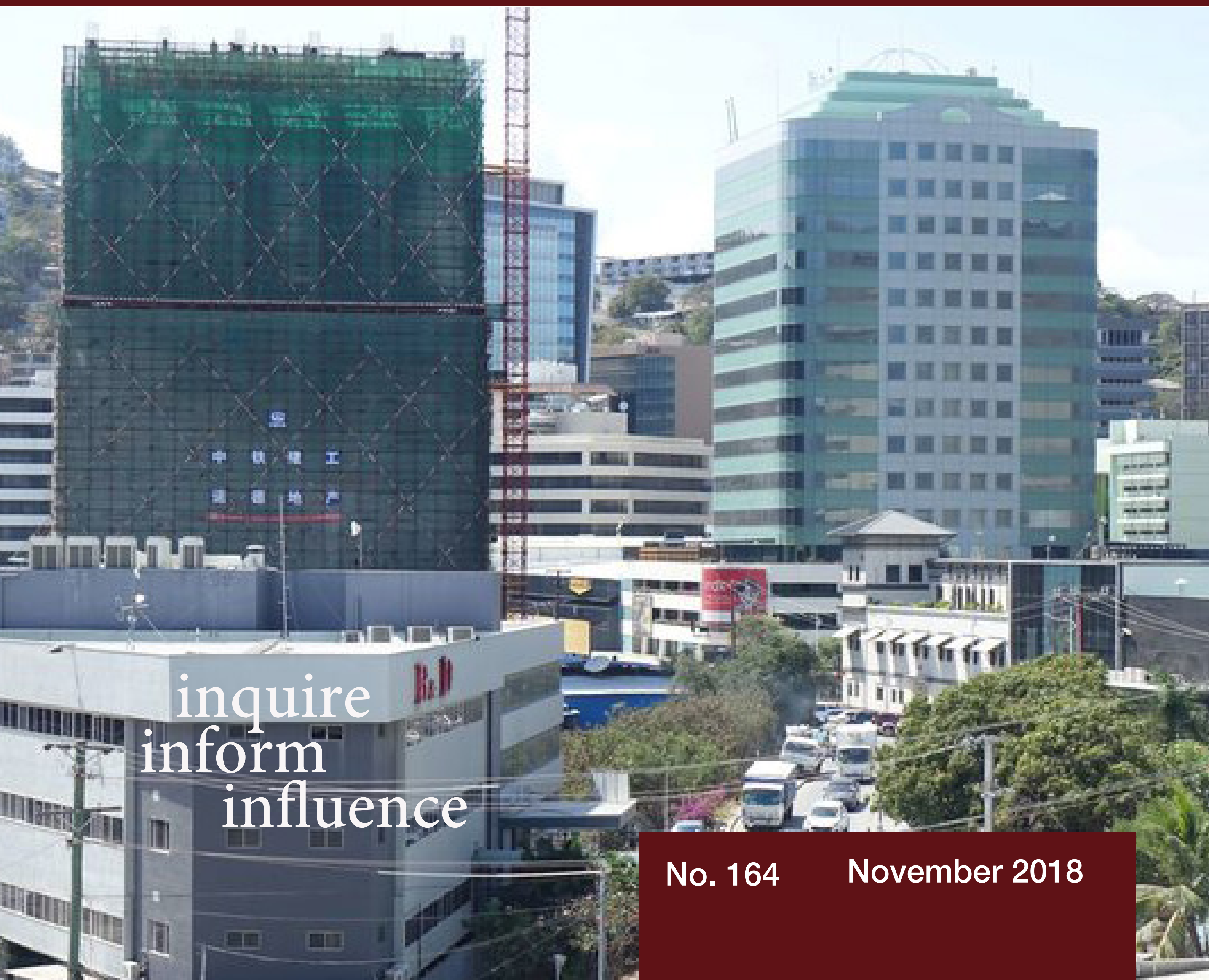
The National Research Institute
PAPUA NEW GUINEA

DISCUSSION PAPER

REVIEW AND FORECAST OF THE PNG ECONOMY: DECEMBER 2016 ISSUE

Theo Levantis
Osborne Ogis Sanida

www.pngnri.org



No. 164 November 2018

This page is intentionally left blank

THE NATIONAL RESEARCH INSTITUTE
PAPUA NEW GUINEA

DISCUSSION PAPER

REVIEW AND FORECAST OF THE PNG ECONOMY: DECEMBER 2016 ISSUE

Theo Levantis
Osborne Ogis Sanida

inquire
inform
influence

No.164 November 2018

THE NATIONAL RESEARCH INSTITUTE
PAPUA NEW GUINEA

First published in November 2018

Direct any inquiries regarding this publication to:
The Editorial Unit Leader
National Research Institute
P.O. Box 5854
Boroko, NCD 111
Papua New Guinea

Tel: +675 326 0300/326 0061; Fax: +675 326 0213
Email: pngnri@pngnri.org
Website: www.pngnri.org

The National Research Institute (NRI) is an independent statutory authority established by an Act of Parliament in 1988 and confirmed by the IASER (Amendment) Act 1993.

NRI is mandated by legislation to carry out independent research and analysis on development issues affecting PNG. The legislation states that the functions of the NRI are:
(a) the promotion of research into Papua New Guinea society and the economy
(b) the undertaking of research into social, political and economic problems of Papua New Guinea in order to enable practical solutions to such problems to be formulated.

ISBN 9980 75 255 6
National Library Service of Papua New Guinea

ABCDE 202221201918

Cover designed by PNG NRI Digital Media Unit

Table of Contents

List of Charts, Figures and Tables

List of Figures

List of Tables

Acknowledgements

The authors wish to acknowledge and thank Professor Satish Chand for his helpful feedback and comments on an earlier draft of this report. Any shortcomings of the paper rest with the authors.

About the Authors

Dr Theo Levantis has worked extensively in Papua New Guinea (PNG) and the Pacific Islands on a broad range of development issues. He completed his PhD at the Australian National University in 1996 and continued working there until 2001 as a researcher specialising in development issues affecting PNG and the Pacific Islands. He was a Senior Research Economist at ABARE from 2002–2006 and an Economics Adviser at AusAID from 2006–2008. From late 2008 until 2015 he worked for the PNG Department of National Planning and Monitoring in an advisory role and has since been an advisor for the Ministry of Strategic Planning, National Development and Statistics in Fiji. Dr Levantis has published three books and more than 20 articles in refereed journals. He has had considerable experience in economic modelling having developed economy-wide models of PNG, Fiji and Australia.

Dr Osborne Ogis Sanida is the Director of the PNG National Research Institute (NRI). Dr Sanida holds a PhD in Applied Economics (University of Queensland), an MBA and Postgraduate Diploma in Economics (Monash University, Melbourne), and a Bachelor of Economics (University of PNG). His research interests and contributions are in the areas of economic modelling, development economics, time series econometrics, development planning, international trade and foreign direct investment, and economic policy analysis. Besides research, he has contributed to public policy analysis and advice, via membership on various committees and lecturing in PNG NRI's annual Diploma of Economic Policy Analysis program.

