Tourism and Economic Growth in Vanuatu: A Kaldor-Type Test of Sectoral Spillovers, 1998–2024

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Abstract

The paper examines whether tourism acts as an engine of growth for the rest of the Vanuatu economy. Using annual chain-linked real GDP by sector for 1998 to 2024, taken from the Department of Finance and Treasury chain-linked GDP model (MEC 2, 2026), the paper estimates a Kaldor-type spillover regression in which growth of non-tourism GDP is regressed on growth of accommodation and food services. Augmented Dickey-Fuller tests show that all growth series are stationary, and residual diagnostics show no serial correlation or heteroskedasticity, thus inference is based on OLS standard errors. Over 1999 to 2024, a 10 per cent rise in tourism output is associated with an increase of about 0.72 percentage points in non-tourism growth, significant at the 1 per cent level. However, the effect weakens to 0.57 percentage points and is significant only at the 10 per cent level once the Cyclone Pam and COVID-19 years are controlled for. Over 2006 to 2024 the point estimate falls to 0.30 percentage points and is not statistically significant. The paper concludes that tourism has a positive spillover effect on the wider economy, but that the size of the effect in normal years cannot yet be pinned down with the short annual series available.

Keywords: tourism-led growth, Kaldor's growth laws, sectoral spillovers, Newey-West, Vanuatu

1. Introduction

Tourism has become one of the main avenues through which small island economies tap into foreign demand. Globally, the tourism-led growth hypothesis has been tested in about 100 peer-reviewed studies, and with a few exceptions the evidence shows that international tourism drives economic growth (Brida, Cortes-Jimenez and Pulina, 2016). In the Pacific, Narayan, Narayan, Prasad and Prasad (2010) found that a 1 per cent rise in tourism exports raises real GDP by 0.72 per cent in the long run and by 0.24 per cent in the short run for Fiji, Tonga, Solomon Islands and Papua New Guinea. Moreover, visitor arrivals have been shown to predict exports, money supply and, to a lesser extent, GDP across six Pacific Island countries including Vanuatu (Narayan, Sharma and Bannigidadmath, 2013).

For Vanuatu, however, the evidence is less clear. Kumar, Naidu and Kumar (2011) found that trade openness and remittances had a positive and significant effect on long-run growth over 1983 to 2009, but tourism expansion was not statistically significant. This is a surprising result for an economy where tourism is widely regarded as a key source of foreign exchange and jobs, and it has not been revisited with the sectoral national accounts now available.

The question matters more today than ever. The closure of borders in 2020 and 2021 caused real output of accommodation and food services to fall by 56 per cent in 2020 and by a further 16 per cent in 2021, before it recovered by 92 per cent in 2022 (DoFT chain-linked GDP model, MEC 2 2026). On the downside, the liquidation of Air Vanuatu in 2024 coincided with a further fall of 5 per cent in the sector. Accordingly, policy makers need to know whether a shock to tourism stays within hotels and restaurants, or whether it filters through to the rest of the economy.

The paper answers this question by applying a Kaldor-type test to Vanuatu's sectoral real GDP for 1998 to 2024. In particular, it regresses growth of GDP excluding tourism on growth of the tourism sector, so that the result is not driven by the accounting identity that tourism is part of GDP. The rest of the paper is organized as follows. Section 2 reviews the literature, section 3 describes the data and methodology, section 4 presents the empirical results, section 5 discusses the policy implications and section 6 concludes.

2. Literature review

2.1 Kaldor's growth laws

Kaldor (1966) argued that some sectors act as an engine of growth for the whole economy, as their expansion creates demand, increasing returns and spillover effects for the other sectors. His first law states that GDP growth is closely linked to growth of manufacturing output. Thirlwall (1983) set out how the law should be tested and pointed to a problem; since manufacturing is itself part of GDP, a regression of GDP growth on manufacturing growth will show a positive link even when there is no spillover at all. Thus, the recommended test regresses growth of output outside the sector on growth of the sector. Wells and Thirlwall (2003) applied the laws across the countries of Africa and found that GDP growth is more closely tied to industrial and manufacturing growth than to agriculture or services.

