

STATISTICAL NEWS

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SEASONALLY ADJUSTED VISITOR ARRIVALS NOVEMBER 2018

Seasonal adjustment is the process of estimating and then removing from a time series influences that are systematic and calendar related. Observed data needs to be seasonally adjusted as seasonal effects can conceal both the true underlying movement in the series, as well as certain non-seasonal characteristics which may be of interest to analysts. (Refer to “Appendix 1-Explanatory Notes” for a detailed explanation).

VISITOR ARRIVALS TO FIJI

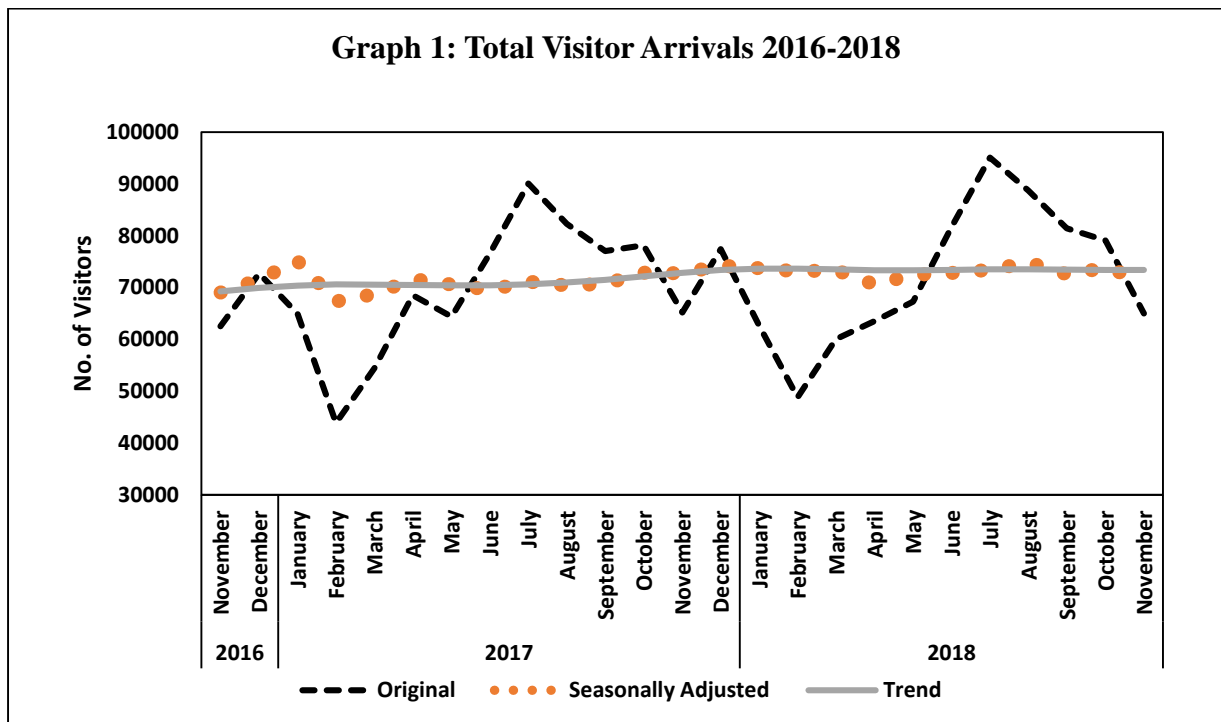
	November 2018	October 2018 to November 2018 % change	November 2017 to November 2018 % change
Total			
Trend	73,391	0.01	0.74
Seasonally Adjusted	71,511	-3.14	...
Original	64,989	...	...
Australia			
Trend	30,975	0.23	0.77
Seasonally Adjusted	30,992	-0.59	...
Original	29,828	...	...
New Zealand			
Trend	16,725	0.78	4.13
Seasonally Adjusted	16,368	-1.15	...
Original	12,631	...	...
USA			
Trend	7,321	0.43	4.75
Seasonally Adjusted	7,191	-2.40	...
Original	6,913	...	...
Continental Europe			
Trend	3,292	-0.03	11.82
Seasonally Adjusted	3,117	-5.57	...
Original	3,092	...	...
Japan			
Trend	1,454	-0.82	-9.01
Seasonally Adjusted	896	-43.43	...
Original	693	...	...