Abbreviations & Acronyms

APT	Additional profits tax
APEC	Asia-Pacific Economic Cooperation
BEPS	Base erosion and profit shifting
BTT	Bookmaker's turnover tax
DSIP	District Services Improvement Program
GDP	Gross domestic product
IMF	International Monetary Fund
IRC	Internal Revenue Commission
K	Kina
LLGSIP	Local Level Government Services Improvement Program
LNG	Liquefied natural gas
MMBTU	Million British thermal units
OECD	Organisation for Economic Co-operation and Development
PNG	Papua New Guinea
PNG DSP	Papua New Guinea Development Strategic Plan
PNG NRI	Papua New Guinea National Research Institute
PNGGEM	Papua New Guinea General Equilibrium Model
PSIP	Provincial Services Improvement Program
SME	Small and medium-sized enterprise
US	United States
WSIP	Ward Services Improvement Program

Abstract

The Papua New Guinea National Research Institute (PNG NRI) has been publishing a series of biannual economic reports focusing on the review and forecast of the PNG economy since July 2015. This issue is the fourth in the series, and focuses on the assumptions of the 2017 Budget (handed down in November 2016), providing a 10-year forecast (2017–2026) of the key economic variables. The forecasts use the Papua New Guinea General Equilibrium Model (PNGGEM), the model employed for studies in the series (see Levantis, 2004 for model details).

Two forecast scenarios reflecting alternative Government policy positions are modelled and compared. The first one is the Vision forecast scenario which assumes that the Government reverts to policies of fiscal expansion and public investment in the enablers in accordance with its development plans of PNG Vision 2050 and the PNG Development Strategic Plan (DSP) 2010–2030 over the forecast period 2017–2026. Under this scenario, it is assumed that all revenues flowing from the LNG Project make their way to the budget. The other is the Austerity forecast scenario which assumes that the policy of austerity in place since 2015 will continue for the period 2017–2026. With this approach, LNG Project revenues will continue to be diverted to Kumul Petroleum and to debt repayment. These two forecast scenarios are provided because the Government's policy position is unclear with the official endorsement of the development plans contradicted by the actions in the recent budgets.

PNG is expected to enter into a boom at the beginning of the next decade for the mining and petroleum sector. New mines coming in production are expected to see gold production nearly double to 3.6 million ounces by 2026 and copper production increase 10-fold to 554,000 tonnes. Add to this the Papua LNG Project, which is expected to enter the investment phase before the end of the decade and is anticipated to more than double current LNG production.

The PNGGEM modelling has excluded the Papua LNG project. This is because the large scale of the project will have a significant impact on the forecasts, but uncertainty surrounding the timing of the project will mean the year-to-year forecasts will become unreliable. The forecasts presented here must therefore be interpreted as being conservative.

The results and conclusions of the paper are as follows:

- In terms of non-mining GDP growth (most suitable measure of PNG economic performance), under the Vision scenario, it is expected to average around 4.2 percent annually for the 2017–2021 period and improve to 6.5 percent from 2022 to 2026. This contrasts with the 'Austerity scenario', where the average annual non-mining GDP growth for 2017–2021 is only 2.7 percent – just matching population growth – and with recovery to 5.1 percent for the 2022–2026 period (but still lower than the Vision scenario).
- For national income, which is a vital measure of how well PNG is going (i.e. what accrues to Papua New Guineans out of the total income or GDP), the average annual growth under the Vision scenario for 2017–2016 is 5.3 percent compared with a lower average of 4.0 percent for the Austerity scenario. This implies that the austerity measures would penalise Papua New Guineans in terms of income losses.
- In terms of the demand side of the economy, PNGGEM is predicting a shift away from Government towards consumers. Average private consumption growth for the forecast period (2017–2026) is 6.4 percent in the Vision scenario and 4.7 percent under the Austerity scenario. In contrast, Government consumption is expected to grow slower at 4.8 percent for the Vision scenario and 2.8 percent for the Austerity scenario.
- For exports, the alternate fiscal positions of the two scenarios play little role given the enclave nature of the mining industry which dominates PNG exports. Average growth is 1.9 percent and 1.4 percent for 2017–

2021 for the two scenarios, respectively, while it is 8.0 percent and 7.6 percent for the 2022–2026 period.

- In terms of sector performance, in 2017, the overall conclusion is that the sectors are expected to perform better under the Vision than the Austerity scenario. This is because under the Vison scenario, the higher spending by Government will have positive flow-on effects in terms of investment in the key enablers, which in turn will positively affect the economy. On the other hand, under austerity conditions, cuts in Government spending would adversely affect the positive flow-on effects. The mining and petroleum sector is the only sector that would not be directly affected by Government spending changes, given the enclave nature of the sector.
- In terms of fiscal outlook, the 2017 budget takes a grim view of the level of Government revenues, which translates to grim spending forecasts. This grim view appears to be due to the budget not properly accounting for inflation, economic growth and LNG revenues. PNGGEM forecasts a more optimistic outlook (inclusive of LNG revenues) with total revenue reaching K15.9 billion in 2021 (budget forecast is K13.6 billion) under the Vision scenario. For the Austerity scenario, PNGGEM forecasts a revenue to GDP ratio of 16 percent of GDP, which is more optimistic than the budget forecast of 13 percent of GDP, by 2021. For the 2022–2026 period, under the Vision scenario, the fiscal stimulus and productivity benefits lead to higher tax revenues growing to K2.8 billion higher than the Austerity case.
- Finally, for employment creation, which is a key indicator of economic growth, economic participation and social welfare, the outlook is again better under the Vision than the Austerity scenario. Under the Vision scenario, about 389,000 jobs are expected to be created for the 2022–2026 period. In contrast, under the Austerity scenario, only 201,000 are expected to be created for the period, which implies that about 188,000 people will miss out on work they would have had under the Vision scenario.

A key message from the modelling forecasts is that the focus on the key enablers articulated in the Government's development plans is vital for economic growth and development. This is consistent with the experience in other developing economies where investment in the key enablers has been a priority. In PNG's case, the additional funding needed under the Government's development plans is shown by the modelling to provide strong returns in development outcomes compared with the austerity measures that have been implemented in more recent times.

Introduction

This Discussion Paper is the fourth in the series of biannual economic modelling reports by the Papua New Guinea National Research Institute (PNG NRI), focusing on the review and forecast of the PNG economy. The three previous issues were published as NRI Discussion Papers in July 2015, December 2015 and July 2016 (see Levantis and Sanida, 2015, 2016, 2017).

The focus of this issue is on analysing the assumptions of the 2017 Budget (which was handed down in November 2016) and providing a 10-year forecast (2017–2026) of the key economic variables. The forecasts use the Papua New Guinea General Equilibrium Model (PNGGEM), the model employed for studies in the series (see Levantis 2004 for model details).

For the 10-year forecasts, two scenarios are modelled to reflect alternative policy positions of the Government in the face of a lack of clarity on the part of the Government. The first one is the Vision forecast scenario which assumes that the Government reverts to policies of fiscal expansion and public investment in the enablers in accordance with its development plans of *PNG Vision 2050* and the *PNG Development Strategic Plan (DSP) 2010–2030 over the forecast period 2017–2026*. Under this scenario, it is assumed that all revenues flowing from the LNG Project make their way to the budget, which is fundamental in the Government's development plans. The other scenario is the Austerity forecast, which assumes that the policy of austerity in place since 2015 will continue for the period 2017–2026. With this approach, LNG Project revenues will continue to be diverted to Kumul Petroleum and to debt repayment.