2.2 The tourism-led growth hypothesis

The tourism-led growth hypothesis applies the same idea to tourism. Balaguer and Cantavella-Jordá (2002) found that Spanish economic growth over three decades responded to sustained expansion in international tourism, and that tourism had multiplier effects over time. Since then the literature has grown rapidly. Brida, Cortes-Jimenez and Pulina (2016) reviewed about 100 studies and found that, with a few exceptions, international tourism drives economic growth, although the methods used have become increasingly varied. Island economies have also received particular attention in this literature (Seetanah, 2011).

2.3 Evidence for the Pacific and Vanuatu

In the Pacific, the evidence is mostly positive. Narayan et al. (2010) found panel cointegration between real GDP and real tourism exports for four Pacific Island countries, with a long-run elasticity of 0.72. Narayan, Sharma and Bannigidadmath (2013) found that visitor arrivals predict exports and money supply in six Pacific Island countries, including Vanuatu, and predict GDP to a lesser extent. For the Cook Islands, Kumar, Kumar, Kumar and Stauvermann (2019) found that the effect is asymmetric; a 1 per cent rise in visitor arrivals per capita raises GDP per capita by 0.92 per cent, while a 1 per cent fall reduces it by 0.34 per cent.

The only Vanuatu-specific study found, Kumar, Naidu and Kumar (2011), used an augmented Solow model and the ARDL bounds test over 1983 to 2009 and found tourism to be insignificant. On the contrary, the paper takes a sectoral approach. Rather than relating total GDP to visitor arrivals, it asks whether growth in the tourism sector raises growth in the other sectors, following the Kaldorian test set out by Thirlwall (1983). To the author's knowledge, this is the first application of a Kaldor-type spillover test to tourism in Vanuatu.

3. Data and methodology

3.1 Data

The paper uses annual real GDP by sector for 1998 to 2024, taken from the constant price data of the Department of Finance and Treasury chain-linked GDP model. All values are in VT million at constant 2024 prices. The sample covers only the 27 years marked as actual in the model; the forecast years from 2025 onwards are excluded, as using the model's own projections would make the results circular. After taking growth rates, 26 annual observations remain, from 1999 to 2024.

Tourism is proxied by real output of accommodation and food services, which includes hotels, restaurants and nakamals. The sector made up 3.9 per cent of real GDP in 1998, fell to 1.4 per cent in 2021 when borders were closed, and recovered to 2.5 per cent in 2024. Non-tourism GDP is real GDP less accommodation and food services. Since chain-linked components are not additive, this subtraction is an approximation; however, with the sector at less than 5 per cent of GDP, the error is small. The variables are defined in table 1 below.

Variable	Definition	Unit
g_nontour	Growth of real GDP less accommodation and food services	log change × 100, per cent
g_tourism	Growth of real output of accommodation and food services	log change × 100, per cent
d_pam	Dummy for Cyclone Pam, equal to 1 in 2015	0 or 1
d_covid	Dummy for the COVID-19 border closure, equal to 1 in 2020 and 2021	0 or 1

Table 1. *Definition of variables*

Variable	Mean	Std. dev.	Minimum	Maximum
g_nontour	2.54	3.01	-4.91 (2002)	8.27 (2006)
g_tourism	0.85	22.73	-83.01 (2020)	65.23 (2022)

Table 2. *Descriptive statistics, 1999–2024 (26 observations). Source: Stata output, summarize g_nontour g_tourism.*

As shown in table 2 above, tourism growth is far more volatile than growth in the rest of the economy, with a standard deviation of 22.73 compared to 3.01 for non-tourism GDP. The relationship between the two is shown in figure 1 below.

