Sources of Growth and the Cost of Shocks in Vanuatu, 1999–2024

Ernest Killion, Economics Unit, Department of Finance and Treasury, Ministry of Finance and Economic Management

November 2026

The views expressed in this paper are those of the author and do not necessarily reflect the views or policies of the Department of Finance and Treasury or the Ministry of Finance and Economic Management. Any errors or omissions are the author's own.

Abstract

The paper examines where Vanuatu's economic growth has come from since 1999, and how much the major shocks of the period cost each sector of the economy. Using annual chain-linked real GDP by sector for 1998 to 2024 from the Department of Finance and Treasury chain-linked GDP model (MEC 2, 2026), the paper first breaks GDP growth into the contribution of each sector over five periods. It then measures the cost of COVID-19 as the gap between actual output and its pre-2020 trend, and uses event regressions to estimate the effect of Cyclone Pam, the COVID-19 border closure and the 2023 cyclones on the growth of each sector. Over 1999 to 2024 the economy grew by an average of 2.57 per cent a year, driven mainly by agriculture, trade and finance, real estate and business services, which together contributed about 1.5 percentage points a year. COVID-19 was by far the largest shock: output in 2020 to 2022 was VT 49.0 billion below its pre-2020 trend, with the heaviest losses in net taxes, transport and tourism. In contrast, Cyclone Pam cut agricultural growth by about 8.7 percentage points in 2015, but the rebuilding boom in construction offset this at the level of total GDP. The paper concludes that Vanuatu's growth depends heavily on a few sectors that are highly exposed to shocks, and that border and transport shocks have proved more costly to output than cyclones.

Keywords: sources of growth, growth contributions, natural disasters, COVID-19, Vanuatu

1. Introduction

Small island economies are among the most exposed in the world to natural disasters and external shocks. Globally, the evidence shows that disasters reduce output in the short run, and that developing and smaller economies lose a much larger share of output than larger ones from a disaster of similar relative size (Noy, 2009). In the Pacific, Cabezon, Hunter, Tumbarello, Washimi and Wu (2015) found that damage and losses equal to 1 per cent of GDP reduce growth by 0.7 percentage points in the year of the disaster, and that trend growth over 1980 to 2014 was 0.7 percentage points lower than it would have been without natural disasters.

Vanuatu has faced more than its share of such shocks. Cyclone Pam struck in March 2015, and the Post-Disaster Needs Assessment put total damage and losses at about VT 48.6 billion, or about 64 per cent of GDP (Government of Vanuatu, 2015). Moreover, the closure of

international borders in 2020 halted tourism and air travel until the borders reopened on 1 July 2022, while Cyclone Harold struck in April 2020 and Cyclones Judy and Kevin in March 2023. As a result, real GDP fell by 5.7 per cent in 2020 and by a further 1.2 per cent in 2021 (DoFT chain-linked GDP model, MEC 2 2026).

However, headline GDP growth does not show which sectors carry the economy in good years, or which sectors bear the cost when a shock hits. This matters for policy, as the answer decides where recovery support, infrastructure spending and risk financing will do the most good. Thus, the paper sets out to answer two questions. First, where has Vanuatu's growth come from since 1999? Second, how much did Cyclone Pam, COVID-19 and the 2023 cyclones cost each sector of the economy?

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 results, section 5 discusses the policy implications and section 6 concludes.

2. Literature review

2.1 Disasters and economic growth

The literature on the macroeconomic cost of disasters is divided on how long the effects last. Noy (2009) found that natural disasters have a negative effect on output in the short run, and that countries with higher literacy, stronger institutions, higher income and greater trade openness are better able to absorb the shock and prevent spillovers into the wider economy. Raddatz (2009) found that a climate-related disaster reduces real GDP per capita by at least 0.6 per cent, and that small states are more vulnerable to windstorms than other countries. On the contrary, Cavallo, Galiani, Noy and Pantano (2013) found that even very large disasters show no significant effect on long-run growth once the political upheavals that followed two of them are accounted for. Thus, the evidence points to a clear short-run cost, but a less certain long-run one.