...not applicable (see notes below and “Appendix 1-Explanatory Notes” for more details)

Note:

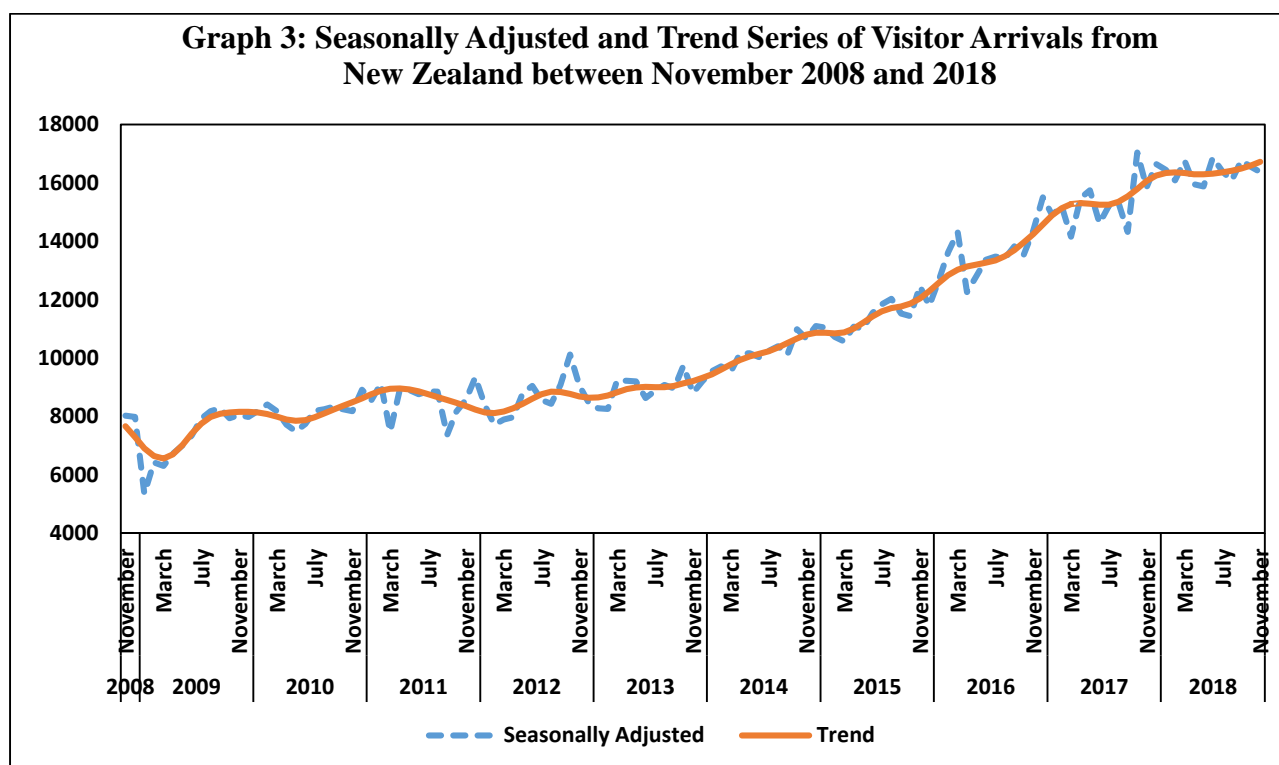
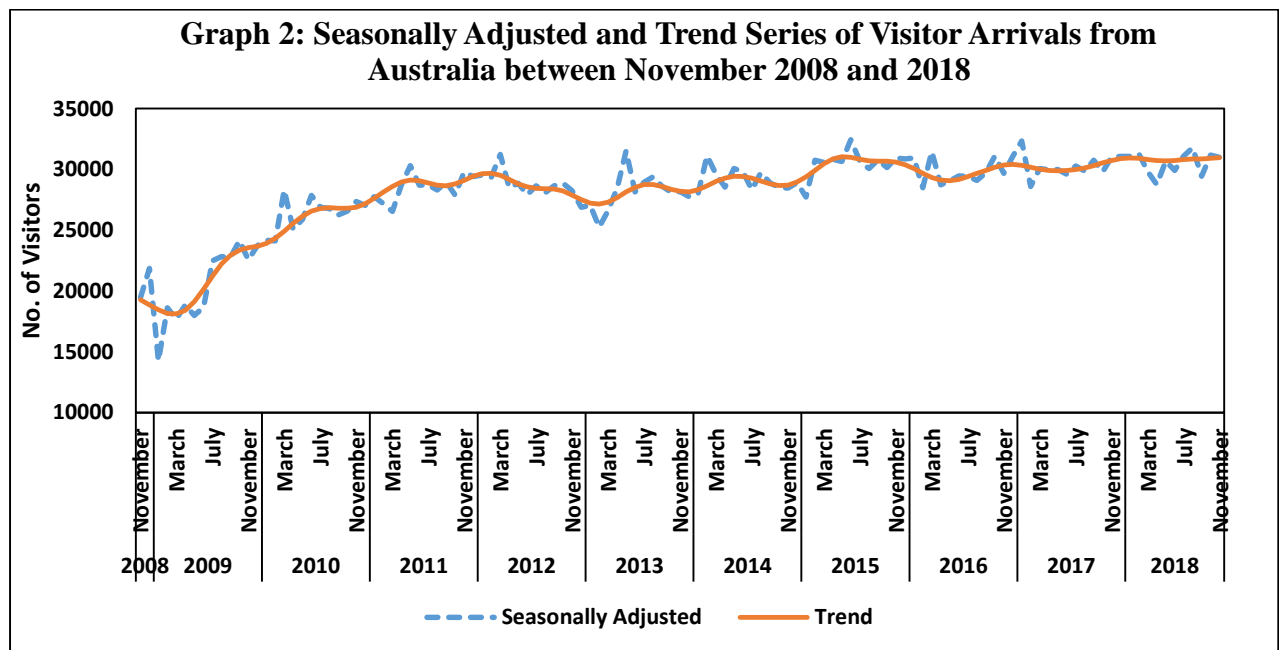
1. *Month-to-month % change and year-to-year % change* in the original estimates are not shown here and must be used with caution as seasonal and irregular influences can dominate movements.
2. *Year-to-year % change* in the seasonally adjusted estimates are not shown here and must be used with caution as irregular influences can dominate movements.

