Domestic and international visitor expenditure and growth in the Christchurch economy

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Abstract

The city of Christchurch is the main gateway to New Zealand's South Island and attracts a significant number of tourists every year. In 2010 and 2011, significant damage to the city's building stock and infrastructure occurred as a result of two successive earthquakes. Consequently, Christchurch's tourist arrivals and associated tourist spending declined significantly. However, the rebuilding efforts since 2011 and the re-opening of tourist facilities and infrastructure have led to a steady increase in visitor arrivals and expenditure. This paper investigates whether tourism expenditure as well as the prevailing exchange rate influence local gross domestic product for the city of Christchurch. We separate domestic and international expenditure analysis into two different vector auto-regression models followed by causality analysis to determine the direction of relationships between these three variables. Our results show that increased domestic and international visitor spending is followed by a measurable and significant increase of local GDP. Exchange rates have a small but non-significant impact on international tourist spending. We conclude that stimulating tourism is an essential element to achieve substantial economic growth in Christchurch.

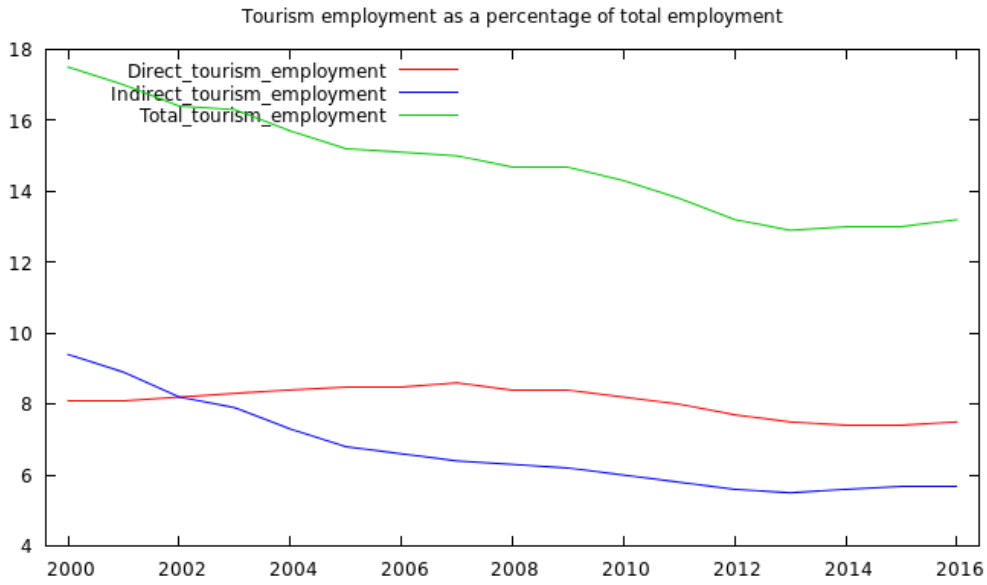
Introduction

Exports play an important role in facilitating the economic growth of a country. This is also true for foreign receipts related to tourism (Alodadi and Benhin, 2015; Shan and Wilson, 2001; Tang and Tan, 2015). These and other authors have suggested a tourism-led growth hypothesis that postulates a relationship between international tourism and economic growth, even where tourism is a minor part of an economy. Arguments cited to support this hypothesis include the significant foreign exchange earning ability of tourism, tourism's role in stimulating investment in facilities, infrastructure and other related industries, the creation of direct and indirect employment, and tourism's role as an important diffusion factor of technical knowledge, stimulation of research and the development of human capital (Brida and Risso, 2009).

In New Zealand, tourism is an important service industry (Jaforullah, 2015). Its contribution to national gross domestic product (GDP) currently amounts to $10.6 billion per annum or 4.9 % of GDP. Additionally, industries supporting the tourism sector added another $7.8 billion or 3.6 % to GDP so that tourism's overall contribution to the national economy totals to $18.4 billion or 8.5 % of GDP (Tourism New Zealand, 2015). Total tourism expenditure in the year to March 2015 amounted to $29.8 billion, amounting to 15.3% of New Zealand export earnings and placing the industry just second behind the dairy sector (NZN, 2016).

The importance of tourism notwithstanding, tourism's share of the overall economy has been slightly declining in recent years. Over the period from 2007 to 2015, tourism's direct contribution to national GDP decreased from 5.7 to 4.9 percent (SNZ, 2016). Similarly, the percentage of employees in the tourism sector as a percentage of all employees in New Zealand has been declining from around 16.5% at the turn of the century to about 12.1 % in 2015 (Figure 1). The decline in overall tourism employment as a share of total employment has mostly been driven by decreasing indirect tourism employment[1].