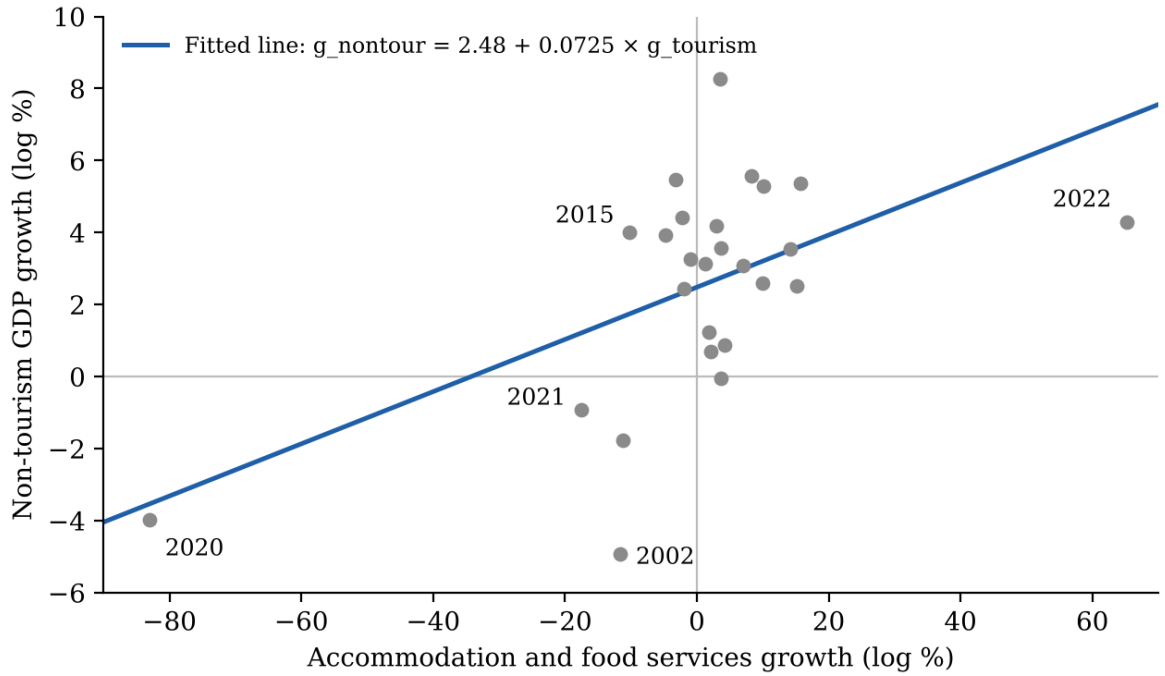


Figure 1. *Tourism growth and non-tourism GDP growth, 1999–2024. Each dot is one year; the line is the fitted regression from column (1) of table 4. Source: DoFT chain-linked GDP model (MEC 2, 2026), SUMMARY sheet; author's estimation in Stata.*

As shown in figure 1 above, years of strong tourism growth tend to be years of strong growth in the rest of the economy, and the simple correlation between the two series is 0.55. The 2020 and 2022 observations sit far from the other years, which reflects the border closure and

reopening. In contrast, 2015 lies above the fitted line, as reconstruction after Cyclone Pam lifted construction while tourism fell.

3.2 Methodology

Following Thirlwall (1983), the paper estimates a Kaldor-type spillover equation in which the dependent variable excludes the sector being tested:

$$g_t^{nontour} = \alpha + \beta g_t^{tourism} + \varepsilon_t \qquad (1)$$

A positive and significant β means that growth in tourism is associated with faster growth in the other sectors, which is the spillover effect. Since the sample includes two large shocks, equation (1) is then extended with the two event dummies:

$$g_t^{nontour} = \alpha + \beta g_t^{tourism} + \gamma_1 d_t^{pam} + \gamma_2 d_t^{covid} + \varepsilon_t \qquad (2)$$

Before estimation, each growth series is tested for a unit root with the augmented Dickey-Fuller test with one lag (Dickey and Fuller, 1979). The equations are estimated by OLS, and both the usual OLS standard errors and Newey-West standard errors with a maximum lag of 2 are reported (Newey and West, 1987). The residuals are then tested for serial correlation (Breusch-Godfrey), heteroskedasticity (Breusch-Pagan), functional form (Ramsey RESET) and normality (skewness-kurtosis and Shapiro-Wilk), and these tests decide which standard errors are used for inference.