The differences in the forecast results for the two scenarios are compared to provide an understanding of the impact on key economic variables of investing in the key economic enablers as intended in the development plans.

The rest of the paper is organised into five sections. Section 2 provides an overview of the global economy and markets for PNG's key export commodities to provide the global context and especially given that PNG is an export-dependent economy. Section 3 provides an update on the development of the resources sector focusing on both existing projects and new prospects. In Section 4, the policy context is provided along with the key features of the 2017 Budget. Using the context in Section 4, Section 5 then discusses the modelling and the results with forecasts for 10 years. Section 6 concludes the paper.

The global economy and markets for PNG's commodities

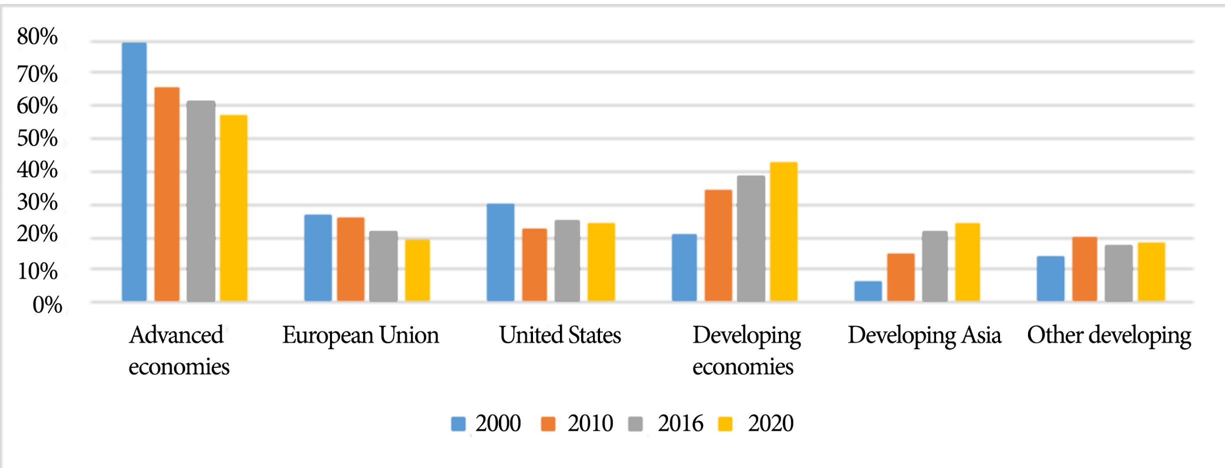
The Trump presidency brings with it much concern over the consequences for trade and global economic prospects. If the rhetoric of erecting trade and investment barriers were to come true, then such concern may well become a reality. The outcome would be a race to erect retaliatory trade and investment barriers in Europe, China, Mexico and elsewhere.

At this stage, however, the process of 'closing shop' in the United States has not gone beyond rhetoric and there is little to suggest that it ever will. On this basis, the International Monetary Fund (IMF) (2017a) is forecasting a strengthening of global economic growth to 3.5 percent in 2017 and 3.6 percent in 2018, compared with 3.1 percent in 2016. Importantly, the advanced economies look set to continue on their new path of stable and steady growth of around 2.0 percent a year following the economic turmoil during 2007 to 2014. Economic stability is a core ingredient for investor confidence, which would explain the signs of renewed buoyancy in financial markets. This turnaround is particularly welcome in Europe which had mostly endured negative growth between 2007 and 2014 before recovering to growth of 2.0 percent in 2015 and 1.7 percent in 2016. More of the same is forecast for 2017 and 2018 with growth of 1.7 percent and 1.8 percent, respectively.

The emerging economies in PNG's neighbourhood continue to lead the way in global economic growth. East Asia and the Pacific recorded growth of 6.4 percent in 2016 and according to the IMF, similar growth is expected in 2017 and 2018 (IMF, 2017a). In comparison, ongoing recession in Brazil, Argentina and Venezuela has dragged 2016 growth down to -1.0 percent in Latin America. Sub-Saharan Africa is fairing only marginally better with growth of just 1.4 percent in 2016. The relentless economic growth in East Asia is found not just in China, where growth of 6.7 percent was recorded in 2016. India, Indonesia, Philippines, Vietnam, Bangladesh, Cambodia and Myanmar all recorded growth above 5 percent.

The East Asian success story is rapidly changing the structure of the global economy. In the past, the global economy was centred around Europe and North America. East Asia is now a third force in the global economy, and on current trends, will begin to dominate. By 2020, East Asia is expected to make up about one-quarter of the world economy compared with just 5 percent two decades earlier in 2000 (Figure 1). The combined share of the advanced economies of Europe, North America, Japan and Australia is expected to drop to 58 percent in 2020 from 79 percent in 2000.

Figure 1: Country group shares of the global economy, 2000–2020



The crash in global commodity prices for PNG's mineral exports appears to have come to an end. During the second half of 2016, copper, nickel, oil and natural gas prices all began to recover after bottoming out earlier in 2016. Average prices for oil and gas during 2016 fell to less than half of their average over 2010 to 2014 (Table 1). Nickel prices in 2016 were at about half the 2010–2014 average, and copper prices were at about two-thirds.

Relentless economic growth in China had been the driver of high commodity prices in the early part of the decade as ongoing increases in capacity and supply failed to keep pace with growth in demand. In 2000, out of global copper production of 14.7 million tonnes, 1.9 million tonnes went to China. By 2010, copper demand from China surged to 7.4 million tonnes and by 2014, 11.3 million tonnes – accounting for more than half of the 22.4 million tonnes produced globally. However, this surge in China-driven growth came to a halt in 2015. In 2016, global production increased moderately to 23.5 million tonnes with demand from China increasing marginally to 11.6 million tonnes.

A similar story may be told for nickel with a surge in demand from China from 58,000 tonnes in 2000 to 909,000 tonnes in 2013 – nearly half of global production of almost 2 million tonnes. Demand from China collapsed in 2014, but has recovered to reach 873,000 tonnes in 2016. As a result, global production in 2016 remained moderate at around 1.9 million tonnes.

The cessation of commodity demand growth in China may be attributable in part to weaker economic growth which fell from an average of about 10 percent a year in 2000–2012 to an average of about 7 percent in 2013–2016. But the growth outcomes in recent years remain healthy and cannot properly explain the halt in demand growth for commodities. Instead, the main factor is a structural change in the economic drivers in China towards service industries and away from construction and manufacturing – the key users of commodities.

Moving into 2017, growth in China is again being driven by construction and manufacturing, putting renewed pressure on commodity markets. This has helped lift copper prices which are expected to average US$5,837 a tonne in 2017, a 20 percent gain from 2016 (Table 1). Industrial action at a number of large South American copper mines is also helping to fuel copper prices.

