

9th National Convention on Statistics (NCS)
EDSA Shangri-La Hotel
October 4-5, 2004

**Trend Analysis of Overseas Filipino Workers
Using Regression**

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I. Background of the Study

The Philippine was on its way to “sustainable growth” during the first half of the 1990s. However, this was hindered by the major crisis and problems experienced by the country on: (1) the currency crisis in 1997 in which the exchange rate of peso to a dollar became forty pesos from twenty-six pesos, causing panic among investors and businessmen; (2) the political crisis in 1999 during the time of ousted President Joseph Estrada, which affected the economy heavily; (3) the bombing of the New York Twin Towers on September 11, 2001 that obviously rocked the entire world; and (4) the local terrorism done by the rebels in Mindanao, causing fear among the locals and foreign nationals.

These crises aggravated and destabilized the country’s economy as can be seen in the high prices of commodities, retrenchment due to closing down of companies specifically the multi-national companies, increasing number of poor households, etc. During these hard times, many Filipinos chose to look for work or continued to work outside the Philippines to support the needs of their families, though most of them encountered problems with their foreign employers.

The recent global crisis caused by war between the US and Iraq paved the way for the OFWs to work in Iraq. The local labor of Iraq was not sufficient to rebuild the huge ruins of war. It was realized that overseas workers would be the answer to augment the shortage of workers.

In addition, new labor markets and employment opportunities in Asia might be opening their doors for OFWs like Japan for caregivers and IT experts; China for domestic helpers, English teachers and skilled professionals in various fields; and Malaysia for nurses because of the expansion of its health care services.

The rising flow of OFWs is unavoidable because Filipinos need to survive, even if this would mean separation from their families. Stopping the rising flow of OFWs would require measures that would effectively address the issues on unemployment as well as poverty. There is no alternative for the government but to allow the Filipinos to work abroad and to strengthen the policies concerning their safety and security.

But then, knowing there is a huge demand for overseas workers, there is a need to evaluate the data/information on OFWs being released by different agencies, whether the number is increasing every year or remaining at the same level. Most often the number and other relevant information on OFWs confused the data users and researchers due to the different purposes and methodologies of generating such data.

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No agency attempted to study and analyze the trend and characteristics and to forecast the number of OFWs. If these can be done, these will be of great help to the decisions and plans of the Philippine government concerning OFWs. This paper attempts to set the trend analysis and forecast of OFWs using the results of the Labor Force Survey (LFS) and Survey on Overseas Filipinos (SOF) of the National Statistics Office and using regression against time.

II. Characteristics of OFWs

For purposes of this study and a clear understanding of the subject under study, the Overseas Filipino Workers (OFWs) is defined as those Filipinos who are presently and temporarily out of the country to fulfill an overseas work contract for a specific length of time or who are presently at home on vacation but still has an existing contract to work abroad. They may be land-based or sea-based workers.

Number and Percent of OFWs by Age Group

Table 1 shows the number and percentage of OFWs by age group from 1993 to 2002. Based from this table, the highest number of OFWs (1,055) deployed abroad occurred in 2002. The least numbered was in 1995 with 798 deployed workers. This was the year when the number of OFWs decreased because of the alarming problems encountered in different countries like the Flor Contemplacion's case in Singapore. Thus, the Philippine government became more careful in sending OFWs.