The paper does not use cointegration or ARDL bounds testing. With only 26 growth observations, the sample is below the smallest sample size of 30 for which Narayan (2005) tabulates small-sample critical values for the bounds test. Thus, a regression in growth rates is the more reliable choice for this sample. Finally, equation (2) is re-estimated over 2006 to 2024 as a robustness check, which drops the earliest years where some sector series appear to have been back-cast; for example, real mining output is held constant from 1998 to 2007.

4. Empirical results

4.1 Unit root tests

Variable	ADF test statistic	MacKinnon p-value	Result
g_nontour	-3.417	0.0104	Stationary at 5 per cent
g_tourism	-5.289	0.0000	Stationary at 1 per cent
g_agri	-5.788	0.0000	Stationary at 1 per cent
g_constr	-3.668	0.0046	Stationary at 5 per cent
g_govt	-4.020	0.0013	Stationary at 1 per cent

Table 3. *Augmented Dickey-Fuller tests on growth rates, one lag, 24 observations. Critical values are -3.750 (1 per cent), -3.000 (5 per cent) and -2.630 (10 per cent). Source: Stata output, dfuller.*

As shown in table 3 above, the null hypothesis of a unit root is rejected for all the growth series. The test statistics for tourism, agriculture and government services are more negative than the 1 per cent critical value of -3.750, while those for non-tourism GDP and construction are more

negative than the 5 per cent critical value of -3.000. Thus, the growth series are stationary, and the regressions in growth rates will not suffer from the spurious regression problem.

4.2 Regression results

	(1) 1999–2024	(2) 1999–2024	(3) 2006–2024
g_tourism	0.0725	0.0571	0.0296
OLS std. err. (p-value)	0.0226 (0.004)	0.0310 (0.079)	0.0252 (0.258)
Newey-West std. err. (p-value)	0.0155 (0.000)	0.0327 (0.094)	0.0097 (0.008)
d_pam		1.9953	1.1768
OLS std. err. (p-value)		2.6957 (0.467)	2.0772 (0.579)
Newey-West std. err. (p-value)		0.9936 (0.057)	0.7195 (0.123)
d_covid		-2.1538	-4.0745
OLS std. err. (p-value)		2.5834 (0.413)	2.0891 (0.070)
Newey-West std. err. (p-value)		2.2601 (0.351)	1.0516 (0.001)
Constant	2.4819	2.5838	3.1218
OLS std. err. (p-value)	0.5036 (0.000)	0.5697 (0.000)	0.5357 (0.000)
Newey-West std. err. (p-value)	0.5292 (0.000)	0.7216 (0.002)	0.6360 (0.000)
Observations	26	26	19
R-squared	0.3004	0.3447	0.5371
Adjusted R-squared	0.2712	0.2553	0.4445
Root MSE	2.5663	2.5941	1.9624

Table 4. *Kaldor-type spillover regressions. Dependent variable: g_nontour. The coefficients are identical under OLS and Newey-West (maximum lag 2); only the standard errors differ. Source: Stata output, regress and newey.*

As shown in table 4 above, the tourism coefficient is positive in all three regressions. In column (1), the coefficient is 0.0725 and significant at the 1 per cent level ($p = 0.004$). This means that a 10 per cent rise in real output of accommodation and food services is associated with an increase of about 0.72 percentage points in the growth of the rest of the economy. The constant of 2.48 per cent is the growth of non-tourism GDP when tourism output does not change, and tourism growth alone explains 30 per cent of the variation in non-tourism growth.

However, once the two shock dummies are added in column (2), the coefficient falls to 0.0571 and is significant only at the 10 per cent level ($p = 0.079$). This shows that part of the link in column (1) comes from the COVID-19 years, when tourism and the rest of the economy collapsed together. Neither dummy is significant under OLS standard errors, as the fall in tourism output in 2020 and 2021 already captures most of the COVID-19 shock.