- **Trend estimates:** Trend estimates show the long term, underlying movement in the series after the removal of seasonal and irregular influences. The trend estimates of Total Visitor Arrivals during November 2018 (73,391) **increased by 0.01%**, compared with October 2018 (73,381). The current trend estimate for arrivals is **0.74% higher** than November 2017.
- **Seasonally adjusted estimates:** Seasonally Adjusted estimates show the trend and irregular components after removing all seasonal and systematic related behaviors from the series. During November 2018, seasonally adjusted Total Visitor Arrivals to Fiji (71,511) **decreased by 3.14%** compared with October 2018 (73,827).
- **Original estimates:** The Total Visitor Arrivals to Fiji in November 2018 was 64,989. In this publication, the *month-to-month % change* and *year-to-year % change* are not reported as they contain seasonal and irregular influences that may hide the underlying, long term movement of the series.



Graph 1 shows the Total Visitor Arrivals to Fiji from November 2016 to November 2018 using three series: original, seasonally adjusted and trend. In terms of the original series, arrivals in February are low which could be due to visitors returning to their home countries after the holiday period in December and January. February also has less days compared to other months of the year. Arrivals in June and July on the other hand, are higher as these are winter months in the southern hemisphere. These variations contribute to calendar related, seasonal and irregular influences in the series, therefore seasonally adjusted and trend estimates are produced to show the true underlying movement of the series.

Australia and New Zealand are the two major contributors of Visitor Arrivals in Fiji, consisting of 45.90% and 19.44% of total arrivals respectively. After removing seasonal and irregular influences, arrivals from Australia (Graph 2) shows a slightly increasing trend which has been generally stable since 2010. On the other hand, arrivals from New Zealand (Graph 3) is trending upwards. The seasonally adjusted shows the trend and irregular so contains random fluctuations as well as the impact of one-off real world events. (For difference between seasonally adjusted and trend series see “Appendix: 1, Explanatory Notes” 3-5).



For details on trend breaks and extreme outliers (see “Appendix: 1, Explanatory Notes”, subheading 7&8)

For more information, the following can be referred to:

- Table 1: Original and Seasonally Adjusted Visitor Arrivals- Number by Country of Residence
- Table 2: Seasonally Adjusted and Trend Series of Visitor Arrivals- Number by Country of Residence

