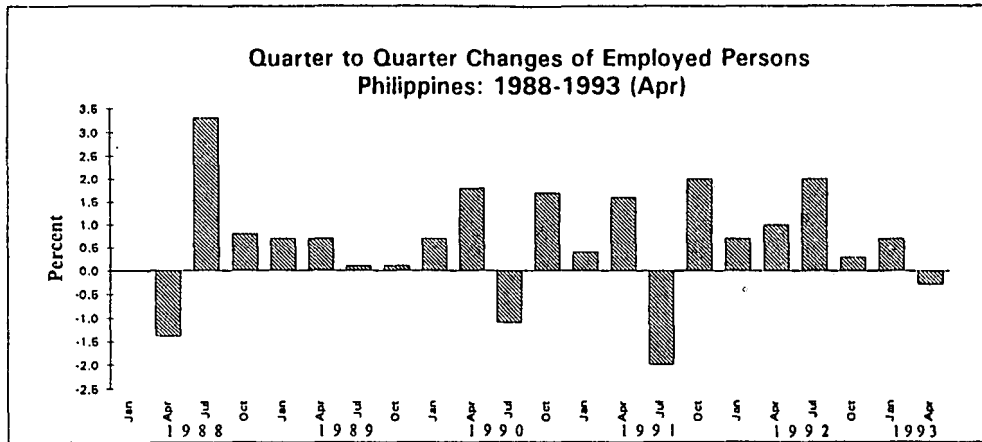
QUARTER TO QUARTER CHANGES OF UNEMPLOYED PERSONS AGED 15-19 AND 20-24 PHILIPPINES: 1988-1993 (APR) (ADJUSTED SERIES)

Year	Survey Round	Age Group 15-19	Age Group 20-24
1988	Jan	0.0	0.0
	Apr	-32.7	0.8
	Jul	50.1	4.2
	Oct	-9.0	-6.5
1989	Jan	-3.7	-1.0
	Apr	-10.5	-4.6
	Jul	15.1	1.7
	Oct	5.8	14.8
1990	Jan	-5.6	-1.9
	Apr	5.5	3.7
	Jul	-9.5	-3.7
	Oct	-0.7	1.9
1991	Jan	-0.7	6.5
	Apr	31.7	10.5
	Jul	2.1	2.2
	Oct	-12.3	-5.6
1992	Jan	-1.9	-0.5
	Apr	5.8	-1.8
	Jul	-6.6	-1.9
	Oct	-0.2	9.9
1993	Jan	-6.2	-8.0
	Apr	-23.9	-5.1

QUARTER TO QUARTER CHANGES OF UNEMPLOYED PERSONS AGED 15-19, PHILIPPINES 1988-1993 (APR)

QUARTER TO QUARTER CHANGES OF UNEMPLOYED PERSONS AGED 20-24, PHILIPPINES: 1988-1993 (APR)

Year	Survey Round	LFPR	Employment Rate	Unemployment Rate	Underemployment Rate
1988	Jan	0.0	0.0	0.0	0.0
	Apr	-2.3	1.3	-1.3	-1.0
	Jul	2.2	-0.8	0.8	1.0
	Oct	0.0	0.2	-0.2	-0.4
1989	Jan	-0.3	0.4	-0.4	-0.1
	Apr	-0.4	0.6	-0.6	-0.5
	Jul	0.2	-0.8	0.8	0.4
	Oct	-5.2	-0.3	0.3	0.1
1990	'an	4.9	0.0	0.0	-0.1
	Apr	0.8	-0.1	0.1	-0.5
	Jul	-1.6	0.4	-0.4	-0.5
	Oct	0.7	0.1	-0.1	-0.1
199'	'an	0.1	-0.5	0.5	0.3
	Apr	1.5	-1.2	1.2	0.2
	Jul	1.2	-0.1	0.1	0.0
	Oct	0.4	0.9	-0.9	-0.5
1992	Jan	0.0	0.0	0.0	-1.8
	Apr	-0.1	-0.3	-0.3	0.1
	Jul	0.6	0.3	-0.3	0.8
	Oct	-0.1	-0.2	0.2	-1.3
1993	Jan	-0.4	0.5	0.5	1.2
	Apr	-1.2	0.7	-0.7	0.1

Quarter to Quarter Changes in Labor Force Participation
Rates, Philippines: 1988-1993 (Apr)

Quarter to Quarter Changes in Employment Rates
Philippines: 1988-1993 (Apr)

Quarter to Quarter Changes in Unemployment Rates
Philippines: 1988-1993 (Apr)

Quarter to Quarter Changes in Underemployment Rates
Philippines: 1988-1993 (Apr)