In Indonesia, the Government has been taking measures to restrict exports of copper, nickel and other metals in an effort to boost local processing. This has been a further contributing factor driving higher copper prices and has played an important role in the pattern of nickel prices. Indonesia is one of the world's largest nickel producers and recent measures to restrict nickel exports have underpinned higher global prices. Nickel prices are expected to be 12 percent higher in 2017 at US$10,727 a tonne, however, this forecast is subject to policy developments in Indonesia. In the medium term, environmental concerns may force some mine closures in the Philippines, the world's largest producer of nickel, putting upward pressure on prices.

Demand for electric cars and hybrid electric/petrol cars has surged in recent years and is expected to gather further steam over the coming 5–10 years as mainstream manufacturers begin rolling out new models of electric cars. This is an important development for nickel and cobalt mining because they are key components in batteries. As a result, healthy price growth is expected to continue for nickel, reaching US$15,424 a tonne by 2026 (Table 1). The pressure is much greater for cobalt—which is produced at the Ramu mine—with electric car demand already leading to prices more than doubling in early 2017. The emergence of battery storage for solar and wind electricity generation is likely to add even further pressure on both cobalt and nickel prices.

Gold prices spiked up during 2016 as markets reacted with concern over the 'Brexit' vote, gravitating towards gold as a safe haven investment. Many commentators, including the IMF, expected a collapse in the British economy in the aftermath of the vote. However, as explained in our July 2016 issue of this report, the commentary is alarmist and the reality is that little will change as a result of the vote. The British economy will continue to have close economic links with Europe and will benefit from greater scope to break down trade barriers with other markets. This analysis has so far been vindicated with 2016 growth in Britain of 1.8 percent continuing to be above the Euro average. As a result, markets have calmed down and gold prices have slipped again.

The average price across 2016 was US$1,249 an ounce, up from US$1,161 in 2015 (Table 1). During 2017, the average price is expected to weaken to US$1,225 an ounce and decrease to US$1,151 an ounce at the beginning of the next decade. Interest rate rises in the United States have attracted investors away from gold, contributing to weaker gold prices, and this pattern is expected to continue over the medium term. The outlook of lower prices is also being driven on the supply side by both rises in mine production and by lower production costs.

Crude oil prices are expected to recover to US$55.10 a barrel in 2017 from their 2016 average of just US$42.80 a barrel (Table 1). This is some welcome news for PNG as the budget and the macro-economy struggles to adapt to the collapse in revenues compared with 2010–2014 when oil prices averaged US$97.70 a barrel. Recent agreements among oil producers to restrict production has helped underpin the strengthening prices.

For the foreseeable future, a return to the high prices seen early in the decade would appear highly unlikely as a result of the changing landscape of oil production. In 2014, the United States surpassed Saudi Arabia to become the world's largest oil producer. Much of the new capacity in the United States is high cost shale oil and as a result, the collapse in prices has seen much new capacity in the United States sit idle. The recent recovery in prices has led to a recommissioning of some of this idle capacity. The scope for the United States to ramp up production as oil prices rise is therefore putting a ceiling on price growth.

Also working against higher prices are some key factors pointing to ongoing weakness on the demand side. The anticipated surge in electric car production discussed earlier will mean demand will begin shifting away from fuel-powered cars. Moreover, the ongoing drive towards cars that are more fuel efficient with lower emission intensity is already having an impact as demand in most major economies is either stagnating or declining. If there is to be any demand growth it will come from increases in demand for motor vehicles in emerging economies, including China and India. However, demand growth could re-emerge in the United States as a result of a strong appetite for inefficient 'pick up' trucks and a scaling back of greenhouse gas emission initiatives by the new Trump administration. Weighing up the various demand and supply considerations, the forecast of US$66.80 a barrel in 2026 (Table 1) would appear optimistic.

Gas prices were weak in 2016 as subdued demand was exceeded by increased supply as new production capacity was completed. This trend of supply outstripping demand is likely to continue in 2017 and 2018 as additional new capacity from Australia and the Unites States enters the market. However, low prices are likely to see a stimulation in demand due to the improved competitiveness of gas for baseload electricity production. The much lower emission intensity of gas compared with coal is likely to result in continued strong growth in demand over the medium to long term. Meanwhile, investment in new LNG gas projects has stalled, which has the potential to undermine low prices early into the next decade. With these considerations, there is expected to be little recovery from the low prices of 2016 until the early 2020s.

There was mixed news in 2016 for PNG's key agricultural exports. Coffee prices stayed much the same as in 2015, but well below the higher levels recorded earlier this decade (Table 1). Cocoa prices began collapsing in 2016 as a result of increased supply coming out of Côte d'Ivoire, Ghana and Nigeria, and 2017 prices are expected to be at two-thirds the level of 2015. The outlook is for a partial recovery in prices over the next decade. Palm oil and coconut oil prices did well in 2016, lifting by 13 percent and 33 percent respectively. This was helped by a tightening of supply following the El Niño weather event. The outlook is for further strengthening in coconut oil prices before settling back to current levels, and for stability in palm oil prices. As a result of environmental concerns in Malaysia, Indonesia and PNG, the European Union is taking measures to ban the use of palm oil as a source for biodiesel, presenting a downside risk for palm oil prices. Hardwood prices were also up in 2016 and little change is expected over the next few years.

Table 1: Prices for PNG's commodities, 2010–2026

		Average		Forecasts				
		2010–14	2015	2016	2017	2018	2021	2026
Coffee Arabica	US$/tonne	4,406	3,532	3,619	3,614	3,738	3,821	3,761
Cocoa beans	US$/tonne	2,798	3,135	2,891	2,112	2,176	2,261	2,520
Coconut oil	US$/tonne	1,237	1,110	1,475	1,600	1,584	1,536	1,459
Palm oil	US$/tonne	876	594	670	689	681	698	744
Hardwood logs	US$/M3	323	246	274	267	269	276	297
Copper	US$/tonne	7,703	5,510	4,868	5,837	5,894	6,013	6,436
Nickel	US$/tonne	18,837	11,863	9,595	10,727	11,147	12,298	15,424
Gold	US$/ounce	1,428	1,161	1,249	1,225	1,206	1,151	1,065
Oil	US$/barrel	97.7	50.8	42.8	55.1	57.6	59.5	66.8
Natural gas	US$/MMBTU	15.2	10.7	7.2	7.4	7.5	7.8	8.7

Sources: Calculated from data in the commodity markets page of the World Bank website (www.worldbank.org/en/research/commodity-markets) and the primary commodity prices page of the IMF website (www.imf.org/external/np/res/commod/index.aspx). The 2017–2021 forecasts are averages of the two sources, except for gold and coconut oil for which forecasts are only available from the World Bank. The forecasts for 2026 are based on the percentage change forecasts for 2022–2026 of the World Bank.

An update on the resources sector in PNG

Oil and gas

The LNG Project has been hit hard by the collapse of gas prices in PNG's East Asian markets. In 2016, the average price received by the LNG Project was US$6.40/MMBTU, down from US$13.90/MMBTU in 2014 (Oil Search, 2017). Yet the project remains profitable. It is astounding that prices, and hence revenue, are at less than half the levels of just 2 years earlier, yet the bottom line net profit for the project in 2016 was about US$500 million, or K1,590 million.[1] This reaffirms the competitiveness of the LNG Project and is cause for optimism over its future profitability and potential for boosting Government revenues through both taxes and dividends.