- Appendix 1: Explanatory Notes

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TABLE 1

ORIGINAL AND SEASONALLY ADJUSTED VISITOR ARRIVALS : NUMBER BY COUNTRY OF RESIDENCE

YEAR	MONTH	AUSTRALIA	NEW		USA	CANADA	UNITED	CONTINENTAL	JAPAN	SOUTH	REST OF	PACIFIC	OTHERS	TOTAL
			ZEALAND	KINGDOM			EUROPE	KOREA		ASIA	ISLANDS			
ORIGINAL VISITOR ARRIVALS														
2016	November	28,234	11,633	5,847	1,154	1,379	2,776	471	794	5,468	4,366	366		62,488
	December	36,130	13,172	6,558	1,055	1,522	2,753	528	800	5,082	4,735	384		72,719
2017	January	30,128	9,251	5,533	918	1,349	2,849	587	749	7,676	5,435	468		64,943
	February	15,603	6,228	5,538	896	1,325	2,295	720	633	5,576	4,712	350		43,876
	March	23,489	8,253	6,068	1,154	1,553	2,754	460	732	5,680	3,881	383		54,407
	April	30,951	13,804	5,922	1,099	1,449	3,450	467	634	6,382	3,928	409		68,495
	May	28,039	14,465	6,002	1,054	1,189	2,622	441	640	5,626	3,979	310		64,367
	June	32,833	18,590	9,167	865	1,465	2,314	407	733	5,810	4,152	262		76,598
	July	34,584	26,448	9,525	1,319	1,961	3,006	564	703	7,102	4,547	349		90,108
	August	32,908	23,106	7,165	1,290	1,296	3,421	836	672	6,928	4,330	364		82,316
	September	36,323	19,099	5,795	792	1,183	2,295	655	803	5,405	4,312	367		77,029
	October	34,359	18,564	6,756	1,053	1,296	3,455	410	968	6,448	4,344	511		78,164
	November	29,686	12,214	6,465	993	1,243	3,036	394	771	5,142	4,847	360		65,151
	December	36,786	14,573	7,262	988	1,616	3,141	409	833	5,972	5,253	597		77,430
2018	January	28,313	10,612	5,617	1,000	1,321	2,952	505	792	5,569	5,529	438		62,648
	February	17,014	6,641	5,951	993	1,252	2,682	510	553	8,245	4,416	541		48,798
	March	25,196	9,868	7,264	1,196	1,474	2,706	427	720	6,667	4,112	428		60,058
	April	26,809	13,731	6,170	908	1,261	2,763	438	760	6,346	3,926	423		63,535
	May	29,730	14,383	7,059	834	1,239	3,013	391	598	5,907	3,725	411		67,290
	June	32,785	22,404	9,962	1,099	1,239	2,431	336	683	5,923	4,450	341		81,653
	July	35,608	28,572	9,104	1,675	1,871	3,392	1,736	712	7,513	4,403	475		95,061
	August	34,641	24,065	7,727	1,437	1,486	4,301	2,454	685	7,297	4,219	381		88,693
	September	35,585	21,675	6,060	883	1,000	3,176	1,723	585	6,340	4,014	396		81,437
	October	34,899	18,562	7,004	957	1,379	3,621	1,335	772	6,241	3,923	384		79,077
	November	29,828	12,631	6,913	1,063	1,145	3,092	693	699	4,314	4,290	321		64,989
SEASONALLY ADJUSTED VISITOR ARRIVALS														
2016	November	29,686	14,359	6,254	1,077	1,418	2,733	1,920	703	6,248	4,231	384		69,013
	December	31,074	15,501	6,418	993	1,406	2,728	1,943	718	5,975	4,448	332		71,536
2017	January	32,339	14,899	6,718	1,032	1,395	2,659	1,873	702	8,392	4,736	406		75,151
	February	28,611	15,194	6,711	981	1,378	2,488	2,214	764	4,298	4,287	352		67,278
	March	30,068	14,158	6,424	1,020	1,360	2,827	1,519	698	5,931	4,362	365		68,732
	April	29,975	15,483	6,690	1,196	1,423	3,239	1,825	700	6,389	4,252	436		71,608
	May	29,983	15,746	6,420	1,148	1,256	2,800	1,663	666	6,357	4,217	344		70,600
	June	29,597	14,611	6,521	1,074	1,606	2,805	1,585	750	6,472	4,220	310		69,551
	July	30,290	15,204	7,061	944	1,586	2,913	1,625	731	6,119	4,320	335		71,128
	August	29,868	15,331	6,711	1,088	1,222	2,761	1,648	750	6,118	4,554	361		70,412
	September	30,750	14,319	6,951	1,096	1,584	2,807	1,762	846	5,548	4,650	375		70,688
	October	29,804	17,040	6,782	1,039	1,346	3,079	1,518	831	6,322	4,595	519		72,875
	November	31,026	15,841	6,967	962	1,357	2,967	1,642	711	6,112	4,757	388		72,730
	December	31,080	16,650	7,124	910	1,422	3,066	1,504	725	6,578	4,683	511		74,253
2018	January	31,082	16,449	7,107	1,095	1,354	2,856	1,616	733	6,152	4,871	408		73,723
	February	31,275	16,086	7,214	1,092	1,317	2,917	1,544	678	6,432	4,050	529		73,134
	March	29,821	16,760	7,448	1,088	1,304	2,776	1,459	711	7,037	4,576	408		73,388
	April	28,747	15,955	7,194	1,041	1,274	2,668	1,620	787	6,541	4,319	440		70,586
	May	30,678	15,881	7,270	912	1,344	3,138	1,482	666	6,571	4,063	433		72,438
	June	29,916	16,870	7,233	1,283	1,298	2,992	1,382	698	6,310	4,422	431		72,835
	July	31,095	16,396	6,538	1,214	1,468	3,251	1,469	714	6,611	4,260	435		73,451
	August	31,794	16,081	7,370	1,199	1,431	3,587	1,550	731	6,433	4,307	387		74,870
	September	29,444	16,761	7,225	1,182	1,334	3,654	1,426	643	6,242	4,256	398		72,565
	October	31,175	16,558	7,368	932	1,418	3,301	1,584	650	6,162	4,267	412		73,827
	November	30,992	16,368	7,191	1,081	1,289	3,117	896	629	5,454	4,158	336		71,511

*China India and Hong Kong are included in Rest of Asia due to less than 10 years of data

* Seasonally Adjusted figures and trend estimates change as new data becomes available. This ensures that the most up-to-date and best possible estimates are derived.