Figure 1: Tourism employment as a percentage of total employment in NZ (source: Statistics NZ)

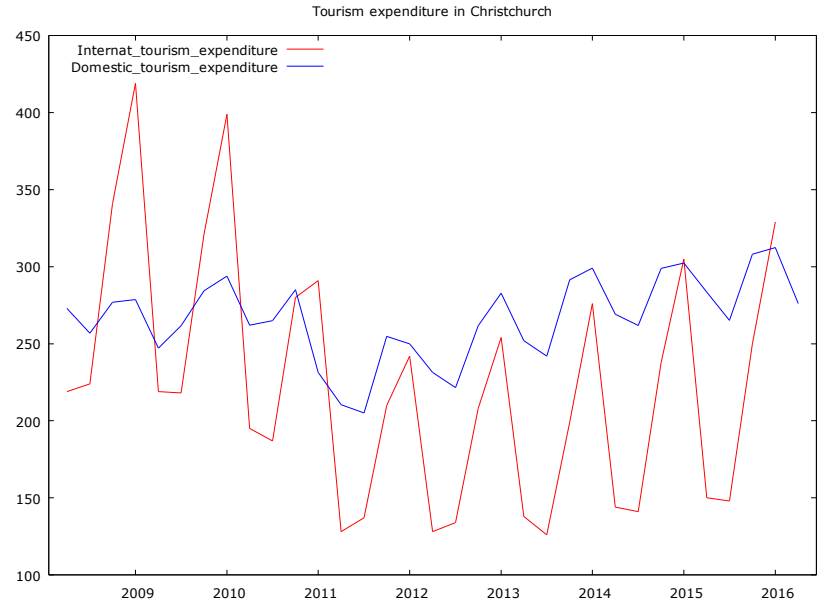


Christchurch's tourism-related sector has been impacted by several significant economic and natural events in recent years. The impact of the Global Financial Crisis (GFC) and the two Christchurch earthquakes of 2010 and 2011 can be clearly seen in Figure 2 and is demonstrated by declining domestic and international visitor spending figures until 2012 and a steady rise of both time series since then. Overall, domestic tourism expenditure appears to have been less affected by these events than international tourism expenditure. It is also notable that while domestic visitor expenditure had by 2015 already recovered to above pre-earthquake levels, international expenditure is at the time of writing still lagging behind domestic spending levels and is far from reaching pre-earthquake value.

This may be attributed mostly to a slower pace in the rebuild of facilities that specifically cater more to international visitors, such as international hotels. It is also likely that the image of an earthquake-damaged city is more persistent on the minds of international travellers, leading to a slower recovery to pre-earthquake international tourist arrivals. An additional observation from Figure 2 is that the seasonal nature of domestic and international visitor spending can be clearly detected, along with the more pronounced magnitude of seasonality in international visitor spending.

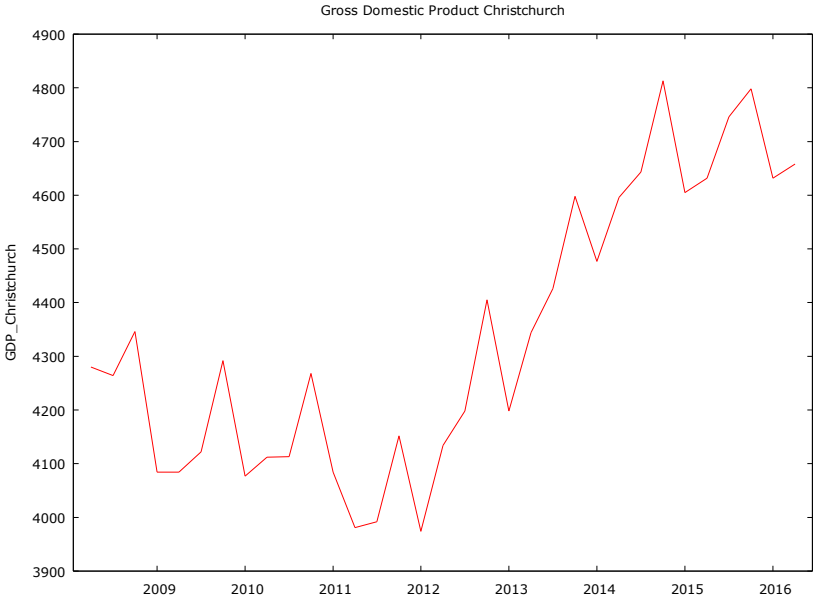
1 Indirect employment refers to activities like restaurant suppliers, construction companies that build and maintain tourist facilities, as well as necessary infrastructure, aircraft manufacturers, various handicrafts producers, marketing agencies, accounting services, which are more or less dependent on the companies providing direct employment for their revenues.