2.2 Evidence for the Pacific

For the Pacific, Cabezon et al. (2015) used a panel VAR for the small states of the region and found that damage and losses equal to 1 per cent of GDP reduce growth by 0.7 percentage points in the year of the disaster. They also found that natural disasters lowered trend growth by 0.7 percentage points over 1980 to 2014, and called for a more strategic approach to building resilience before disasters strike rather than responding after them. For Vanuatu, the Cyclone Pam Post-Disaster Needs Assessment put damage and losses at about 64 per cent of GDP, with the productive sectors hit hardest (Government of Vanuatu, 2015).

2.3 The gap this paper fills

Most of these studies measure the effect of shocks on total GDP across many countries. However, they say little about which sectors drive growth in a single small economy, or which sectors bear the cost when a shock hits. A companion paper found that growth in tourism is associated with faster growth in the rest of the Vanuatu economy (Killion, 2026).

The present paper takes a wider view. It uses the Department's own sectoral national accounts to trace the sources of growth over 1999 to 2024, and compares the sectoral cost of a pandemic and border closure with that of cyclones in the same economy.

3. Data and methodology

3.1 Data

The paper uses annual real GDP by sector for 1998 to 2024 from the constant price section of the SUMMARY sheet of the Department of Finance and Treasury chain-linked GDP model (MEC 2, 2026), in VT million at constant 2024 prices. Only the years marked as actual in the model are used. The 19 industries in the model, together with net taxes and FISIM, are grouped into the 11 sectors shown in table 1 below.

Sector	Industries included
Agriculture	Crop production, animal production, forestry, fishing
Mining, manufacturing, utilities	Mining and quarrying, manufacturing, electricity and water
Construction	Construction
Trade	Wholesale and retail trade, motor vehicle repair, other wholesale trade, retail trade
Tourism	Accommodation and food services
Transport	Transport
ICT	Information and communication
Finance, real estate, business services	Finance and insurance, real estate, professional, scientific, technical and administrative services
Government services	Public administration
Education, health, other services	Education, health, recreation and other services
Net taxes less FISIM	Taxes less subsidies on production, less the imputed bank service charge

Table 1. *Sector groups used in the paper. Source: DoFT chain-linked GDP model, MEC 2 2026.*

Since the data are chain-linked, the sectors add up exactly to GDP only in the reference year, 2024. In earlier years their sum differs from GDP, by 8.3 per cent in 1998 and by 1.2 per cent in 2019. Thus, sector shares are measured against the sum of the sectors, and the contributions to growth are reported together with a residual that captures this non-additivity.

3.2 Methodology

The paper uses three methods. First, the contribution of each sector to GDP growth is its change in real output divided by GDP in the previous year:

$$C_{i,t} = \frac{X_{i,t} - X_{i,t-1}}{GDP_{t-1}} \times 100 \tag{1}$$

where X is the real output of sector i. The contributions are averaged over five periods: 1999 to 2005, 2006 to 2014, 2015 to 2019 (Cyclone Pam and the recovery), 2020 to 2021 (border closure) and 2022 to 2024 (reopening).

Second, the cost of COVID-19 is measured as the gap between actual output and a counterfactual trend. Each sector's 2019 output is projected forward at its average growth rate

over 2017 to 2019, and the gap between actual and projected output is summed over 2020 to 2022:

$$\hat{X}_{i,t} = X_{i,2019}\, e^{\bar{g}_i (t - 2019)}, \qquad Gap_i = \sum_{t=2020}^{2022} (X_{i,t} - \hat{X}_{i,t}) \tag{2}$$

Third, the effect of each shock on each sector's growth is estimated with an event regression over 1999 to 2024:

$$g_{i,t} = \alpha_i + \beta_1 d_t^{pam} + \beta_2 d_t^{covid} + \beta_3 d_t^{cyc2023} + \varepsilon_{i,t} \tag{3}$$

where g is the log growth rate of sector i in per cent, and the dummies equal 1 in 2015 (Cyclone Pam), in 2020 and 2021 (COVID-19) and in 2023 (Cyclones Judy and Kevin). Each coefficient measures how far the sector's growth in the shock year departed from its normal growth in the other years. The equations are estimated by OLS with the usual standard errors, consistent with the diagnostics in Killion (2026). Since Cyclone Harold struck in April 2020, its effect cannot be separated from the COVID-19 dummy.

4. Results

4.1 Sources of growth by period

The contribution of each sector to growth over the five periods is shown in figure 1 below.