However, there remains a serious cause of concern over transparency. As discussed in the previous NRI Economic Outlook report (see Levantis and Sanida, 2017), we know substantial taxes are being paid and dividends are being earned by the Government because they are reported in the annual reports of the publicly listed companies that have shareholdings in the LNG Project. But where this money is ending up is a mystery because they do not appear in the budget papers. Given what is at stake with this project, the lack of transparency is a ticking time bomb that needs to be defused as a matter of priority. Oil Search, which has a 29 percent stake in the project, paid US$95 million (K217 million) in taxes in 2016 (Oil Search, 2017). It may therefore be extrapolated that roughly K650 million of tax would have been received from all stakeholders.

The state-owned enterprise, Kumul Petroleum, holds 16.6 percent of the LNG Project on behalf of the Government (KPHL, 2017). However, no financial reports are made public and no information is offered about the income received from the LNG Project. Based on the 2016 net profit of US$185 million reported by Oil Search in its 2016 Annual Report, a safe bet would be that about K300 million (US$94 million) was received by Kumul Petroleum for 2016.

Nevertheless, with solid profits at times when gas prices are so low, the LNG Project is proving to be a commercial success. Production increased in 2016 to 355 million MMBTU in 108 cargo deliveries compared with 333 million MMBTU and 101 cargos in 2015 (Oil Search, 2017). This puts production at about 15 percent above the original anticipated production capacity. The operators report that the current level of production is sustainable with long-term contract sales being negotiated for the unexpected additional output.

The commercial success of the LNG Project has provided a solid platform for the development of the Antelope gas fields, referred to as the 'Papua LNG Project'. According to the 2016 Oil Search Annual Report, these will add two additional trains, each one as big as the current LNG Project. In what is likely to be a positive development, ExxonMobil – the lead operator of the LNG Project – has acquired Interoil, a key stakeholder in the Papua LNG Project. The outcome will be an enforced collaboration with Total, the lead company in the project. The end result should be better integration with the existing LNG project and more effective use of existing infrastructure. Ultimately, this means costs will be lower, profits will be higher, the returns to the PNG Government will be greater, and the scope for financing gas field development will be better.

With engineering design for the development of the Papua LNG Project expected to commence later in 2017, a second LNG Project by early next decade is fast becoming a reality.

The story for crude oil production in PNG is one of continued slow decline as the fields of Kutubu and Moran slowly become depleted. However, liquids are a by-product of LNG production and when these are taken account of, total oil production in 2016 was 21.3 million barrels, down only slightly from 21.6 million barrels in 2015 (Table 2). Production from the existing oil fields fell from 10.2 million barrels in 2015 to 9.4 million barrels in 2016.

[1] This was calculated based on the net profit for Oil Search of US$185 million reported in its 2016 Annual Report. About three-quarters of Oil Search revenue was from the LNG Project and Oil Search has a 29 percent stake in the LNG Project. The exact measure of LNG profits is unknown as it is not made available to the public.

Gold, copper and nickel mining

PNG is on track to enter into a 'mining boom' in the next decade. Not only is LNG production set to at least double, but gold production is expected to nearly double from 1.9 million ounces in 2016 to 3.6 million ounces in 2026 (Table 2). Copper production is expected to rise from 60,000 tonnes in 2016 to reach 554,000 tonnes in 2026. At these levels, PNG will be among the top 10 producing countries in the world for both copper and gold. In all, the total value of copper and gold production in 2026 is expected to reach K23 billion in today's prices compared with K8 billion in 2016.

Since opening in 2012, the Ramu nickel mine near Madang – PNG's first nickel mine – has hit various environmental, safety and technical roadblocks in its efforts to operate efficiently and at full production. However, towards the end of 2016 the operation finally navigated its way forward, reaching full nameplate production of about 8,000 tonnes of nickel per quarter for the first time, and repeating that level in the first quarter of 2017. In more positive news, the price of cobalt – of which the mine is likely to produce about 3,200 tonnes in 2017 – has doubled, adding about US$80 million (K254 million) to the bottom line. The mine should now prove both viable and profitable; however, it will be many years before the Government will see any tax benefit due to the vast losses, and hence tax credits, accumulated before 2017.

As is the case for state-owned Kumul Petroleum, the operations and financial performance of the state-owned Ok Tedi copper mine is shrouded in secrecy. This is in quite considerable contrast to the transparency demonstrated by the mines operated by companies listed on stock exchanges in Australia, Canada, South Africa and elsewhere. The lack of transparency on the part of these state-owned operations only serves to fuel suspicions about the way they are being operated. The last annual review for the Ok Tedi mine was provided back in May 2015 for the year 2014, with no updates available for production, sales or profitability since. However, at the end of 2016 the mine paid the Government a dividend of K150 million, suggesting that the operations have returned to profitability after a drought enforced shutdown between September 2015 and March 2016. Export data available from the Bank of Papua New Guinea suggest that copper production was about 60,000 tonnes, up from 46,000 tonnes in 2015. A return to full-year production should see output of about 75,000 tonnes in 2017 and beyond.

Gold production at the Lihir mine rose sharply in 2016 to 903,000 ounces, up from 805,000 ounces in 2015 as a result of operational improvements (Table 2). For 2017, production is on track to reach 930,000 ounces and is expected to continue at this level for decades to come. The foundation for sustained profitability is in place with costs kept below US$900 an ounce, well below current and foreseeable gold prices (Table 1). However, whether this profitability converts to revenue for the PNG Government is another question, with the operators to date being able to avoid paying any taxes of note compared with the value of gold being extracted and exported.

The South African company Harmony acquired full control of the Hidden Valley gold mine late in 2016. This is a positive development as Harmony is committing to investing and upgrading the mine. Expectations are for sustained production levels of 180,000 ounces of gold a year and costs at a similar level to Lihir of about US$900 an ounce. This would mark a turnaround from what has largely been an unsuccessful venture to date, providing little return to the PNG Government. Production in 2016 was about 140,000 ounces.

The Porgera gold mine in Enga Province is PNG's second largest gold mine, producing 493,000 ounces in 2016, down from 519,000 ounces in 2015. The operators are expecting an improved outcome in 2017 of about 525,000 ounces. To what extent the PNG Government is benefitting from the mine is unclear from the financial reports of Barrick Gold, the key stakeholder in the mine. But given that Barrick Gold reported income taxes paid in international jurisdictions of US$917 million in 2016, and given that Porgera is a well-established and profitable mine, it seems likely that significant income taxes are being paid in PNG.

After a less than successful start to life in the late 2000s, the Simberi gold mine in New Ireland Province has now established itself as a successful and profitable mine. In 2016, a record 106,000 ounces of gold was produced and production is on target to reach similar levels in 2017. Costs have continued to fall from their previously unsustainable levels, and are now at similar levels to PNG's other gold mines.