Figure 2: International and domestic tourism expenditure in NZ (source: MBIE)



Christchurch GDP contracted as a result of GFC and the two earthquakes. The decline was substantially arrested as significant rebuilding activity (Figure 3), funded by government, insurers, the private sector and households, accelerated. Since late 2014, Christchurch GDP has been plateauing as the rebuild activity has reached its peak.

Figure 3 Christchurch Gross Domestic Product



In this paper we aim to analyse the impact of domestic and international visitor spending on the Christchurch economy. Similar analyses have been performed in other contexts. For example, Balaguer and Cantavella-Jorda (2002) used Spanish tourism data to assess the impact of international visitor spending on the Spanish economy. Their analysis showed positive effects of tourism on economic indicators and concluded that the magnitude of this effect justified the Spanish government's promotion of tourist activity. Oh (2005) investigated the contribution of tourism development to economic growth in South Korea. While unable to confirm a long term relationship, he found a short period dependence between increased income from tourism and economic growth. In another example, using Tunisian data, Belloumi (2010) established long term dependence between tourism expenditure, currency exchange rates and gross domestic product and found unidirectional causality of tourism on Tunisian GDP growth. Brida and Risso (2009) and Jaforullah (2015) also found evidence for long and short term dependence between tourist expenditure, exchange rates and economic growth.

In this present study we build on these empirical studies, extending and varying the approach taken in these previous research efforts.

First, our unit of analysis is at the sub-national level, more specifically the economic region of the city of Christchurch. The city's infrastructure was seriously damaged in 2010 and 2011 and the ongoing reconstruction efforts ensure that Christchurch's economic growth is distinct from the remainder of the country. As such, the unique issues associated with the economic activity after the two successive earthquakes provides an important contextual backdrop that may be of relevance to other regions recovering from natural or man-made disasters (Sohel Azad, Chheang and Ahsan, 2014). We join other recent studies that seek to better understand tourism demand and economic impact at the city or regional level (for example, Önder and Gunter, 2016; Wray and Croy, 2015).

Relatedly, in an empirical sense, this would also be the first time that this type of 'tourism-led growth hypothesis' empirical analysis is applied to a small economic area. Focusing on regions is important in the context of tourism as nations often have tourism-focused regional clusters and indeed national economies with uniformly distributed tourism sectors would be atypical (Hanrahan and McLoughlin, 2015). Investigating tourism's impact at the national level might then lead to spurious findings as to its relative regional and national importance.

Finally, this study splits up the analysis into domestic and foreign visitor expenditure. As we have seen in the introductory paragraph, domestic and international visitor expenditure have followed quite a different trajectory in the post-earthquake environment, which would suggest the usefulness of this variable in any analysis. This approach also allows for the inclusion of the exchange rate into the international expenditure model. We limit the inclusion of exchange rates to the international element of our analysis as its inclusion in the aggregate model could expose the domestic data to exchange rate variance which could lead to spurious results.

Data and Methods

Data for this study were obtained from two sources. Quarterly Christchurch GDP figures are based on data obtained from Infometrics. These GDP figures are derived employing a top down approach that breaks national industrial production (sourced from production based GDP measures published by Statistics New Zealand) into the Christchurch level by applying Christchurch's share of the national total of fundamental economic activity. Christchurch's industry output is based on earnings data from linked employer-employee data (Infometrics, 2016).

The time series on domestic and international tourism expenditure were sourced from the regional tourism indicator (RTI) database of New Zealand's Ministry of Business, Innovation and Employment (MBIE, 2016). The RTIs are designed to provide timely data on tourism spending in the various regions of New Zealand and use electronic card transaction data as the source. Finally, the exchange rate was captured via the New Zealand trade weighted index (TWI). The TWI is a measure of the value of the New Zealand dollar relative to the currencies of New Zealand's major trading partners. The TWI is the New Zealand's Reserve Bank's preferred summary measure for capturing the medium-term effect of exchange rate changes on the New Zealand economy and inflation. TWI data was obtained from the Reserve Bank of New Zealand (RBNZ, 2016). We subsequently averaged the monthly exchange rate and aggregated the tourism expenditure estimates to quarterly data in order to align all data with the quarterly Christchurch GDP. As a final step in data preparation for analysis we transformed all time series to their natural logarithm in order to stabilise their variance.