Table 1. Number (in Thousands) and Percent of OFWs, by Age Group: 1993-2002

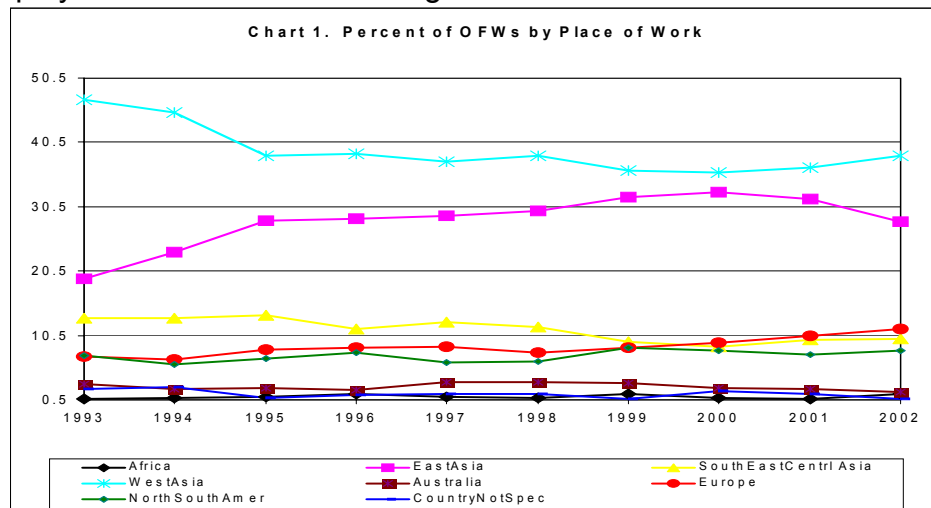
Year	All Ages	15-24		25-34		35-44		45 and over		Not Reported	
		No.	%	No.	%	No.	%	No.	%	No.	%
1993	942	151	16.0	403	42.7	264	28.0	119	12.6	6	0.6
1994	939	163	17.4	388	41.4	268	28.6	114	12.2	5	0.5
1995	798	136	17.1	321	40.4	219	27.6	117	14.7	1	0.1
1996	902	130	14.5	379	42.2	257	28.6	129	14.4	3	0.3
1997	1,015	135	13.3	431	42.5	298	29.4	142	14.0	7	0.7
1998	905	116	12.8	388	42.9	272	30.1	128	14.2		
1999	1,015	123	12.1	426	41.8	289	28.4	177	17.4	3	0.3
2000	980	118	12.1	406	41.6	269	27.6	182	18.6	1	0.1
2001	1,031	128	12.4	417	40.4	285	27.6	200	19.4	1	0.1
2002	1,056	122	11.6	429	40.7	306	29.0	198	18.8		

Source: Survey of Overseas Filipinos, NSO

Among the age groups, those belonging to 25-34 years old had the highest number and percentage of OFWs followed by age group 35-44. As expected, the age group with the least number and percentage belonged to the youngest and oldest age group, 15-24 and 45 & over, respectively. The median age of OFWs deployed in different countries from 1993 to 2002 was 33 years old.

Number and Percent of OFWs by Place of Work

The countries in the Western Asia, composed of Saudi Arabia, Kuwait, United Arab Emirates, Qatar, Bahrain, Oman and other middle east countries were the most populated by OFWs (between 300 to 400 thousand workers) since the start of the shift of migration in 1960s in neighboring Asia. The OFWs also went to East Asian region (Hongkong, Japan, Taiwan, South Korea, China, etc.) as service workers like entertainers, domestic helpers, factory workers and laborers. The total number of workers deployed in these countries ranges from 181 to 326 thousand workers.



Source: Survey of Overseas Filipino Workers

On the average, about 517 thousand male OFWs (see Table 2A) were hired each year in different countries. Filipino male workers mostly got their contract in Asia particularly in the countries composing Western Asia. An average of 243 thousand Filipino men per year were deployed as workers in these countries.

Table 2A. Number (in Thousands) of Male OFWs, by Place of Work

Year	Total	Africa		East Asia		South East Central Asia		West Asia		Australia		Europe		North South America		Country Not Specify	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1993	558	5	0.8	77	12.0	44	6.9	307	47.9	20	3.1	44	6.9	42	6.6	18	2.8
1994	514	8	1.3	86	14.4	38	6.4	274	46.0	13	2.2	41	6.9	33	5.5	20	3.4
1995	418	5	1.0	81	16.3	32	6.4	199	40.0	15	3.0	43	8.7	33	6.6	7	1.4
1996	503	11	1.9	110	18.7	38	6.5	230	39.2	10	1.7	50	8.5	44	7.5	10	1.7
1997	555	9	1.4	117	18.3	49	7.7	248	38.8	23	3.6	59	9.2	38	5.9	12	1.9
1998	467	6	1.1	87	15.8	38	6.9	223	40.5	21	3.8	45	8.2	39	7.1	9	1.6
1999	539	13	2.1	116	18.5	32	5.1	230	36.7	18	2.9	66	10.5	61	9.7	5	0.8
2000	529	6	1.0	111	18.2	33	5.4	231	37.9	15	2.5	64	10.5	52	8.5	14	2.3
2001	529	5	0.8	103	16.7	39	6.3	237	38.5	18	2.9	72	11.7	49	8.0	7	1.1
2002	554	13	2.0	96	15.0	40	6.3	255	39.9	11	1.7	78	12.2	56	8.8	5	0.8

Source: Survey of Filipino Overseas,
NSO

Around 442 thousand Filipino women workers (see Table 2B) were deployed annually in different regions in the world. These Filipino women dominated the workforce in East Asia starting in 1995. On the average, 173 thousand female workers every year were hired in this region particularly in Hongkong and Singapore.