In column (3), which restricts the sample to 2006 to 2024, the coefficient falls further to 0.0296 and is not significant under OLS standard errors ($p = 0.258$). The model fits better, with an R-squared of 0.54 and a root MSE of 1.96 compared to 2.57 in column (1), but the 19 observations are too few to estimate the tourism effect precisely. The COVID-19 dummy is negative at -

4.07 and significant at the 10 per cent level (p = 0.070), which suggests the border closure reduced non-tourism growth over and above the effect that came through tourism output.

4.3 Diagnostic tests

Test	(1) 1999–2024	(2) 1999–2024	(3) 2006–2024
Breusch-Godfrey, 1 lag: chi2 (p-value)	0.363 (0.547)	0.198 (0.656)	0.007 (0.932)
Breusch-Godfrey, 2 lags: chi2 (p-value)	0.665 (0.717)	0.326 (0.850)	0.956 (0.620)
Breusch-Pagan: chi2(1) (p-value)	0.01 (0.936)	0.00 (0.965)	0.49 (0.485)
Ramsey RESET: F (p-value)	1.86 (0.167)	3.20 (0.047)	0.17 (0.917)
Skewness-kurtosis: adj. chi2(2) (p-value)	2.07 (0.355)	4.57 (0.102)	6.49 (0.039)
Shapiro-Wilk: W (p-value)	0.979 (0.843)	0.965 (0.502)	0.935 (0.211)
Dickey-Fuller on residuals: Z(t)	-4.353	-4.509	-5.364

Table 5. *Residual diagnostics, from OLS estimation of each model on its own sample. The 1 per cent critical value for the Dickey-Fuller test without constant is -2.660. Source: Stata output, estat bgodfrey, estat hettest, estat ovtest, sktest, swilk and dfuller.*

As shown in table 5 above, the Breusch-Godfrey tests do not reject the null of no serial correlation at one or two lags in any model, and the Breusch-Pagan tests do not reject constant variance. The residuals of all three models are stationary, with Dickey-Fuller statistics well beyond the 1 per cent critical value of -2.660. Nonetheless, two warnings arise. First, the Ramsey RESET test rejects correct functional form for column (2) at the 5 per cent level (p = 0.047). Second, the skewness-kurtosis test rejects normal residuals for column (3) at the 5 per cent level (p = 0.039), although the Shapiro-Wilk test does not (p = 0.211); this is mostly due to the large residual of about 5 in 2006, the first year of that sample. The residuals of the three models are shown in figure 2 below.