As we were able to separate our spending data into domestic and international spending we further assumed that domestic tourism spending is largely unaffected by exchange rates and we thus decided to conduct our analysis using two separate models, one including the international tourism spending model (the 'international model') which included the exchange rate and GDP, and one domestic tourism expenditure model (the 'domestic model'), analysing the relationship between domestic spending and GDP.

Domestic expenditure model

A major finding of prior research regarding the impact of tourism spending and exchange rates on GDP was that there appeared to be cointegration between these three time series, indicating that there is a long term dependency between them (see, for instance, Belloumi, 2010). We thus followed the same hypothesis and applied Engle-Granger's tests for cointegration on our domestic model. This test determines whether individual variables display the property of having a unit root (e.g. can be considered random walks), and if so, whether the residuals of the subsequent cointegrating regression are stationary. We applied Dickey-Fuller's augmented test which revealed that the domestic expenditure and Christchurch GDP time series both exhibited a unit root, and could thus not be considered as stationary ($p=0.687$ and $p=0.988$ respectively). However, residuals from the regression of GDP on domestic spending also displayed the pattern of non-stationarity ($p=0.731$), thus prompting us to reject the hypothesis of cointegration (e.g. long term dependency) between these time series. While most similar studies have established the existence of cointegration

between the variables hypothesised to influence the impact of tourism on the economy (e.g. GDP, exchange rates, and visitor spending), our result of no cointegration is not entirely unique. This was also observed by Oh when analysing the impact of these variables on the Korean economy (Oh, 2005).

Following on from the rejection of the cointegration hypothesis, we differenced the two logged time series to achieve stationarity and proceeded with the calibration of a vector autoregressive model. A vector autoregression (VAR) model is less restrictive in respect to the existence of cointegration and can be seen as a seemingly unrelated regression model with the same variables in each constituent equation. The generalised structure of a VAR model can be formalised in matrix form like this:

$$\begin{bmatrix} Y_{1,t} \\ Y_{2,t} \end{bmatrix} = \begin{bmatrix} A_{1,1} & A_{1,2} \\ A_{2,1} & A_{2,2} \end{bmatrix} \begin{bmatrix} Y_{1,t-1} \\ Y_{2,t-1} \end{bmatrix} + \begin{bmatrix} e_{1,t} \\ e_{2,t} \end{bmatrix}$$

The calibration of a VAR is more demanding than that of a simple regression and a number of additional pre- and post-modelling tests are necessary to satisfy certain assumptions that need to be met in order to build a valid and stable VAR model.

As part of the preparation for a well fitted VAR model it is necessary to determine the number of lags of the endogenous variables that need to be included in the model. The lag selection involves the estimation of several information criteria which determine the discrepancy between the given model and the true model. Once this is established then the lag structure yielding the lowest value is suggested as the optimal lag order. While in some instances the different information criteria produce different suggestions, in our domestic model all three information criteria agreed on an optimal lag structure value of 3 (Table 1)

Table 1 Lag order tests; domestic expenditure model

Lags	LL	p(LR)	AIC	BIC	HQC
1	-269.550		19.417	19.983	19.594
2	-261.007	0.002	19.104	19.858	19.340
3	-244.817	0.000	18.263*	19.206*	18.558*
4	-242.856	0.417	18.404	19.535	18.758

Given this proposed lag structure of three, the domestic VAR model can then be stated as:

$$GDP_t = c_1 + a_{11} DE_{t-1} + a_{21} DE_{t-2} + a_{31} DE_{t-3} + b_{11} GDP_{t-1} + b_{21} GDP_{t-2} + b_{31} GDP_{t-3} + d_1 S_1 + d_2 S_2 + d_3 S_3 + e_1$$

$$DE_t = c_2 + a_{12} DE_{t-1} + a_{22} DE_{t-2} + a_{32} DE_{t-3} + b_{12} GDP_{t-1} + b_{22} GDP_{t-2} + b_{32} GDP_{t-3} + d_2 S_1 + d_2 S_2 + d_3 S_3 + e_2$$

where DE and GDP refer to the logged and differenced domestic expenditure and gross domestic product, c to a vector of constants and e to a vector of error terms. The main results of the domestic VAR model can be seen in table 2.