Table 2: Estimated production profile of mining, oil and gas in PNG, 2015–2026

			Forecasts			
	2015	**2016**	**2017**	**2018**	**2021**	**2026**
Gold production (ounces)						
Lihir	805,000	903,000	930,000	930,000	930,000	930,000
Porgera	519,000	493,000	525,000	525,000	525,000	525,000
Ok Tedi	146,000	191,000	230,000	230,000	230,000	230,000
Hidden Valley	148,000	140,000	180,000	180,000	180,000	180,000
Simberi	80,000	106,000	108,000	108,000	108,000	108,000
Bougainville	0	0	0	0	0	500,000
Offshore mining	0	0	0	0	300,000	350,000
Frieda	0	0	0	0	0	250,000
Wafi-Golpu	0	0	0	0	90,000	320,000
Woodlark	0	0	0	0	55,000	110,000
Small scale mining estimate	115,000	90,000	90,000	90,000	90,000	90,000
TOTAL GOLD	**1,813,000**	**1,923,000**	**2,063,000**	**2,063,000**	**2,758,000**	**3,593,000**
Copper production (tonnes)						
Ok Tedi	46,000	60,000	75,000	75,000	75,000	75,000
Frieda	0	0	0	0	0	175,000
Bougainville	0	0	0	0	0	150,000
Wafi	0	0	0	0	40,000	150,000
Offshore mining	0	0	0	0	3,500	4,000
TOTAL COPPER	**46,000**	**60,000**	**75,000**	**75,000**	**293,500**	**554,000**
Nickel and Cobalt production, Ramu (tonnes)						
Nickel	25,582	22,269	32,000	32,000	32,000	32,000
Cobalt	2,505	2,191	3,200	3,200	3,200	3,200
Oil & Gas						
Oil (million barrels)	21.6	21.3	20.4	19.6	18.0	16.4
Gas (million barrels equiv.)	65.7	69.4	70.1	70.8	73.0	76.7
Gas with Papua LNG	65.7	69.4	70.1	70.8	73.0	150.0

Sources: Financial and production reports available on the websites of the respective operations (see references).

New mining prospects

The Nautilus Minerals-led Solwara deep sea mining project has faced stiff headwinds in its progression towards reaching production. The project is located in the waters between New Ireland and New Britain and is set to become the world's first large-scale deep sea mine. Latest information from Nautilus Minerals points to an early 2019 start to production. However, the start date has been pushed back a number of times due to the challenge of raising finance in an environment of low commodity prices. Add to this the reluctance of lenders to back what are new technologies and techniques. Also, given its pioneering status, concerns about the environmental implications remain a challenge. Despite this, much progress has been made with the sea floor tooling for the mine operation at an advanced stage of development and the giant support vessel under construction in China. The PNG Government has a 15 percent stake in the mine.

Showing good promise for PNG is the Frieda River copper and gold project in Sandaun Province near the border with East Sepik Province. The project is expected to be of a similar scale to Ok Tedi with copper production estimated at 175,000 tonnes a year and gold production of 250,000 ounces a year. Progress is continuing towards the construction phase, with the project at the stage of processing regulatory procedures, including the environmental impact study. A Chinese state-owned enterprise, Guangdong Rising Assets Management, has an 80 percent stake in the project with the Australian-listed company, Highland Pacific, holding the balance. Unfortunately, as is the case in the Ramu nickel project, transparency among the Chinese stakeholders is poor with no public information available about the Frieda River Project on its website. This is a cause of deep concern for the PNG Government that should be addressed before allowing this project to proceed.

Similar in scale to the Frieda River Project is the proposed Wafi-Golpu mine near Lae in Morobe Province. This project has the distinct advantage of being a joint venture between Harmony Gold and Newcrest Mining. As these companies are listed in South Africa and Australia respectively, they are obliged to uphold minimum standards of transparency and accountability. The project is in the process of pre-feasibility analysis and is scheduled to hit production in 2020, although this would seem ambitious given that a special mining lease is yet to be granted. A staged process of upscaling production is anticipated with full capacity of 320,000 ounces of gold and 150,000 tonnes of copper expected by 2025.

Ongoing exploration at the proposed Woodlark Island Gold Project in Milne Bay Province continues to reveal substantial gold reserves. The mine already has a lease but has to date been unable to proceed to the investment stage. This could change as Kula Gold—the Australian-listed owner of the project—faces a takeover challenge from Geopacific Resources—also an Australian-listed company, but with no operating mines among its assets. Geopacific Resources was recently granted a 5 percent stake in the project in return for undertaking ongoing drilling and exploration. In attempting to takeover Kula Gold, it clearly liked what it saw. When the mine is up and running, production of 110,000 ounces is anticipated.

There is cause to be optimistic that the Bougainville copper mine will resume production following its transfer from Rio Tinto to an independently managed PNG company. In this transition phase, progress has been made in engaging all stakeholders – including landowners, the Bougainville Government and the National Government – to navigate a path forward. Agreement has been reached on a staged redevelopment plan.

Policy context and budget overview and outlook

This section provides the policy context and an overview of the 2017 Budget and the outlook to 2021, as per the budget projections and assumptions. The modelling forecasts reported in the rest of the paper draw their fiscal assumptions from the analysis in this section.

It is a challenge to understand the reality behind the fiscal numbers reported in these budget papers. This is because of the lack of clarity and transparency surrounding the LNG revenues. The 2016 Budget included funds moving in and out of the Sovereign Wealth Fund. However, we now know that such a fund does not exist and the 2017 Budget has removed any such entries.

Policy context

The 2017 National Budget ('the Budget') was themed: 'Responsible Consolidation for Growth and Development'. It was the last budget for the O'Neill-Dion Government for the current term of Parliament. Given this, it is claimed that the "2017 Budget not only sets out the priorities for the coming months leading up to the General Elections but also provides an opportunity to reflect on the Government's performance against the economic landscape over the last five years" (Vol. 1, p. i).

The key broad policy measures in the budget (Vol. 1, p. [i] and [ii]) were to:

- "Continue the budget reform process aimed at improving the effectiveness and transparency of the Budget management process;
- pursue structural reforms among state-owned enterprises and streamlining of the public service to minimise wastage and encourage productivity;
- ensure major projects are effectively implemented through improved design, costing, scoping and implementation processes and promote transparency through open and competitive public tenders;
- implement new tax and non-tax measures broadly consistent with the Tax Review Committee's recommendations;
- continued support for the Government's key policy priorities in education, health, infrastructure, agriculture, law and order, and small and medium-sized enterprises (SMEs); and
- responsibly manage the Government's debt profile through capital markets, structural reforms, proceeds of external financing and the potential issuance of a debut Sovereign Bond."

Tax policy measures

The budget proposes taxation measures which are aimed at supporting the Government's "efforts towards a gradual fiscal consolidation path to maintain macroeconomic stability, support continued economic growth and employment through improved, broadened and strong revenue base…raising Government revenue by K620 million in 2017" (Pruaitch, 2017, p. 6). In particular, the following (summarised) tax measures are proposed:

- **Main administrative measures to increase revenue**

    Resourcing the revenue administration institutions: Inefficient revenue administration was a key issue highlighted by the Tax Review Committee, which has resulted in issues relating to poor compliance, tax avoidance and subsequent revenue losses. Based on this, the Government has increased the budget for the Internal Revenue Commission (IRC) by K16 million (or 21.6 percent) to K90 million. Of this amount, K5 million will be used to set up a taskforce (IRC and Treasury) to deal specifically with compliance enforcement. Given the improved resourcing, the Government expects IRC to raise about K400 million additional tax in 2017.