Table 2B. Number (in Thousands) of Female OFWs, by Place of Work

Year	Total	Africa		East Asia		South East Central Asia		West Asia		Australia		Europe		North South America		Country Not Specify	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1993	384	1	0.2	104	22.4	80	17.3	136	29.3	7	1.5	24	5.2	27	5.8	3	0.6
1994	425		0.0	134	26.4	85	16.8	149	29.4	7	1.4	22	4.3	23	4.5	4	0.8
1995	380	3	0.6	144	31.2	77	16.7	107	23.1	4	0.9	23	5.0	22	4.8		0.0
1996	399	2	0.4	148	30.9	66	13.8	118	24.6	8	1.7	27	5.6	26	5.4	2	0.4
1997	460	1	0.2	178	32.8	78	14.4	133	24.5	10	1.8	30	5.5	26	4.8	3	0.6
1998	438	1	0.2	183	35.3	69	13.3	124	23.9	9	1.7	26	5.0	19	3.7	4	0.8
1999	476	2	0.4	209	37.3	65	11.6	137	24.4	13	2.3	22	3.9	27	4.8	1	0.2
2000	451	2	0.4	209	39.0	53	9.9	120	22.4	8	1.5	27	5.0	28	5.2	5	0.9
2001	502	1	0.2	223	38.2	62	10.6	140	24.0	4	0.7	35	6.0	28	4.8	7	1.2
2002	502	2	0.3	201	34.3	66	11.3	150	25.6	7	1.2	43	7.3	30	5.1	2	0.3

Source: Survey of Filipino Overseas,
NSO

The less popular country of destination was Africa with only 1.6% of the male OFWs and 0.3% of the female workers were deployed every year.

Percent of OFWs by Occupation

Table 3. Total Number (in Thousands) and Percentage of OFWs, by Occupation: 1993-2002

Sex/Year	Total	Professional and Technical	Service Workers	Production and Related Workers	Other Workers
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Both Sexes

1993	942	13.6	39.3	46.7	0.4
1994	939	13.1	42.7	44.1	0.1
1995	798	12.4	45.1	41.6	0.9
1996	902	12.4	45.3	41.4	0.9
1997	1015	12.2	45.7	41.8	0.3
1998	905	12.3	47.8	39.7	0.2
1999	1015	15.7	44.2	40.0	0.1
2000	980	14.7	44.0	40.9	0.3

2001	1031	18.5	42.1	66.6	0.6
2002	1056	22.0	41.4	63.5	0.1
Male					
1993	558	7.5	8.5	43.0	0.2
1994	514	6.5	8.5	39.6	0.1
1995	418	6.6	8.1	37.2	0.4
1996	503	7.6	9.8	37.8	0.6
1997	555	6.0	10.2	38.3	0.2
1998	467	6.6	9.6	35.3	0.2
1999	539	8.4	9.5	35.2	0.0
2000	529	6.9	10.0	36.8	0.2
2001	529	9.9	6.3	34.5	0.6
2002	554	13.2	6.1	33.2	0.0
Female					
1993	384	6.1	30.8	3.7	0.2
1994	425	6.6	34.2	4.5	0.0
1995	380	5.8	37.0	4.4	0.5
1996	399	4.8	35.6	3.5	0.3
1997	460	6.2	35.6	3.4	0.1
1998	438	5.7	38.2	4.4	0.0
1999	476	7.2	34.8	4.8	0.1
2000	451	7.9	34.0	4.1	0.1
2001	502	8.7	35.8	4.2	0.0
2002	502	8.8	35.3	3.4	0.0