Table 2 Domestic expenditure vector auto-reression model

	Domestic expenditure	GDP
Constant	0.087	0.047***
	(0.085)	(0.012)
(D, L) Dom expenditure (-1)	−0.018	0.149***
	(0.209)	(0.031)
(D, L) Dom expenditure (-2)	−0.170	0.115**
	(0.298)	(0.045)
(D, L) Dom expenditure (-3)	−0.597*	−0.065
	(0.331)	(0.050)
(D, L) GDP (-1)	1.052	−0.178
	(1.427)	(0.215)
(D, L) GDP (-2)	1.748	0.465**
	(1.198)	(0.181)
(D, L) GDP (-3)	0.025	0.045
	(1.004)	(0.151)
Seasonal Dummy 1	−0.214***	−0.114***
	(0.071)	(0.010)
Seasonal Dummy 2	−0.193	−0.075***
	(0.162)	(0.024)
Seasonal Dummy 3	0.035	0.011
	(0.177)	(0.026)
Adjusted R squared	0.685	0.918
Durbin-Watson	2.193	1.923
Figures in parenthesis indicate standard errors		

The Ljung-Box test yielded a value of 20.2 (P=0.211), indicating that the null hypothesis of overall randomness of autocorrelations could not be rejected and that the model thus satisfactorily does not exhibit serial correlation. The covariance stationarity of the model was checked and non-stability condition of the domestic model was checked. None of the moduli of the eigenvalues was close to one, indicating the stability of the model. The explained variance by the lagged variables and the seasonal indicators were reasonably high (68% and 92% for the expenditure and GDP equation respectively), and the closeness to 2 of the Durbin-Watson tests confirmed the satisfactory absence of significant autocorrelation in both equations of the domestic model.

In respect to the two equations, it is notable that the first 2 lags of domestic expenditure change are strongly positively related to a change in GDP. Seasonal dummies were strongly related to GDP and to domestic expenditure, a finding that corresponds to the patterns apparent in Figures 2 and 3.

Regression analysis by itself does not give us information about the directionality of a relationship. To determine whether one time series follows another Granger developed a causality test (Granger, 1969). This test evaluates whether one time series is useful in predicting another. If this is the case, then one variable is said to ‘Granger cause’ another. The results of the test using the variables from the domestic model can be seen in Table 2.

Table 3 Granger causality test, domestic expenditure model

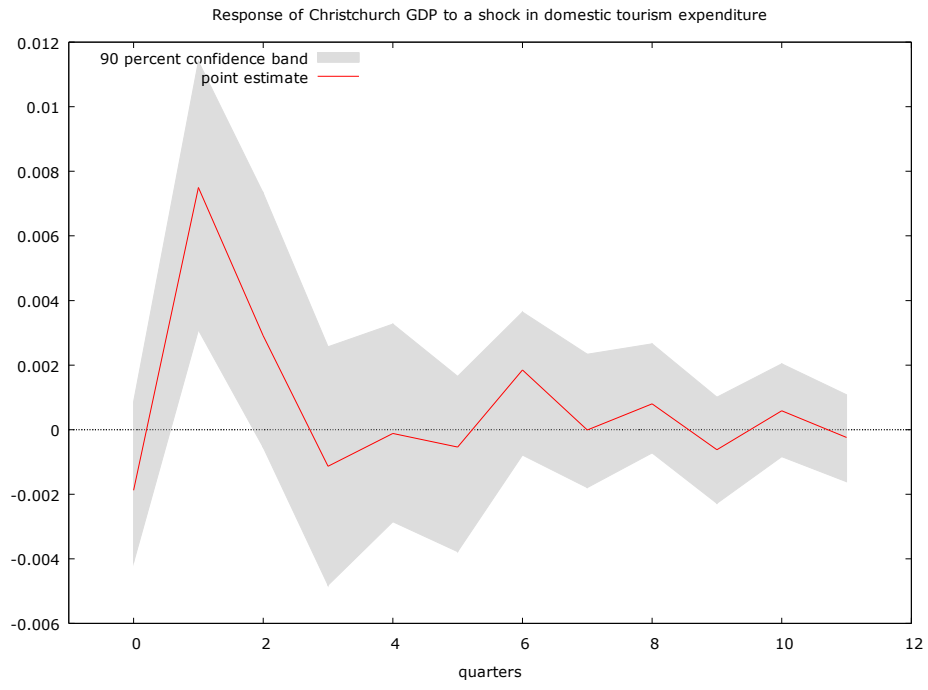
Granger causality test	Dom expenditure	GDP
Dom exp Granger causes	1.105	11.771***
	(0.371)	(<0.001)
GDP Granger causes	0.954	3.468**
	(0.434)	(0.036)

Figures in parenthesis indicate p-values

From the tests in Table 3 it becomes clear that changes in domestic tourism expenditure do indeed cause changes in regional GDP, but not the other way around. There is thus very strong reason to conclude that domestic tourism represents a significant driving force in Christchurch's recent GDP growth.