TABLE 2

SEASONALLY ADJUSTED AND TREND VISITOR ARRIVALS : NUMBER BY COUNTRY OF RESIDENCE

YEAR	MONTH	NEW		USA	CANADA	UNITED KINGDOM	CONTINENTAL EUROPE	JAPAN	SOUTH KOREA	REST OF ASIA	PACIFIC ISLANDS	OTHERS	TOTAL
		AUSTRALIA	ZEALAND										
SEASONALLY ADJUSTED VISITOR ARRIVALS													
2016	November	29,686	14,359	6,254	1,077	1,418	2,733	1,920	703	6,248	4,231	384	69,013
	December	31,074	15,501	6,418	993	1,406	2,728	1,943	718	5,975	4,448	332	71,536
2017	January	32,339	14,899	6,718	1,032	1,395	2,659	1,873	702	8,392	4,736	406	75,151
	February	28,611	15,194	6,711	981	1,378	2,488	2,214	764	4,298	4,287	352	67,278
	March	30,068	14,158	6,424	1,020	1,360	2,827	1,519	698	5,931	4,362	365	68,732
	April	29,975	15,483	6,690	1,196	1,423	3,239	1,825	700	6,389	4,252	436	71,608
	May	29,983	15,746	6,420	1,148	1,256	2,800	1,663	666	6,357	4,217	344	70,600
	June	29,597	14,611	6,521	1,074	1,606	2,805	1,585	750	6,472	4,220	310	69,551
	July	30,290	15,204	7,061	944	1,586	2,913	1,625	731	6,119	4,320	335	71,128
	August	29,868	15,331	6,711	1,088	1,222	2,761	1,648	750	6,118	4,554	361	70,412
	September	30,750	14,319	6,951	1,096	1,584	2,807	1,762	846	5,548	4,650	375	70,688
	October	29,804	17,040	6,782	1,039	1,346	3,079	1,518	831	6,322	4,595	519	72,875
	November	31,026	15,841	6,967	962	1,357	2,967	1,642	711	6,112	4,757	388	72,730
	December	31,080	16,650	7,124	910	1,422	3,066	1,504	725	6,578	4,683	511	74,253
2018	January	31,082	16,449	7,107	1,095	1,354	2,856	1,616	733	6,152	4,871	408	73,723
	February	31,275	16,086	7,214	1,092	1,317	2,917	1,544	678	6,432	4,050	529	73,134
	March	29,821	16,760	7,448	1,088	1,304	2,776	1,459	711	7,037	4,576	408	73,388
	April	28,747	15,955	7,194	1,041	1,274	2,668	1,620	787	6,541	4,319	440	70,586
	May	30,678	15,881	7,270	912	1,344	3,138	1,482	666	6,571	4,063	433	72,438
	June	29,916	16,870	7,233	1,283	1,298	2,992	1,382	698	6,310	4,422	431	72,835
	July	31,095	16,396	6,538	1,214	1,468	3,251	1,469	714	6,611	4,260	435	73,451
	August	31,794	16,081	7,370	1,199	1,431	3,587	1,550	731	6,433	4,307	387	74,870
	September	29,444	16,761	7,225	1,182	1,334	3,654	1,426	643	6,242	4,256	398	72,565
	October	31,175	16,558	7,368	932	1,418	3,301	1,584	650	6,162	4,267	412	73,827
	November	30,992	16,368	7,191	1,081	1,289	3,117	896	629	5,454	4,158	336	71,511
TREND SERIES VISITOR ARRIVALS													
2016	November	30,360	14,248	6,318	1,032	1,383	2,707	1,760	694	6,048	4,354	352	69,256
	December	30,414	14,571	6,438	1,030	1,386	2,707	1,848	708	6,066	4,395	361	69,924
2017	January	30,340	14,890	6,529	1,031	1,390	2,726	1,902	716	6,096	4,405	369	70,394
	February	30,186	15,136	6,576	1,039	1,392	2,758	1,898	717	6,143	4,377	370	70,592
	March	30,018	15,276	6,589	1,055	1,398	2,793	1,839	710	6,207	4,323	364	70,572
	April	29,924	15,312	6,591	1,076	1,409	2,814	1,762	705	6,258	4,275	354	70,480
	May	29,896	15,287	6,608	1,096	1,423	2,822	1,697	710	6,278	4,260	344	70,421
	June	29,913	15,252	6,652	1,104	1,432	2,824	1,660	727	6,245	4,293	340	70,442
	July	29,997	15,254	6,720	1,096	1,430	2,832	1,640	751	6,180	4,371	344	70,615
	August	30,116	15,349	6,795	1,075	1,421	2,854	1,633	773	6,118	4,474	359	70,967
	September	30,315	15,533	6,859	1,051	1,406	2,891	1,630	785	6,076	4,579	382	71,507
	October	30,541	15,789	6,920	1,036	1,392	2,927	1,617	779	6,094	4,672	410	72,177
	November	30,738	16,062	6,989	1,031	1,377	2,944	1,598	762	6,183	4,733	434	72,851
	December	30,890	16,254	7,068	1,033	1,362	2,941	1,577	741	6,318	4,741	450	73,375
2018	January	30,952	16,340	7,156	1,042	1,344	2,924	1,559	724	6,453	4,694	457	73,645
	February	30,904	16,364	7,228	1,060	1,326	2,907	1,543	713	6,550	4,605	457	73,657
	March	30,811	16,337	7,266	1,087	1,314	2,908	1,527	712	6,603	4,495	451	73,511
	April	30,730	16,299	7,275	1,118	1,314	2,948	1,507	715	6,615	4,388	443	73,352
	May	30,695	16,292	7,266	1,150	1,327	3,025	1,489	716	6,605	4,310	435	73,310
	June	30,740	16,315	7,255	1,176	1,350	3,119	1,480	710	6,556	4,271	427	73,399
	July	30,811	16,362	7,249	1,190	1,372	3,203	1,476	699	6,458	4,262	419	73,501
	August	30,873	16,417	7,250	1,187	1,382	3,260	1,476	684	6,331	4,264	408	73,532
	September	30,874	16,490	7,265	1,166	1,378	3,287	1,473	670	6,195	4,255	395	73,448
	October	30,904	16,595	7,290	1,137	1,364	3,293	1,466	662	6,057	4,233	380	73,381
	November	30,975	16,725	7,321	1,116	1,346	3,292	1,454	661	5,927	4,208	366	73,391