    Implementing minimum standards for addressing BEPS: Base erosion and profit shifting (BEPS) is a tax evasion/avoidance strategy practice where firms move profits from high tax places to low or zero tax places (aka tax havens). If BEPS is not effectively addressed, a country loses out from the missed tax revenue. In the 2017 Budget, the Government proposes to address the BEPS issue by strengthening responsible agencies (led by the IRC) to take appropriate measures, using the revised OECD reporting standards as a guide. It is hoped that such a move will strengthen the revenue base in the medium to long term.

Anti-illicit trade taskforce: Using anecdotal evidence as the basis, the Government claims that a lot of revenues have been lost by illicit trade practices, where taxes are not paid for goods traded. In 2017, a taskforce was set up, which is responsible for intelligence sharing, enforcement, investigation, arrest, prosecution and implementation of deterrents for illicit trade. This measure is hoped to protect revenues.

- **Measures on tax rates**

Increasing the benefits from unprocessed logs through a progressive export duty: This is a reintroduction of an old measure but with the variation that the logs will now be taxed according to species to optimise the tax gains. A related objective of this measure is to encourage the setup of downstream processing facilities to provide additional spin-off benefits. This tax measure (effective 1 January 2017) is expected to increase Government revenue by K88 million.

Increasing the alcohol and tobacco excise: The budget intends to increase the alcohol indexation cap from 2.5 percent to a fixed rate of 5 percent biannually, and a one-off increase for the tobacco excise. The main objective appears to be from a health perspective, where it is understood that alcohol and tobacco contribute to social ills, hence the need to discourage such behaviour. This tax measure (effective 1 January 2017) is expected to raise K43 million, K19 million from alcohol excise and K24 million from tobacco excise.

Wary of the potential risk of increased illicit use of drugs and alcohol (given increased excise), the Government proposed to set up a taskforce to combat alcohol and drug activities.

Increasing the taxable component of employer-provided housing benefit: The Government proposes to adjust the taxable component of the employer provided housing benefit by creating two additional categories/tiers (in addition to the existing six tiers) of housing for tax purposes: Up-Market Cost House and Very High Cost House.[2] This measure will apply to employer-provided housing benefit with weekly equivalent rental rates from K3,000 and above. The taxable amounts will be K1,500 for the Up-Market Cost House tier and K2,500 for the Very High Cost House tier.[3] This measure is expected to increase Government revenue by K6 million.

***Redistributing gross profit from gaming machines to increase Consolidated Revenue Fund share*:** This measure is about redistributing the profit made from gambling in order to increase the portion to Government via the Consolidated Revenue Fund. Currently, the gross profit from gaming machines is distributed as follows: 46 percent to Government (via the fund); 25 percent to permit holders (operators); and 14 percent to the Community Benefit Fund, which is used to provide social support programs caused by gambling addiction. The proposed redistribution will see the Government share increase to 55 percent while both the operators' share and the fund's share will fall to 20 percent and 10 percent, respectively.[4] This redistribution measure is expected to raise K32 million for the Government.

Increasing the diesel excise from 6t/litre to 10t/litre: The Government intends to raise K21 million by increasing the excise on diesel from 6 toea per litre to 10 toea per litre. At present, the excise imposed on petroleum products is 6 toea per litre for diesel and 61 toea per litre for petrol. The Government gets the entire excise on petrol; however, for diesel, for every litre, the Government gets 2 toea while the balance

[2] The existing six tiers are (in descending order): High cost house or flat; Medium cost house or flat; Low cost house or flat; Mess/barracks; Government mess/barracks; and Employees in approved low-cost housing scheme.

[3] Up-Market Cost House with weekly rent of K3,000 to K5,000 and Very High Cost House with weekly rent of K5,001 and above.

[4] Note that the total shares equate to 85%. The remaining 15% is unexplained.

(4 toea) goes to the National Roads Authority. Under the 2017 Budget, the status quo is maintained for petrol, for both the rate (i.e. 61 toea/litre) and distribution (i.e. 100 percent to the Government). However, for diesel, the excise rate will be increased to 10 toea per litre (meaning increased revenue) and in terms of the distribution, the portion to the National Roads Authority will remain at 4 toea (or 40 percent) while the Government gets the remaining 6 toea (an increase of 200 percent from the current 2 toea).

Reforms to the taxes on bets placed with bookmakers: Currently, two types of taxes are paid on bets placed with bookmakers: (1) the bookmaker's turnover tax (BTT) at 4 percent; and (2) stamp duty[5] imposed on bookmakers. The national Government retains 100 percent of the stamp duty while the BTT is remitted to the IRC, which in turn transfers it to the provinces where bookmakers' betting shops are located. Under the 2017 Budget, the stamp duty will be merged into the BTT and the rate will be increased to 15 percent. The rationale is that the current arrangement does not raise enough revenue relative to the administrative costs. The proceeds from the new arrangement will be shared between the National Government and relevant provincial governments on a 60:40 split. The new measure (effective 1 January 2017) is expected to raise K18 million for the National Government in 2017.

Increasing the departure tax: Effective 1 January 2017, the departure tax[6] was increased from K30 to K114 (a 280 percent increase) with the rationale that this takes account of the inflation for the past 19 years. For 2017, this measure is expected to raise K20 million for the Government.

***Standardisation of tax treatment on dividends, corporate income tax and withholding taxes*:** Table 3 provides a summary of the standardisation of tax treatment on dividends, corporate income tax and withholding taxes, contained in the 2017 Budget that are scheduled for implementation, effective 1 January 2017.

Table 3: Summary of tax standardisation measures, 2017 Budget

Tax type	Current rate/practice	Proposed rate/practice from 2017	Effective date	2017 revenue impact
Dividend withholding tax (DWT)	• Non-resource companies: 17%. • Mining companies: 10%. • Petroleum companies: exempt (0%).	• Non-resource companies: 15% to 17%. • Mining companies: 10% to 15%. • Petroleum companies: 0% to 15%.	01/01/17	Reduce DWT by K6 million.
Corporate income tax (CIT)	• Non-resource companies: 42%. • Mining companies: 37%. • Petroleum companies: 30-50%.	• Non-resource companies: 42%. • Mining companies: 37%. • Petroleum companies: 30%.	01/01/17	Reduce CIT from petroleum companies by K2 million.
Interest withholding tax (IWT)	• Foreign lenders lending to resource companies are exempt (from 15% IWT).	• Exemption to be lifted (i.e. foreign lenders will have to pay 15% IWT).	01/01/17	No estimates given.

[5] Stamp duty is a duty levied on the legal recognition of betting tickets. Bookmakers pay stamp duty when purchasing the betting tickets from IRC.

[6] The departure tax is imposed under the Departure Tax Act 1980.