The coefficients estimated in the domestic VAR model can then be used to calculate the values for impulse response functions (IRF). Impulse response functions identify the responses of the dependent variables when a shock (a sudden change of one standard deviation) is applied to the error term in the equations of our VAR model. Essentially, impulse response functions provide an insight into how the endogenous variables of a system react to one another within a pre-defined time frame. The impulse response indicates the magnitude of the response and also its duration. In this specific VAR model, we are interested in the impact of a sudden increase in domestic tourist spending. The resulting IRF can be seen in Figure 4. In the graph we can see that increased domestic visitor spending leads to significant increases in GDP, and that this effect lasts for about two successive quarters before receding. This provides further support to the finding that domestic tourist spending does significantly impact on GDP in Christchurch.

Figure 4 Impulse response of Christchurch GDP to a shock in domestic visitor expenditure



International expenditure model

We developed a separate VAR model for the international tourist expenditure model, following our assumption that this type of spending may be influenced by the prevailing exchange rate of the NZ dollar. As a contested market for international tourists it would be reasonable to expect that a higher NZ dollar reduces spending by foreign tourists.

To ascertain whether a restricted or unrestricted VAR model can be applied the starting point was again the Engle-Granger cointegration test. Initial augmented Dickey-Fuller tests revealed that all three time series (international expenditure, exchange rate and GDP) exhibited a unit root, i.e. were not stationary (p=0.197, 0.990 and p=0.503 respectively). The residuals from the cointegrating regression also displayed the pattern of non-stationarity (p=0.916) thus precluding us from the cointegration hypothesis between these three time series. Subsequently, we differenced the three logged time series to achieve stationarity and proceeded with the calibration of the second vector auto-regressive model.

Lag selection analysis for the international VAR model did not yield a unanimous recommendation as in the domestic model, as the Akaike information criterion called for a 5 lag VAR, while the Hannan-Quinn information criterion and the Baysian information criterion suggested a one lag VAR (Table 4). Test running the international model with 5 lags resulted in an unstable VAR (an eigenvalue with a modulus of one), it was therefore decided to proceed with a one lag VAR model.

Table 4 Lag order tests; international expenditure model

Lags	LL	p(LR)	AIC	BIC	HQC
1	184.544		-11.892	-10.743*	-11.549*
2	191.230	0.146	-11.721	-10.137	-11.250
3	202.799	0.006	-11.911	-9.895	-11.312
4	212.594	0.021	-11.969*	-9.522	-11.242

The constituent equations of the VAR system could just be stated as:

$$GDP_t = c_1 + a_{11} IE_{t-1} + a_{21} GDP_{t-1} + a_{31} ER_{t-1} + d_{11} S_{t1} + d_{21} S_{t2} + d_{31} S_{t3} + f_1 k_1 + e_1$$

$$IE_t = c_2 + a_{12} IE_{t-1} + a_{22} GDP_{t-1} + a_{32} ER_{t-1} + d_{12} S_{t1} + d_{22} S_{t2} + d_{32} S_{t3} + f_2 k_2 + e_2$$

$$ER_t = c_3 + a_{13} IE_{t-1} + a_{23} GDP_{t-1} + a_{33} ER_{t-1} + d_{13} S_{t1} + d_{23} S_{t2} + d_{33} S_{t3} + f_3 k_3 + e_3$$

where IE, GDP and ER refer to the logged and differenced international expenditure, gross domestic product, and exchange rate respectively, c to a vector of constants, k to a time trend, and e to a vector of error terms. The main results of the international VAR model can be seen in Table 5.

Table 5 International expenditure model

	Int Exp	GDP	Exchange rate
Constant	0.405***	0.027***	−0.003
	(0.033)	-0.006	(0.022)
(D, L) Int exp (-1)	0.161	0.065*	−0.088
	(0.201)	(0.037)	(0.138)
(D, L) GDP (-1)	−1.559	−0.011	0.343
	(0.943)	(0.175)	(0.651)
(D, L) Exchange rate (-1)	−0.1451	0.151**	0.209
	(0.290)	(0.054)	(0.200)
Seasonal Dummy 1	−0.280***	−0.107***	0.038
	(0.094)	(0.0175)	(0.065)
Seasonal Dummy 2	−1.251***	−0.035**	0.055
	(0.079)	(0.014)	(0.054)
Seasonal Dummy 3	−0.342**	0.019	−0.056
	(0.141)	(0.026)	(0.098)
Trend	0.003**	0.001	−0.001
	(0.001)	(<0.001)	(0.001)
Adjusted R squared	0.978	0.873	-0.181
Durbin Watson	1.772	1.969	1.976

Figures in parenthesis indicate standard errors

Aside from the significance of the trend and seasonal dummies (reflecting the overall decline of international visitor spending as well as the seasonal aspect of spending and GDP in Christchurch), we observe that international visitor expenditure is significantly and positively related to Christchurch GDP. In addition, a rising exchange rate is related to an increasing GDP.