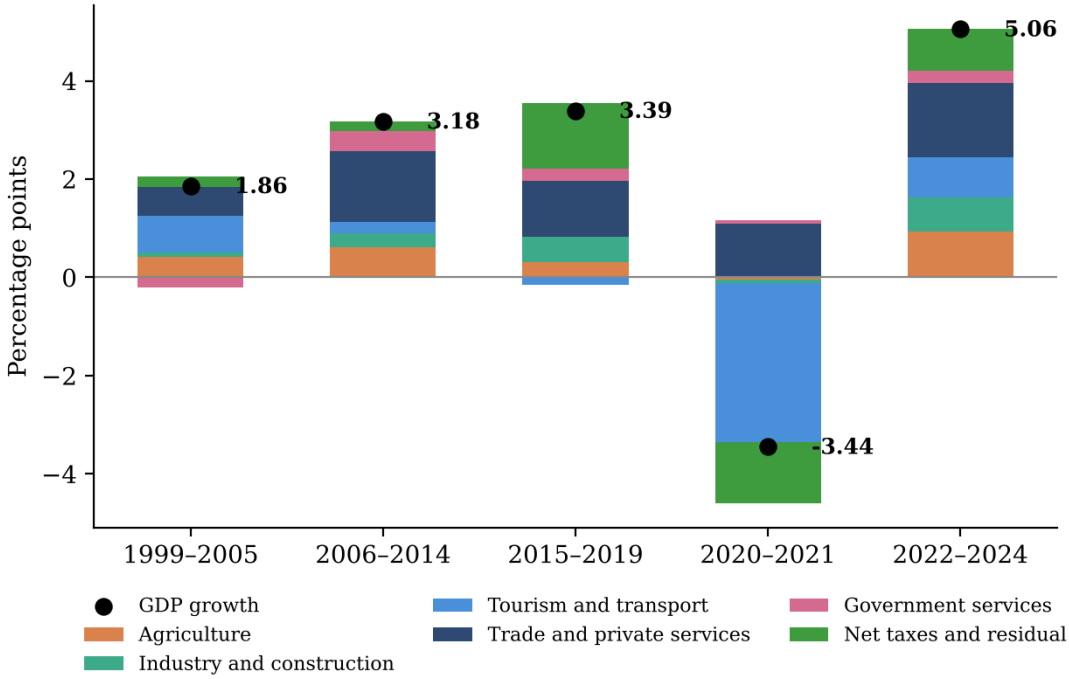


Figure 1. *Average annual contribution to real GDP growth by sector group, percentage points; the dot shows GDP growth. Net taxes and residual includes net taxes less FISIM and the chain-linking residual. Source: Stata output (tabstat), DoFT chain-linked GDP model, MEC 2 2026.*

As shown in figure 1 above, the sources of growth have shifted from one period to the next. Over 1999 to 2005 the economy grew by 1.86 per cent a year, led by transport (0.76 percentage points), finance, real estate and business services (0.43) and agriculture (0.42). Growth then picked up to 3.18 per cent over 2006 to 2014, when trade contributed 0.92 percentage points and agriculture 0.61. Over 2015 to 2019 growth averaged 3.39 per cent, with net taxes (0.70), construction, trade and finance (0.44 each) adding most, although the chain-linking residual of 0.64 percentage points is large in this period.

However, the border closure reversed this picture. Over 2020 and 2021 GDP fell by 3.44 per cent a year, as transport took 2.12 percentage points off growth, net taxes 1.40 and tourism 1.12, while finance, real estate and business services added 0.88. With the reopening, growth rebounded to 5.06 per cent a year over 2022 to 2024, led by finance, real estate and business services (0.98), agriculture (0.93), tourism (0.52), construction (0.47) and ICT (0.45).

Over the whole period from 1999 to 2024, agriculture, trade and finance, real estate and business services each contributed about 0.5 percentage points a year. Together they account for 1.46 of the 2.57 per cent average growth, or about 57 per cent. Thus, these three sectors form the core of Vanuatu's growth.