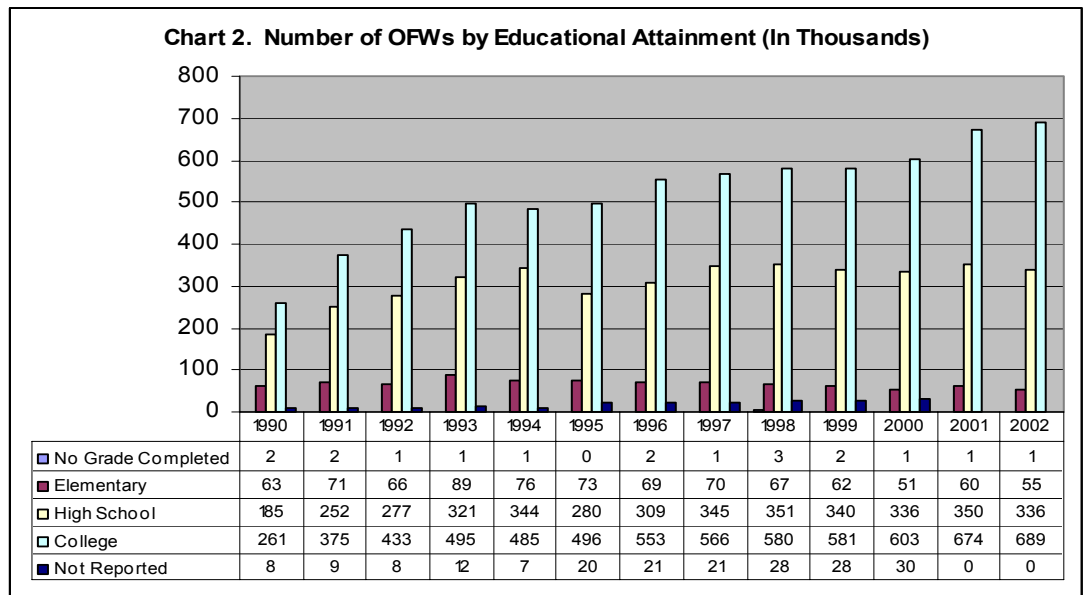
Source: Survey on Overseas Filipino Workers, NSO

From 1993-2002, male Filipino workers, composing around 37% of the total OFWs, dominated the Production & Related Workers. While the service workers were mostly female (35% of the total OFWs).

Overall, both male and female OFWs were given opportunities to work abroad regardless of the type of occupation. Among the various group of workers, the professional workers decreased in percentage from 1993 to 1995 and showed a fluctuating trend from 1996 to 2001. This could be attributed to the availability of the jobs of the professional workers like computer programmers, system analysts, nurses, etc. in the labor market. Some countries did not hire OFWs in the professional fields because they had enough supply of local workers.

On the other hand, the service workers were in demand from 1993 to 1998 as shown in the increasing number of service workers going out of the country. But starting in 1999 the percentage of these workers slightly was going down. Contrary to this were the number of production and related workers, decreasing in percentage from 1993 to 1998 but increasing onwards. This means that the needs of other countries were shifting to more production workers than service workers.

Number of OFWs by Educational Attainment



Source: Labor Force Survey, NSO

Statistics shows that the education level of OFWs was improving. Most of the OFWs deployed outside the country had reached college (average of 518 thousand OFWs) and high school level (average of 310 thousand OFWs). Only few had elementary education or did not complete any grade at all.

Number of OFWs by Marital Status

Table 4. Number (In Thousands) of OFWs by Marital Status

Year	Single	Married	Widowed	Divorced	Unknown
1990	164	338	8	8	0
1991	276	411	12	8	0
1992	286	478	13	8	0
1993	365	515	18	19	1
1994	375	507	17	14	0
1995	351	482	18	18	0
1996	329	591	18	15	1
1997	374	590	16	23	0
1998	380	595	21	31	1
1999	357	613	15	27	1
2000	392	586	19	22	1
2001	402	631	22	31	0
2002	395	630	25	31	0

Source: Labor Force Survey, NSO

There were more married (average of 536 thousand) OFWs than those with single status (average of 342 thousand). Mostly these married OFWs were forced to work abroad because of scarcity of job in the country or they wanted to provide better quality of life for their family.

III. Trend Analysis and Forecast

Using the LFS and SOF results, several analysis were undertaken to identify the variables for the trend models suited for forecasting. The trend analysis used here was regression against time. This means that the independent variable used was the time or the number of years for which the data of a particular variable represented. The study tried to compare models of different sizes (different numbers of independent variables and/or different sample sizes) using the Adjusted R^2 to measure the fit of the model. The adjusted R^2 was used because the usual R^2 had the tendency to grow with the number of independent variables. The model with high adjusted R^2 was considered for the forecasting model.