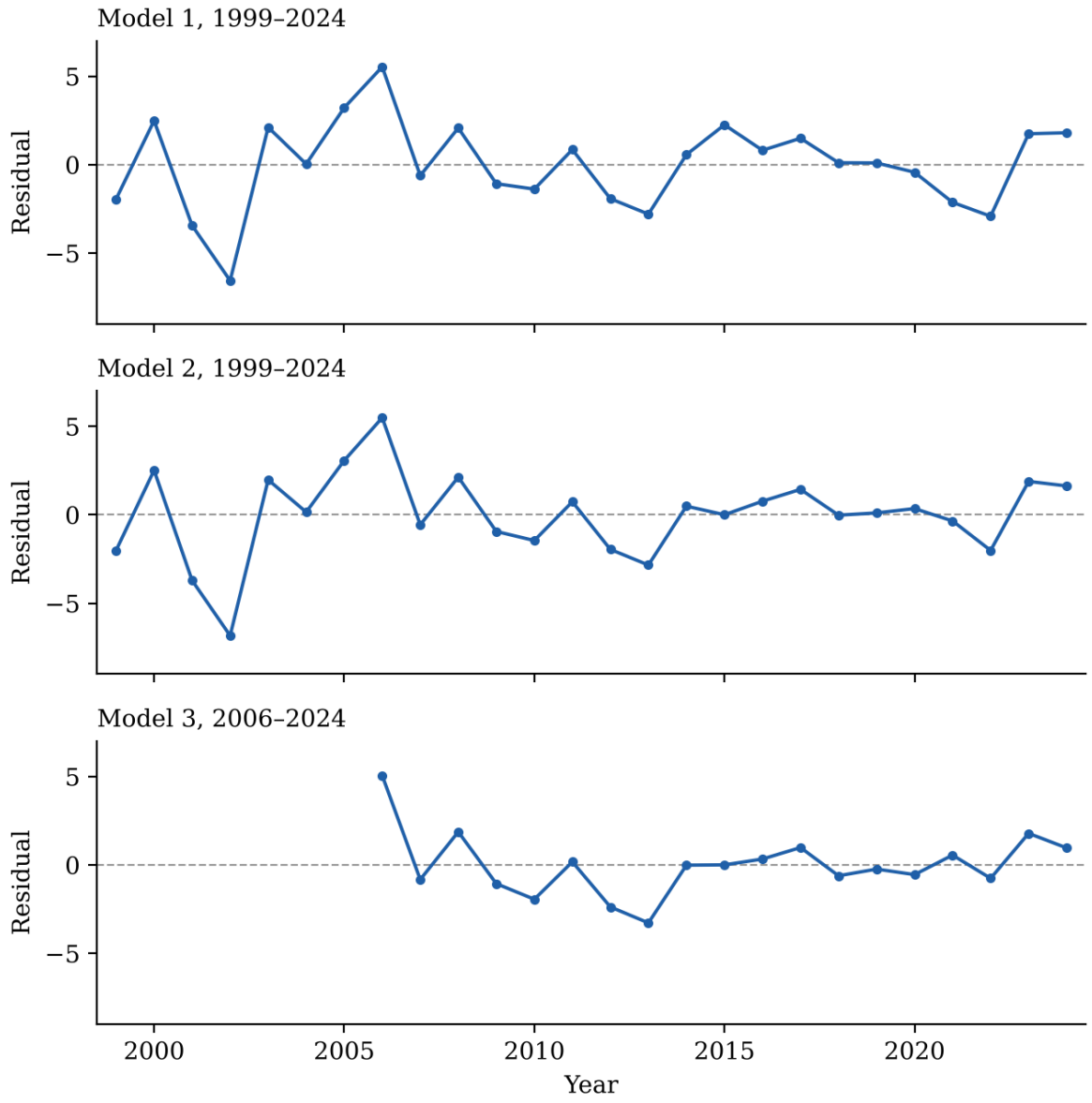


Figure 2. *Residuals of the three models, each on its own estimation sample. Source: author's estimation in Stata.*

As shown in figure 2 above, the residuals of models 1 and 2 are largest in the early 2000s, with the biggest misses in 2002 and 2006. In contrast, the residuals of model 3 stay between about -3.3 and 1.9 from 2007 to 2024, which reflects its better fit over the more recent period.

The diagnostics also decide which standard errors should be used. Newey-West standard errors are meant to correct for autocorrelation and heteroskedasticity, but table 5 shows that neither is present. Moreover, in small samples the Newey-West estimator can understate the true standard error, especially for dummy variables that cover only one or two years, since the residual for those years is close to zero and leaves little to measure the variance from. This helps to explain why the Newey-West standard error on d_pam is 0.99 while the OLS standard error is 2.70. Thus, the paper bases its inference on the OLS standard errors, and reports the Newey-West standard errors for comparison.

4.4 Out-of-sample check

Year	Actual g_nontour	Predicted by column (3)	Prediction error
1999	0.69	3.19	-2.50
2000	5.58	3.37	2.21
2001	-1.77	2.79	-4.56
2002	-4.91	2.78	-7.69
2003	4.43	3.05	1.38
2004	3.54	3.54	0.00
2005	5.47	3.03	2.44

Table 6. *Out-of-sample prediction of non-tourism growth for 1999 to 2005, using the column (3) model estimated on 2006 to 2024 (per cent). Source: Stata output, predict.*

As a further check, the column (3) model was used to predict non-tourism growth for the seven years before its sample. As shown in table 6 above, the out-of-sample root mean squared error is 3.76, nearly double the in-sample root MSE of 1.96. The largest miss is 2002, when the model predicted growth of 2.78 per cent but the economy contracted by 4.91 per cent. Thus, the relationship estimated on recent years does not carry back well to the early 2000s, which is consistent with the concern raised in section 3 about the quality of the earlier data.