*China India and Hong Kong are included in Rest of Asia due to less than 10 years of data

*Seasonally Adjusted figures and trend estimates change as new data becomes available. This ensures that the most up-to-date and best possible estimates are derived.

APPENDIX 1: EXPLANATORY NOTES

WHAT IS A TIME SERIES?

A time series is a collection of observations of well-defined data items obtained through repeated measurements over time. For example, measuring the value of retail sales each month over several years would comprise a time series. This is because sales revenue is well defined, and consistently measured at equally spaced intervals. Data collected irregularly or only once are not time series. In this release, monthly Visitor Arrivals to Fiji by country of residence for the past 48 years (from 1970) are analyzed as a time series. An observed time series can be decomposed into three components: the trend (long term direction), the seasonal (systematic, calendar related movements) and the irregular (unsystematic, short term fluctuations).

WHAT ARE SEASONAL EFFECTS?

A seasonal effect is a systematic and calendar related effect. Some examples include the sharp escalation in most Retail series leading up to December due to the Christmas holiday period, or the increase in tourist arrivals to Fiji during the winter months of Australia and New Zealand.

WHAT IS SEASONAL ADJUSTMENT AND WHY DO WE NEED IT?

Seasonal adjustment is the process of estimating and then removing from a time series influences that are systematic and calendar related. Observed data needs to be seasonally adjusted as seasonal effects can conceal both the true underlying movements in the series, as well as certain non-seasonal characteristics which may be of interest to analysts.

WHY CAN'T WE JUST COMPARE ORIGINAL DATA FROM THE SAME PERIOD IN EACH YEAR?

A comparison of original data from the same period in each year does not completely remove all seasonal effects. Certain holidays such as Easter and Chinese New Year fall in different periods in each year, hence they will distort observations. Also, year to year values will be biased by any changes in seasonal patterns that occur over time. For example, consider a comparison between two consecutive March months i.e. compare the level of the original series observed in March for 2000 and 2001. This comparison ignores the moving holiday effect of Easter. Easter occurs in April for most years but if Easter falls in March, the level of activity can vary greatly for that month for some series. This distorts the original estimates. A comparison of these two months will not reflect the underlying pattern of the data. The comparison also ignores trading day effects. If the two consecutive months of March have different composition of trading days, it might reflect different levels of activity in original terms even though the underlying level of activity is unchanged. In a similar way, any changes to seasonal patterns might also be ignored. The original estimates also contains the influence of the irregular component. If the magnitude of the irregular component of a series is strong compared with the magnitude of the trend component, the underlying direction of the series can be distorted.

However, the major disadvantage of comparing year to year original data, is lack of precision and time delays in the identification of turning points in a series. Turning points occur when the direction of underlying level of the series changes, for example when a consistently decreasing series begins to rise steadily. If we compare year apart data in the original series, we may miss turning points occurring during

the year. For example, if March 2001 has a higher original estimate than March 2000, by comparing these year apart values, we might conclude that the level of activity has increased during the year. However, the series might have increased up to September 2000 and then started to decrease steadily.

WHICH INDICATOR SHOULD BE USED TO COMPARE MONTH-TO-MONTH OR QUARTER-TO QUARTER PERCENTAGE CHANGES?