4.2 Structural change in the economy

Sector	Share 1998 (%)	Share 2019 (%)	Share 2024 (%)	Average growth 1999–2024 (%)	Std. dev. of growth
Agriculture	30.3	25.9	26.6	1.68	4.01
Trade	12.9	16.5	16.1	3.02	5.76
Finance, real estate, business services	10.5	12.1	15.6	3.71	4.49
Government services	17.3	13.5	13.4	1.20	3.12
Net taxes less FISIM	7.1	8.1	6.5	1.88	15.75
Mining, manufacturing, utilities	6.7	6.1	6.0	1.74	14.34
ICT	2.0	3.2	4.3	5.24	11.09
Construction	1.0	2.8	4.1	7.62	39.70
Transport	6.4	6.9	3.3	-0.38	26.19
Tourism	3.6	3.5	2.5	0.85	22.73
Education, health, other services	2.2	1.6	1.5	0.77	11.69
GDP				2.49	3.26

Table 2. *Share of each sector in real output (per cent of the sum of sectors) and its log growth rate, 1999–2024. The average log growth of GDP (2.49 per cent) is slightly below its average percentage change (2.57 per cent) used in section 4.1. Source: Stata output (list, tabstat), DoFT chain-linked GDP model, MEC 2 2026.*

As shown in table 2 above, the structure of the economy has changed considerably since 1998. Agriculture remains the largest sector, but its share fell from 30.3 per cent in 1998 to 26.6 per cent in 2024, while government services fell from 17.3 to 13.4 per cent. On the contrary, finance, real estate and business services rose from 10.5 to 15.6 per cent, construction from 1.0 to 4.1 per cent and ICT from 2.0 to 4.3 per cent. Moreover, transport has not recovered from COVID-19, as its share fell from 6.9 per cent in 2019 to 3.3 per cent in 2024, and tourism fell from 3.5 to 2.5 per cent over the same years.

The change in each sector's share is shown in figure 2 below.

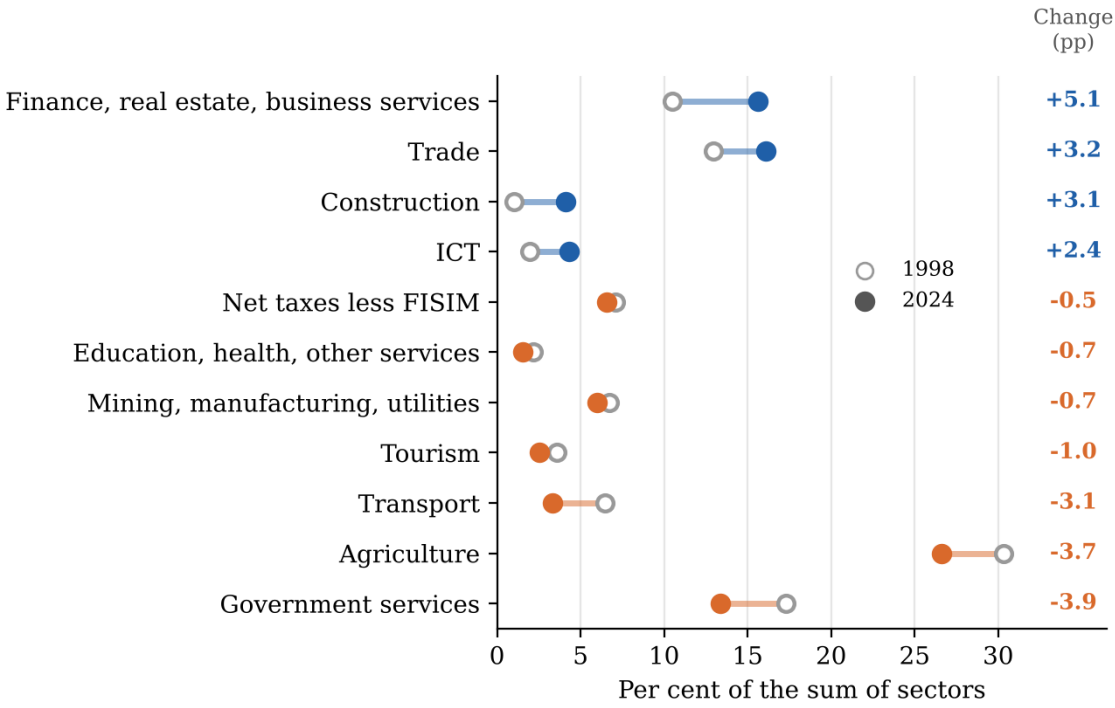


Figure 2. *Share of each sector in real output, 1998 and 2024, per cent of the sum of sectors. Hollow dot = 1998, solid dot = 2024; blue = gained share, orange = lost share. Source: Stata output (list), DoFT chain-linked GDP model, MEC 2 2026.*

As shown in figure 2 above, the gains were concentrated in finance, real estate and business services (5.1 percentage points), trade (3.2), construction (3.1) and ICT (2.4). In contrast, government services lost 3.9 percentage points, agriculture 3.7 and transport 3.1. Thus, the economy has shifted away from the public sector and primary production towards private services.