Regression Models Using Labor Force Survey Annual Data

Model 1: $OFW = \alpha + \beta t + \epsilon$

Data: LFS annual data from 1990-2002

Adjusted $R^2 = 0.7925$

Estimated model: $OFW = 651.63 + 37.66t$

Summary Output:

Regression Statistics	
Multiple R	0.8999
R Square	0.8098
Adjusted R Square	0.7925
Standard Error	74.2375
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	1	25103.1871	25103.1871	46.8324	0.00
Residual	11	60623.3295	5511.2118		
Total	12	318726.5166			

For Model 1, the actual data (from 1996 until 2002) exhibited a graph, almost like a plateau. The fit of the model was not good in the earlier years because of the

big increments in the number of OFWs. These big increments in the early years were causing the overestimation of the forecasts.

Model 2: $OFW = \alpha + \beta_1 t + \beta_2 t^2 + \epsilon$

Data: LFS annual data for 1990-2002

Adjusted $R^2 = 0.8997$

Estimated model: $OFW = 507.41 + 95.35t - 4.12t^2$

Summary Output:

Regression Statistics	
Multiple R	0.9573
R Square	0.9165
Adjusted R Square	0.8997
Standard Error	51.6020
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	2	292098.8987	146049.4493	54.8489	0.00
Residual	10	26627.6180	2662.7618		
Total	12	318726.5166			

The steep positive slope of the time series in the early years and the decreasing number in the latter years indicated a hyperbolic behavior in the graph; thus, the quadratic model (Model 2) showed a much better fit than the linear model.

Another model in higher orders of regression was applied.

Model 3: $OFW = \alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \epsilon$

Data: LFS annual data for 1990-2002

Adjusted $R^2 = 0.9408$

Estimated model: $OFW = 376.59 + 190.35t - 20.47t^2 + 0.78t^3$

Summary Output:

Regression Statistics	
Multiple R	0.9776
R Square	0.9556
Adjusted R Square	0.9408
Standard Error	39.6403
Observations	13

ANOVA

	df	SS	MS	F	Significance F
Regression	3	304584.3608	101528.1203	64.6120	0.00
Residual	9	14142.1558	1571.3506		
Total	12	318726.5166			

This model showed a better fit than the quadratic model. The graph presented an increasing trend for the next five years. Therefore, Model 3 was a better model for forecasting as compared to the other two models presented earlier.

Regression Model Using the Survey on Overseas Filipinos

For SOF, the three models were also applied.

Model 1: OFW = $\alpha + \beta t + \varepsilon$

Data: Number of OFWs taken from SOF annual data for 1993-2002

Adjusted $R^2 = 0.3616$

Estimated model: $OFW = 863.00 + 17.09t$

Summary Output:

Regression Statistics	
Multiple R	0.6577
R Square	0.4325
Adjusted R Square	0.3616
Standard Error	62.8648
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	24098.1818	24098.1818	6.0978	0.0387
Residual	8	31615.8182	3951.9773		

Total	9	55714.0000			
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Model 1 considered all the time series from 1993-2002. However, this model was not fitted for projecting the number of OFWs.

Model 2: $OFW = \alpha + \beta_1 t + \beta_2 t^2 + \varepsilon$

Data: Number of OFWs taken from SOF annual data for 1993-2002

Adjusted $R^2 = 0.3661$

Estimated model: $OFW = 924.67 - 13.74t + 2.80t^2$

Summary Output:

Regression Statistics	
Multiple R	0.7120
R Square	0.5070
Adjusted R Square	0.3661
Standard Error	62.6411
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	2	28246.6667	14123.3333	3.5993	0.0841
Residual	7	27467.3333	3923.9048		
Total	9	55714.000			

Like Model 1, Model 2 had no significant improvement in the fit of the quadratic model compared to the linear model. Trying higher degree for confirmation of the absence of trend, Model 3 was also used.

Model 3: $OFW = \alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \varepsilon$

Data: Number of OFWs taken from SOF annual data for 1993-2002

Adjusted $R^2 = 0.3513$

Estimated model: $OFW = 1014.33 - 93.27t + 20.05t^2 - 1.05t^3$

Summary Output:

Regression Statistics	
Multiple R	0.7534
R Square	0.5675
Adjusted R Square	0.3513
Standard Error	63.3691
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	3	31620.14	10540.05	2.63	0.15
Residual	6	24093.86	4015.64		
Total	9	55714.00			

In Model 3, the fit was even worse than the linear model. Unlike in LFS, there was no good model fitted for forecasting the number of OFWs using the SOF data due to limited number of observations. At least there should be around 14 observations to get a good forecast. But for the purposes of this study, the LFS data with 13 observations and the SOF with only 10 observations were utilized to come up with an initial basis for forecasting the number of OFWs. As can be observed, different models were applied to select the right forecasting model for OFWs.