To further analyse causality and directionality between the variables in the international model we conducted the Granger causality test (Table 6). As expected, international tourist expenditure Granger causes measurable increases in GDP. Interestingly, the significance of this finding is not as strong as the respective finding for domestic visitor spending, adding to the initial observation that domestic visitor spending is more pronounced than international spending. The causality test also confirms the direction of the relationship between exchange rate and Christchurch GDP. An increasing NZ dollar is indeed beneficial to local GDP.

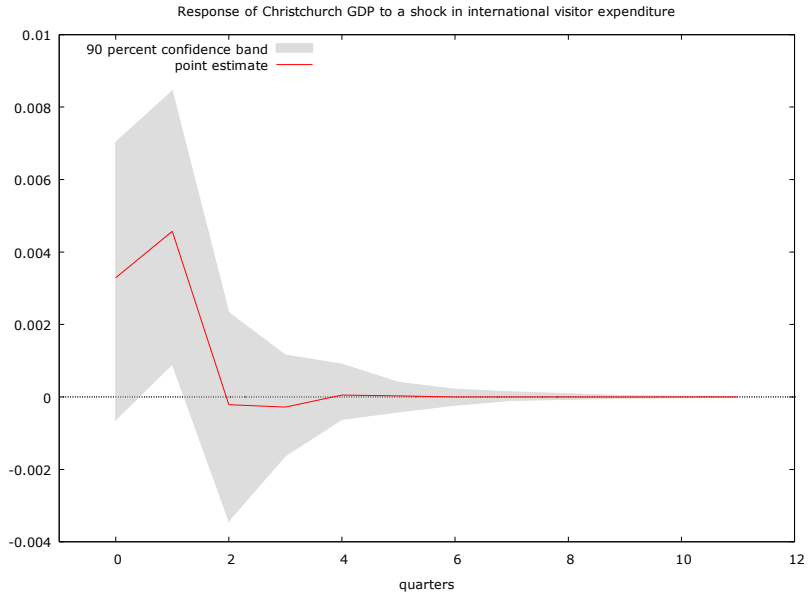
This represents a finding that would not be expected from a tourism perspective. We suggest that this result is due the benefit that Christchurch GDP receives from increasing export receipts from Christchurch exporters, as well as money that flows back into the city from commodity exports from the surrounding rural hinterland of Christchurch. It is highly likely that these sectors overshadow the hypothesised negative effects of an increasing NZ dollar on tourism expenditure. In the international expenditure equation of our international model we can actually see the negative impact of a rising NZ dollar (coefficient: -0.1451), however, this relationship is not statistically significant.

Table 6 Granger causality test – international expenditure model

Granger causality test	Int exp	GDP	Exchange rate
Int exp "Granger causes":	0.641	3.025*	0.403
	(0.431)	(0.095)	(0.532)
GDP "Granger causes":	2.731	0.004	0.276
	(0.112)	(0.949)	(0.604)
Exch rate "Granger causes":	0.249	7.853**	1.084
	(0.622)	(0.011)	(0.309)
Figures in parenthesis indicate p-values			