The last two columns of table 2 also show that the sectors differ greatly in how stable they are. Government services, agriculture, finance and trade grew steadily, with standard deviations of growth between 3.1 and 5.8. In contrast, construction, transport and tourism are highly volatile, with standard deviations of 39.7, 26.2 and 22.7 respectively. Thus, the economy combines a stable core with a set of sectors that swing sharply when shocks hit.

4.3 The cost of COVID-19

To measure the cost of COVID-19, each sector's 2019 output was projected forward at its 2017 to 2019 growth rate, and compared with what actually happened. The result for total GDP is shown in table 3 below.

Year	Gap from trend (VT million)	Gap from trend (%)
2020	-12,884	-8.7
2021	-19,294	-12.6
2022	-16,833	-10.7
2020–2022	-49,011	

Table 3. *Gap between actual real GDP and its 2017–2019 trend of 3.3 per cent a year, VT million at constant 2024 prices. Source: Stata output, DoFT chain-linked GDP model, MEC 2 2026.*

As shown in table 3 above, real GDP was 8.7 per cent below its pre-2020 trend in 2020, 12.6 per cent below in 2021 and still 10.7 per cent below in 2022, even after the borders reopened. In total, the economy lost about VT 49.0 billion of output over the three years, which is about a third of a year's GDP at 2019 levels. The sectors that bore this cost are shown in figure 3 below.

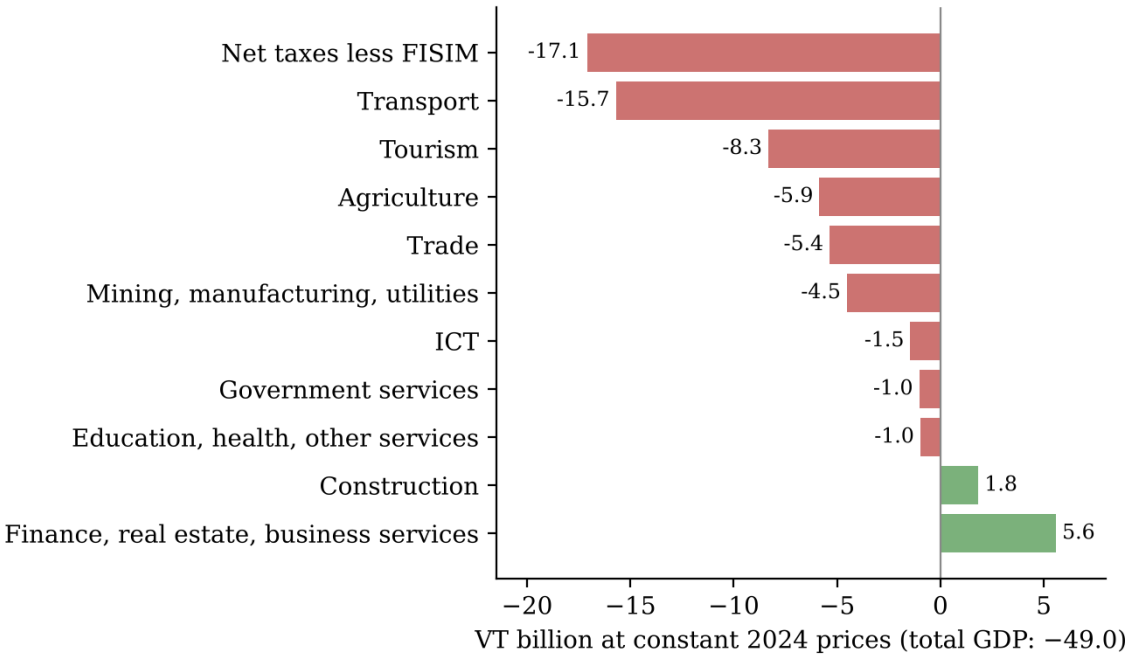


Figure 3. *Cumulative gap between actual real output and its 2017–2019 trend, 2020–2022, VT billion at constant 2024 prices. Sectors do not add exactly to the GDP total because of chain-linking. Source: Stata output, DoFT chain-linked GDP model, MEC 2 2026.*