Using again the SOF data, the three models were applied to the number of OFWs by type of major occupation (with highest OFWs).

Professional and Technical Workers

The data used for Professional and Technical Workers was from 1993-2002. Among the three regression models tested for the fit, Model 2 with two predictors had the highest Adjusted R^2 . Meaning, the predicted values were very close to the actual values. These predicted values showed that the number of OFWs in the next five years is increasing. Professional workers will still be in great demand abroad in the coming years.

Model	Adjusted R^2	Remarks
$\alpha + \beta t + \varepsilon$	0.5261	Model 2 to be adopted since it has the highest adjusted R^2 and with all coefficients significantly different from zero.
$\alpha + \beta_1 t + \beta_2 t^2 + \varepsilon$	0.9100	
$\alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \varepsilon$	0.9026	

Estimated model is: $\hat{Y} = 152.23 - 25.55t + 3.30t^2$

Service Workers

Two sets of data were used. The first one was the 1993-2002 series and the second one was the series without the 1995 observation. The second set was

tested upon observing that the 1995 data was giving predicted values very far from the actual value, thus, primarily causing the bad fit of the regression line.

Model	Adjusted R ²		Remarks
	A 1993-2002	B Without 1995	
$\alpha + \beta t + \varepsilon$	-0.0153	0.2211	Model 2B has the highest adjusted R ² and with all coefficients significantly different from zero but all forecasts are negative.
$\alpha + \beta_1 t + \beta_2 t^2 + \varepsilon$	0.2127	0.7513	
$\alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \varepsilon$	0.3460	0.7474	

After removing the 1995 data, Model 2 had the highest adjusted R² with all coefficients significantly different from zero but all forecasts were negative. Negative forecasts were due to the decreasing trend since 1996.

Negative values are impossible or a zero would also be very unlikely since there will still be a demand for this type of workers.

Production and Related Workers

The data for Production and Related Workers were from 1993-2002. Among the three regression models tested for the fit, Model 2 had the highest Adjusted R².

Model	Adjusted R ²	Remarks
$\alpha + \beta t + \varepsilon$	0.4295	Model 2 to be adopted since it has the highest adjusted R ² and with all coefficients significantly different from zero.
$\alpha + \beta_1 t + \beta_2 t^2 + \varepsilon$	0.7584	
$\alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \varepsilon$	0.7263	

Estimated model is: $\hat{Y} = 481.63 - 74.93t + 9.54t^2$

The predicted values were very close to the actual values. Like the Professional Workers, the number of production and related workers in the next five years showed an increasing trend.

The demand for production and related workers will continue for the coming years.

IV. Summary of Various Trend Models

The various trend models applied to both LFS and SOF to show and compare their differences are shown in Table 8 next page.

Table 5. Summary of Various Trend Models Used on the Number of OFWs

Model	LFS		SOF	
	Adj. R ²	Year covered	Adj. R ²	Year covered
$\alpha + \beta t + \varepsilon$	0.7925	1990-2002	0.3616	1993-2002
$\alpha + \beta_1 t + \beta_2 t^2 + \varepsilon$	0.8997	1990-2002	0.3661	1993-2002
$\alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \varepsilon$	0.9408	1990-2002	0.3531	1993-2002

Based on the four models developed for the LFS data, Model 3 was considered the best fit for forecasting the number of OFWs. It had the highest R^2 of 0.9408, showing an increasing trend in the near future. As observed, the LFS produced a higher adjusted R^2 than the SOF due to more observations used in the trend and forecasting models. The SOF produced a very low adjusted R^2 and no good fit was identified in the forecast. But if the number of observations increases for SOF, the process can be repeated in order to test the fit of the models used in this study.

Table 6. Summary of Various Trend Models Used on the Occupation Group

Model	Adjusted R^2			
	Professional & Tech. Workers	Service Workers		Production & Rel. Workers
	1993-2002	1993-2002	W/out 1995	1993-2002
$\alpha + \beta t + \varepsilon$	0.5261	-0.0153	0.2211	0.4295
$\alpha + \beta_1 t + \beta_2 t^2 + \varepsilon$	0.9100	0.2127	0.7513	0.7584
$\alpha + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \varepsilon$	0.9026	0.3460	0.7474	0.7263

Among the three occupation groups, the professional workers have the most promising prospect in the near future. With 0.9100 adjusted R^2 , more professionals will be hired abroad for the next five years. However, the two other groups of workers, production and service workers, are predicted to still be in demand in the near future.