Original estimates- *Do not use*

Usually dominated by seasonal effects; also residual noise and irregular influences

Seasonally adjusted estimates- *Use with caution*

Provides useful information on the effects of short term, major events. Dominated by irregular and noise, except for series with very little volatility

Trend estimates- *Preferred option*

The best indicator of underlying behavior for month-to-month or quarter-to-quarter changes. Recent estimates, usually the last 3 or 4, may be revised.

WHEN IS SEASONAL ADJUSTMENT INAPPROPRIATE?

When a time series is dominated by the trend or irregular components, it is nearly impossible to identify and remove what little seasonality is present. Hence seasonally adjusting a non-seasonal series is impractical and will often introduce an artificial seasonal element.

WHAT IS SEASONALITY?

The seasonal component consists of effects that are reasonably stable with respect to timing, direction and magnitude. It arises from systematic, calendar related influences such as:

- **Natural Conditions**
Weather fluctuations that are representative of the season (uncharacteristic weather patterns such as snow in summer would be considered irregular influences).
- **Business and Administrative procedures**
Start and end of the school term.
- **Social and Cultural behavior**
Christmas.

It also includes calendar related systematic effects that are not stable in their annual timing or are caused by variations in the calendar from year to year, such as:

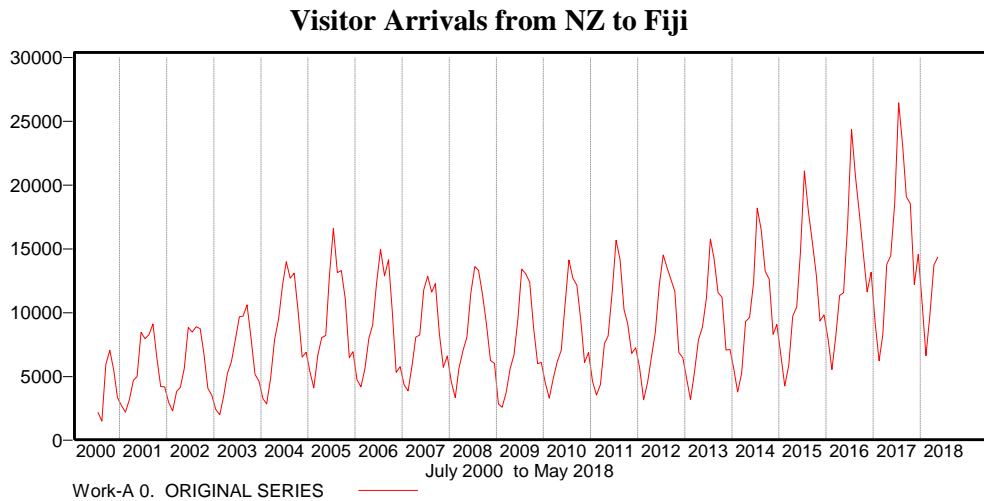
- **Trading Day Effects**
The number of occurrences of each of the day of the week in a given month will differ from year to year
- There were 4 weekends in March in 2000, but 5 weekends in March of 2002

- **Moving Holiday Effects**

Holidays which occur each year, but whose exact timing shifts
 - Easter, Chinese New Year

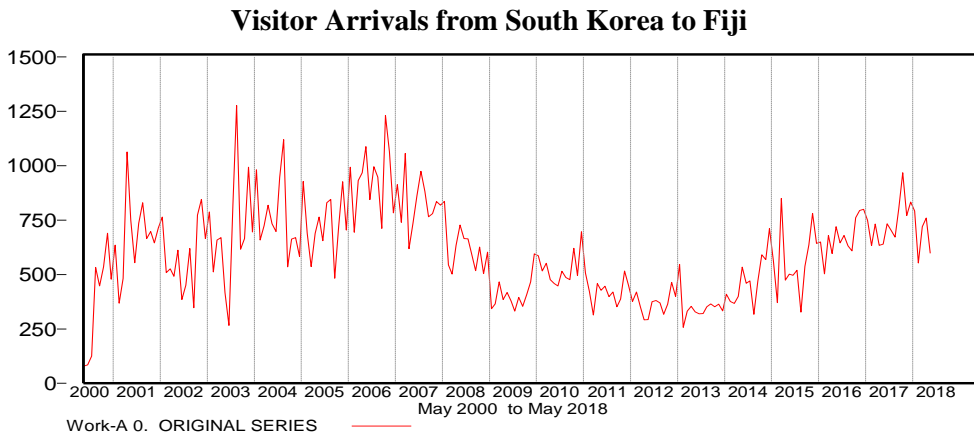
HOW DO WE IDENTIFY SEASONALITY?

Seasonality in a time series can be identified by regularly spaced peaks and troughs which have a consistent direction and approximately the same magnitude every year, relative to the trend. The following diagram depicts a strongly seasonal series. There is an obvious large seasonal increase in December tourist arrival to Fiji from Australia in December due to holiday season in Australia and a decline in January as tourists return. In this example, the magnitude of the seasonal component increases over time, as does the trend.