As shown in figure 3 above, the largest losses were in net taxes less FISIM (VT 17.1 billion), transport (VT 15.7 billion) and tourism (VT 8.3 billion). In 2020 and 2021, transport output was more than half below its trend, and tourism output 57.5 and 65.3 per cent below trend respectively. Agriculture, trade and mining, manufacturing and utilities also lost between VT 4.5 and 5.9 billion each, which shows that the shock filtered through well beyond the sectors that serve visitors. On the contrary, two sectors were above trend: construction (VT 1.8 billion), partly because its pre-2020 trend was falling as the rebuilding after Cyclone Pam wound down, and finance, real estate and business services (VT 5.6 billion), where professional, scientific, technical and administrative services rose by about 44 per cent in 2020 alone.

4.4 Cyclones and the border closure: event regressions

Sector	Constant (normal growth)	Cyclone Pam, 2015	COVID-19, 2020–21	Cyclones Judy and Kevin, 2023	R-squared
Agriculture	2.21	-8.75 (0.036)	-2.45 (0.395)	0.00 (1.000)	0.20
Mining, manufacturing, utilities	2.55	-13.83 (0.374)	-5.72 (0.609)	4.19 (0.786)	0.05
Construction	2.60	110.05 (0.006)	1.01 (0.970)	18.26 (0.619)	0.30
Trade	3.19	-0.43 (0.946)	-2.12 (0.643)	0.32 (0.960)	0.01
Tourism	5.33	-15.53 (0.401)	-55.61 (0.000)	10.38 (0.573)	0.47
Transport	2.50	-6.58 (0.782)	-48.91 (0.009)	29.71 (0.220)	0.32
ICT	4.81	7.41 (0.534)	-3.33 (0.698)	10.37 (0.386)	0.06
Finance, real estate, business services	3.41	-0.31 (0.949)	3.26 (0.355)	1.83 (0.706)	0.04
Government services	1.21	0.38 (0.911)	-0.76 (0.759)	0.97 (0.777)	0.01
Education, health, other services	1.55	-5.84 (0.647)	-3.16 (0.731)	-7.95 (0.533)	0.03
Net taxes less FISIM	3.59	5.22 (0.742)	-23.32 (0.051)	-3.03 (0.848)	0.17
GDP	2.85	0.61 (0.838)	-6.38 (0.006)	2.79 (0.350)	0.33

Table 4. *Event regressions of each sector's log growth rate (per cent) on the three shock dummies, 1999–2024, 26 observations. Coefficients are in percentage points; p-values from OLS standard errors in brackets. Source: Stata output (regress), DoFT chain-linked GDP model, MEC 2 2026.*

As shown in table 4 above, the three shocks hit the economy in very different ways. The COVID-19 border closure is the only shock with a significant effect on total GDP, lowering growth by 6.4 percentage points a year in 2020 and 2021 ($p = 0.006$). The damage was concentrated in tourism, where growth was 55.6 percentage points lower ($p = 0.000$), and transport, at 48.9 percentage points lower ($p = 0.009$), while net taxes less FISIM fell by 23.3 percentage points ($p = 0.051$). The F-tests confirm that the three shock dummies together explain a significant share of the variation in growth only for tourism ($p = 0.003$), GDP ($p = 0.032$), transport ($p = 0.034$) and construction ($p = 0.046$); for the other eight sectors the dummies are not jointly significant, although Cyclone Pam on its own is significant for agriculture.

Cyclone Pam, on the other hand, had no significant effect on total GDP growth in 2015 ($p = 0.838$). This is not because it did little damage. Agricultural growth was 8.7 percentage points below normal ($p = 0.036$), but construction growth was 110 log points above normal ($p = 0.006$), as reconstruction after the cyclone lifted the sector. Thus, at the level of total GDP the losses in agriculture were offset by the reconstruction boom, which is consistent with the finding of Cavallo et al. (2013) that even large disasters often leave little trace in measured growth.

The 2023 cyclones show no significant effect on any sector, and total GDP grew by 5.8 per cent that year. It should be noted, however, that each dummy covering a single year rests on one observation, so these estimates are imprecise, and annual data cannot show losses that were recovered within the same year.

5. Policy implications

The findings have five implications for policy.