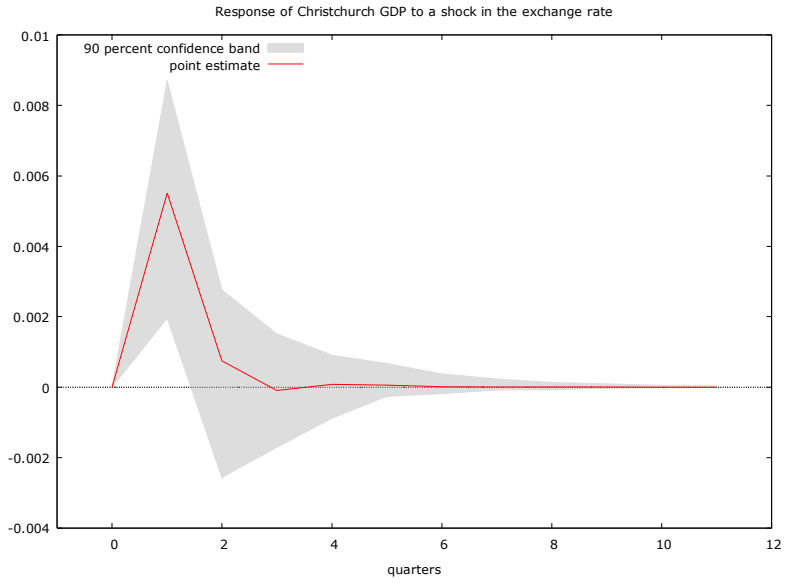
The impulse response function of the impact of a sudden increase in international visitor spending on Christchurch GDP confirm our earlier findings: While there is a measurable and positive impact, the impact is smaller and more short-lived than the impact of domestic visitor spending. The magnitude is only about half of the domestic magnitude, and the effect disappears after the first quarter following the increase.

Figure 5 Impulse response of Christchurch GDP to a shock in international visitor expenditure



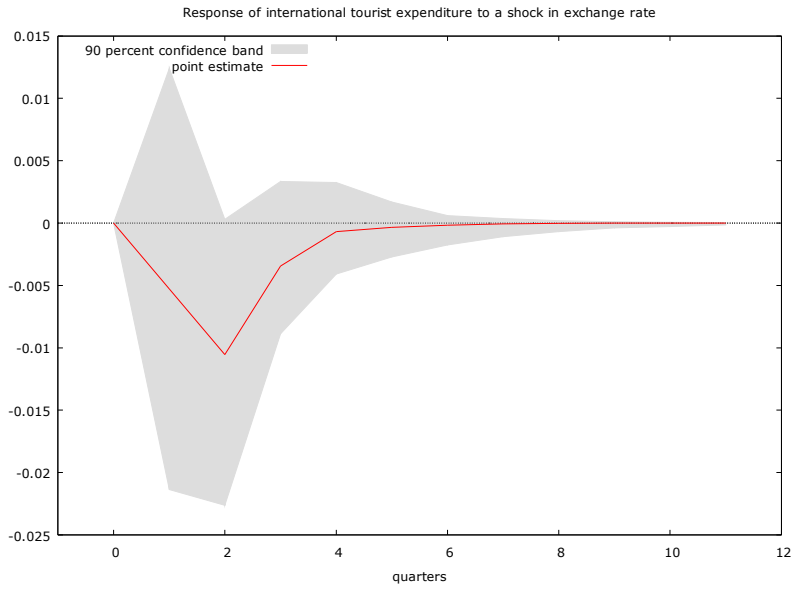
The response of a shock in the exchange rate in Christchurch GDP can be seen in Figure 6. As discussed earlier, the relationship is positive and short lived, with the impact of any shock disappearing after one quarter.

Figure 6 Impulse response of Christchurch GDP to a shock in the NZ$ exchange rate



A sudden increase in the relative value of the NZ dollar does have a negative impact on international tourism spending. This impact, however, fails to reach significance (Figure 7). If Figure 7 is viewed in conjunction with Figure 6 it becomes clear that a rising NZ dollar discourages foreign visitor spending in Christchurch. However, at the same time the positive impact of a rising NZ dollar on other parts of the Christchurch economy does largely offset any negative currency effects that arise from the negative impact of an increasing NZ dollar on the Christchurch tourism industry.

Figure 7 Impulse response of international tourism expenditure on a shock in the NZ$ exchange rate



Conclusion

In this analysis we have applied two separate models to determine the impact of tourism expenditure on Christchurch economic growth. Our findings differ from Balaguer and Cantavella-Jorda, (2002) Brida and Risso (2009), Belloumi (2010), and Jaforullah (2015) in that we could not demonstrate cointegration between GDP, visitor expenditure, and exchange rates. This prompted us to apply vector auto-regression analysis, rather than vector error correction analysis, a route of analysis that was also taken by Oh (2002).

Our analysis provides very strong evidence for a causal and uni-directional relationship between tourism spending and economic growth in Christchurch. This relationship holds for domestic as well as international tourism.

The findings above provide support for the tourism-led growth hypothesis in the Christchurch context. Our findings presented here further suggest that continued investments in tourism related infrastructure, facilities and marketing have the potential to facilitate and catalyse significant positive economic growth for Christchurch. It also suggests that, above and beyond national tourism promotion initiatives, regional and territorial councils may be well advised to consider these findings in their policy making initiatives.

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