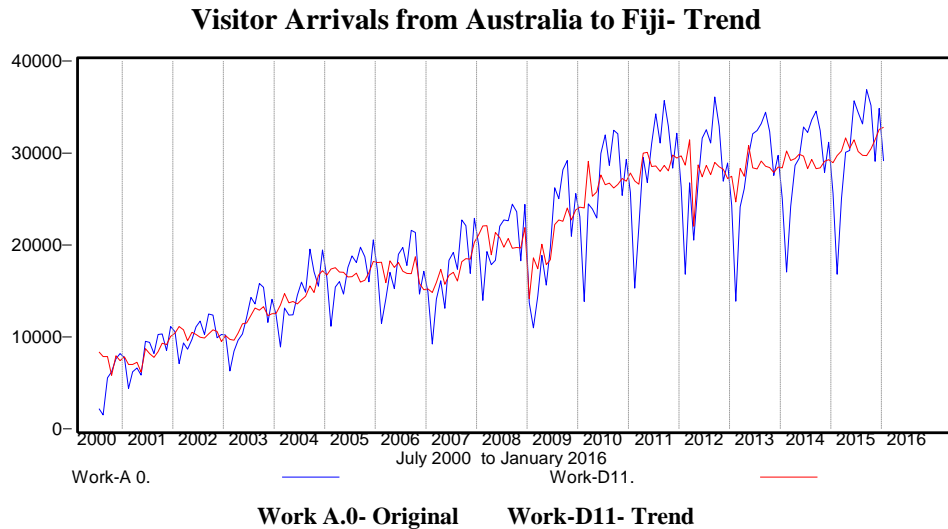
WHAT IS AN IRREGULAR?

The irregular component (sometimes also known as the residual) is what remains after the seasonal and trend components of a time series have been estimated and removed. It results from short term fluctuations in the series which are neither systematic nor predictable. In a highly irregular series, these fluctuations can dominate movements, which will mask the trend and seasonality. The following graph is an example of a highly irregular time series.



WHAT IS THE TREND?

The trend is defined as the 'long term' movement in a time series without calendar related and irregular effects, and is a reflection of the underlying level. It is the result of influences such as population growth, price inflation and general economic changes. The following graph depicts a series in which there is an obvious upward trend over time:



HOW IS SEASONAL ADJUSTMENT CONDUCTED?

A filter based method of seasonal adjustment based on the X11 algorithm) is applied to FBoS series. The procedure consists of the following steps:

- 1) Estimate the trend by a moving average
- 2) Remove the trend leaving the seasonal and irregular components
- 3) Estimate the seasonal component using moving averages to smooth out the irregulars.

Seasonality generally cannot be identified until the trend is known, however a good estimate of the trend cannot be made until the series has been seasonally adjusted. Therefore X11 uses an iterative approach to estimate the components of a time series.

HANDLING UNUSUAL BEHAVIOURS IN A TIME SERIES

Often series display behaviour that is not consistent with the expected seasonal pattern or trend. When series are not well behaved they need to be corrected or adjusted to avoid obtaining an inferior seasonal adjustment. Since seasonal adjustment often involves filters, any strange values will have a large impact on the final result average is influenced by a real large or low value. The original series are not always well behaved. In reality, there are activities that are systematic and predictable, but doesn't affect the same calendar period the same way every year, for example, moving holidays, trading day, etc. There are cases of unusually high or low values, sudden and sustained level shifts, and sudden and sustained changes in the seasonal patten pattern.

Before estimating the components of the time series, we need to correct for these so that we have a series that is better but may not be perfect because we are still dealing with estimates. Prior corrected series is used for calculating higher quality estimates of the Seasonal factors and the Trend. It enables more adequate

models to be found both in terms of the decomposition model and ARIMA model. It also ensures that the results of the seasonal adjustment process are not distorted by known events.

EXTREME VALUES

Extremes or outliers are values in a time series that are unusually large or small relative to the other data. They can distort the appearance of the underlying movement of the time series by altering the trend. For this reason, and to improve estimation of the three series components (trend, seasonal and irregular), it is necessary to detect and correct outliers.

For example, a real world event one off event (like a tropical cyclone) could lead to a sudden and drastic decline or increase in the number of Tourist Arrivals. In this case, an extreme value correction is applied prior to seasonal adjustment to ensure an optimal result. The value is then returned to the seasonally adjusted series to show the extent of the effect of the real world event.

TREND BREAKS

An abrupt but sustained change in the level of a time series is known as a trend break. This is reflected in at least 6 months or 3 quarters of raised or lowered levels. If the span of increased or decreased values is shorter than this, they are classified as extreme values.

For example, real world events could lead to a sudden and sustained change in the level of the series. In this case, trend break corrections are applied and the factor is returned to the trend and seasonally adjusted series.

(Source: Australian Bureau of Statistics)