1. Protect the stable core of growth. Agriculture, trade and finance, real estate and business services provided about 1.5 percentage points of the economy's average growth of 2.57 per cent a year. Agriculture is also the sector most clearly hurt by cyclones, with growth 8.7 percentage points below normal after Cyclone Pam. Thus, fast recovery support for farmers after a cyclone, such as planting material and access to markets, protects one of the main engines of growth.
2. Border and transport shocks are the most costly. COVID-19 cost about VT 49.0 billion of output over 2020 to 2022, far more than any cyclone in the period, and transport has still not recovered its 2019 share of the economy. Reliable international and domestic air connectivity should therefore be treated as a core economic priority, not only a tourism issue.
3. Shocks hit government revenue hard. Net taxes less FISIM were VT 17.1 billion below trend over 2020 to 2022, the largest loss of any line in the accounts. This supports building fiscal buffers and disaster risk financing before shocks strike, as recommended for the Pacific by Cabezon et al. (2015).
4. GDP understates the cost of disasters. Real GDP grew by 3.5 per cent in 2015, even though Cyclone Pam caused damage and losses of about 64 per cent of GDP, because reconstruction lifted construction. Assessments of disaster costs should therefore rely on the Post-Disaster Needs Assessment as well as GDP.
5. Use the sector effects in forecasting. The event regression results in table 4 give the Department a simple template for shock scenarios in the GDP model: a cyclone mainly lowers agriculture and lifts construction, while a border shock mainly lowers tourism, transport and tax revenue.

6. Conclusion and limitations

The paper examined where Vanuatu's growth has come from since 1999 and how much the major shocks of the period cost each sector. Over 1999 to 2024 the economy grew by an average of 2.57 per cent a year, with agriculture, trade and finance, real estate and business services as the main and most stable sources of growth. Over the same period, finance, real estate, business services, construction and ICT gained a larger share of the economy, while agriculture and government services lost ground. COVID-19 was by far the costliest shock, leaving output VT 49.0 billion below its pre-2020 trend over 2020 to 2022, with the heaviest losses in net taxes, transport and tourism. In contrast, Cyclone Pam sharply reduced agricultural growth, but reconstruction in construction offset this at the level of total GDP. Thus, the economy's growth rests on a few steady sectors, while a set of highly volatile sectors carries most of the cost when the borders or transport links are cut.

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

1. The chain-linked sectors do not add up exactly to GDP outside 2024, so the contributions carry a residual of up to 0.64 percentage points a year on average over 2015 to 2019.
2. The cost of COVID-19 depends on the trend assumed; a different pre-2020 window would give a somewhat different figure.
3. The dummies for Cyclone Pam and the 2023 cyclones each rest on a single year, so their estimates are imprecise, and the effect of Cyclone Harold cannot be separated from that of COVID-19.
4. Annual data cannot show losses that were recovered within the same year, and GDP measures output, not the damage to houses, roads and other assets.

Further research could use quarterly data to measure the timing of losses and recovery, extend the analysis to the expenditure side of GDP, and link the sector effects to the Department's revenue forecasts.

References

Cabezon, E., Hunter, L., Tumbarello, P., Washimi, K. and Wu, Y. (2015). Enhancing macroeconomic resilience to natural disasters and climate change in the small states of the Pacific. IMF Working Paper WP/15/125. Washington, DC: International Monetary Fund.

Cavallo, E., Galiani, S., Noy, I. and Pantano, J. (2013). Catastrophic natural disasters and economic growth. *Review of Economics and Statistics*, 95(5), 1549–1561.

Department of Finance and Treasury (2026). Chain-linked GDP model, MEC 2 2026 (Excel workbook). Ministry of Finance and Economic Management, Port Vila.

Government of Vanuatu (2015). Vanuatu Post-Disaster Needs Assessment: Tropical Cyclone Pam. Port Vila. Figures as reported in "Pam damage exceeds 50% of GDP: PDNA report", *Vanuatu Daily Post*.

Killion, E. (2026). Tourism and economic growth in Vanuatu: a Kaldor-type test of sectoral spillovers, 1998–2024. Department of Finance and Treasury, Port Vila.

Noy, I. (2009). The macroeconomic consequences of disasters. *Journal of Development Economics*, 88(2), 221–231.

Raddatz, C. (2009). The wrath of God: macroeconomic costs of natural disasters. Policy Research Working Paper 5039. Washington, DC: World Bank.