5. Discussion and policy implications

The results give qualified support to the tourism-led growth hypothesis for Vanuatu, in the Kaldorian sense that growth in tourism spills over into the other sectors. This differs from Kumar, Naidu and Kumar (2011), who found tourism to be insignificant over 1983 to 2009. The difference is most likely due to method; the sectoral approach measures the link between tourism and the rest of the economy directly, rather than through total GDP and visitor arrivals. Nonetheless, the spillover is modest and not precisely measured. The estimates range from 0.0296 to 0.0725, all well below the long-run elasticity of 0.72 found by Narayan et al. (2010) for four Pacific Island countries, although the two are not directly comparable, as one measures a spillover to other sectors while the other measures the total effect on GDP.

The spillover is likely to work through the demand that hotels, restaurants and visitors create for other sectors, such as fresh produce from farmers, transport, retail trade, handicrafts and construction. However, accommodation and food services is only part of the tourism economy, and visitor spending on transport, tours and shopping is recorded in other sectors. Thus, the coefficient should be read as the spillover from the core tourism sector rather than from tourism as a whole.

The findings have three implications for policy.

1. Shocks to tourism do not stay within tourism. Using the range of estimates in table 4, a 20 per cent fall in accommodation and food services output would reduce growth in the rest of the economy by between about 0.6 and 1.5 percentage points, with a central estimate of about 1.1 percentage points from column (2). This should be built into the

shock scenarios of the Department's GDP model whenever a cyclone, an airline disruption or a border closure hits the sector.

2. Keeping the sector afloat after a shock supports the whole economy. The COVID-19 years show that when tourism halted, growth in the other sectors plunged as well. Support that helps hotels and tour operators to recuperate quickly, together with reliable international and domestic air connectivity, will therefore have benefits well beyond the sector itself.
3. The spillover can be made larger. Policies that strengthen the links between tourism and local suppliers, especially agriculture and fisheries, will allow more of each Vatu spent by visitors to filter through to rural households instead of leaking out through imports.

6. Conclusion and limitations

The paper tested whether tourism acts as an engine of growth for the rest of the Vanuatu economy, using a Kaldor-type spillover regression on chain-linked real GDP by sector for 1998 to 2024. All growth series were found to be stationary, and the residual diagnostics showed no serial correlation or heteroskedasticity, so inference was based on OLS standard errors. Over the full sample, a 10 per cent rise in tourism output is associated with about 0.72 percentage points of additional non-tourism growth, significant at the 1 per cent level. Once the Cyclone Pam and COVID-19 years are controlled for, the effect falls to 0.57 percentage points and is significant at the 10 per cent level. Over 2006 to 2024, the point estimate of 0.30 percentage points remains positive but is not statistically significant. Thus, the evidence points to a positive spillover from tourism to the rest of the economy, but its size in normal years is still uncertain, and much of the measured link comes from the large shocks of 2020 to 2022.

The paper has some limitations which should be kept in mind.

1. The sample is short, with 26 observations for the full sample and 19 for the robustness check, which limits the precision of the estimates and rules out cointegration analysis.
2. Non-tourism GDP is obtained by subtracting a chain-linked component from chain-linked GDP, which is only an approximation.
3. Accommodation and food services captures only the core of the tourism economy.
4. The regressions show association rather than causality; a common shock, such as a cyclone, can move tourism and the other sectors at the same time.
5. The Ramsey RESET test rejects correct functional form for column (2) at the 5 per cent level, and the skewness-kurtosis test rejects normal residuals for column (3) at the 5 per cent level, so these two results should be read with care.

Further research could extend the analysis with quarterly data, test for structural breaks with the Zivot-Andrews test, and apply the same spillover test to agriculture, construction and government services to find out which sectors act as the main engines of growth in Vanuatu.

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