Tax type	Current rate/practice	Proposed rate/practice from 2017	Effective date	2017 revenue impact
Foreign contractor withholding tax (FCWT)	• Tax is levied on 25% of gross contract value. • 48% non-resident income tax rate is applied. • 12% effective tax rate	• 15% flat tax rate on the gross contract amount.	01/01/15	No estimate on numbers, only that it will have a positive impact on Government revenues.

Source: 2017 Budget Books.

Removal of double deduction for exploration expenses: The double deduction for exploration expenses was put in place as an incentive for mining project developments effective 1 January 2003 (IRC, 2016). The double deduction assists the mining sector by reducing the corporate income tax paid by mining companies and a 30 percent subsidy on the double deducted amount. The incentive does not apply to the petroleum sector. This incentive will now be removed with the rationale that it will broaden the tax base and also realign the taxation regime with the petroleum sector.

Revamp of the additional profits tax (APT) or the resource rent tax: The APT is a tax charged on the super profits (i.e. profits over and above the average rate of return) of resource companies. Currently, the APT is only applicable to gas projects, whereby APT rates of 7.5 percent and 10 percent are applied to the super normal profit thresholds of 17.5 percent and 20 percent, respectively. Under the 2017 Budget, it is proposed that the APT will now apply to all resource projects with the following arrangements: (1) hurdle rate[7] at a flat nominal rate of 15 percent; (2) a single APT threshold rate of 15 percent; and (3) APT rate of 30 percent.

The rationale for this – according to the budget and based on IMF reports – is that the current rates are highly concessional, hence the need to revamp it to achieve a fairer return to the people. Two additional reasons given were that the move will simplify the APT administration and ensure a level playing field in the resource sector.

Expenditure policy context and priorities

The preceding section outlined the measures the Government will take in 2017 to address the revenue side of the budget. This part summarises the expenditure measures to be employed to guide the 2017 Budget. The context of the budget in terms of expenditure is based on three factors:

- Total Government expenditure projections for 2017 and over the medium term are now based on the Government Finance Statistics 2014 classification, whereby expenditure consists of expense and net acquisition of non-financial assets and goods and services tax and BTT to provinces.
- The 2017 Budget reflects the budget reform jointly undertaken by the Department of National Planning and Monitoring, and the Department of Treasury.
- The framing of the 2017 Budget is constrained by the fiscal environment; that is, sharp declines in commodity prices, latent effects of the drought, and a foreign currency imbalance.

Given this context, the key expenditure priorities for the 2017 Budget (Volume 1, p. 38) are:

- enhancing opportunities by building the foundation for the future development of the country while recognising the need for macroeconomic stability by returning to a balanced budget beyond 2021;
- continuing the support for policy priorities in education, health, infrastructure, agriculture, tourism, rural

[7] Hurdle rate is the minimum rate of return for an investment the investor is willing to accept before undertaking a project, given the risk profile and opportunity cost considerations.

development and SMEs;[8]

- facilitating the 2017 General Elections and hosting the 2018 APEC Summit;
- promoting the efficient and effective implementation of major projects through improving design, scoping, and implementation processes;
- placing more emphasis on monitoring, evaluation and compliance so as to achieve improved development outcomes;
- strengthening efficiency in the public sector; and
- strengthening and improving spending controls particularly in relation to the escalating public sector wage bill.

Summary of the 2017 Budget

Given the policy context and the revenue measures and expenditure priorities, the following provides a summary of the 2017 Budget. As far as the numbers are concerned, the budget appears to provide two sets of numbers: those under Volume 1 of the budget and those under Volume 2 and the Appropriation Bills. We summarise each in turn.

Numbers according to Volume 1 of the 2017 Budget

In terms of the budget under Volume 1, Table 4 presents a summary of the figures (Pruaitch, 2016). The total budget (i.e. expenditure) for 2017 is estimated at K13.35 billion and with an expected total revenue of K11.47 billion; there is a budget deficit of K1.88 billion (-3.3 percent of GDP). Total revenue is lower in 2017 than the 2016 Supplementary Budget, by 2.1 percent, while the total expenditure is slightly higher, by 0.5 percent.

Table 4: Budget summary, based on Volume 1 of 2017 Budget

Items	2016-S* (K million)	2017 (K million)	% share (2017)	Rank (2017)	2016-S to 2017 % change
1. Summary					
1.1 Total revenues	11,722.1	11,473.2			-2.1
1.2 Total expenditure	13,280.9	13,349.5			0.5
1.3 Surplus (+)/deficit (-)	-1,558.8	-1,876.3			20.4
% of GDP	-3.0	-3.3			7.9
2. Revenues	**11,722.1**	**11,473.2**	**100**		**-2.1**
2.1 Tax revenue	8,825.8	9,182.2	80	1	4.0
2.2 Grants	1,948.0	1,045.3	9	3	-46.3
2.3 Other revenue	948.3	1,245.7	11	2	31.4
3. Expenses	**13,280.9**	**13,349.5**			**0.5**
3.1 Administration	2,203.5	2,732.3	20.5	2	24.0
3.2 Community & Culture	168.5	224.6	1.7	9	33.3
3.3 Debt services	1,479.6	1,382.9	10.4	3	-6.5
3.4 Economic	452.4	397.9	3.0	8	-12.0
3.5 Education	1,255.4	1,162.5	8.7	5	-7.4
3.6 Health	1,536.7	1,221.5	9.2	4	-20.5
3.7 Law & Justice	1,232.6	1,124.5	8.4	6	-8.8

[8] This is vital in the context of modelling assumptions of this study, which focuses on the key enablers.

Items	2016-S* (K million)	2017 (K million)	% share (2017)	Rank (2017)	2016-S to 2017 % change
3.8 Provinces	3,565.8	3,989.9	29.9	1	11.9
3.9 Transport	1,025.2	897.2	6.7	7	-12.5
3.10 Utilities	361.2	216.2	1.6	10	-40.1
GDP	**51,386.4**	**57,337.6**			**11.6**

Source: 2017 Budget Books.

*S denotes Supplementary Budget 2016.

In terms of the breakdown of total revenues, most revenues come from taxes (80 percent) with the remaining 20 percent coming from grants (9 percent) and other revenues (11 percent). Other revenues constitute dividends, rent, sale of goods and services, fines, penalties, profits and transfers not classified elsewhere. The total revenue is 2.1 percent lower than the 2016 Supplementary Budget, which is due to a fall in grants (-46.3 percent), which more than offset the increases in tax revenue (4 percent) and other revenues (31.4 percent).

On the expenditure side, total expenditure in 2017 (K13.35 billion) is lower than the Supplementary Budget figure (K13.28 billion) by 0.5 percent. In terms of the sector breakdown, provincial governments constitute the largest share of the total expenditure at about K4 billion (30 percent). This is followed by administration with K2.73 billion (21 percent) and debt services with K1.38 billion (10 percent), which represents interest payments and borrowing-related charges.[9] The remaining sectors have single digit shares. The sectoral breakdown reflects the Government's focus on districts/provinces (via PSIP, DSIP, LLGSIP, WSIP), continued funding of National Government institutions, and repayment of loans.[10]

Numbers according to Volume 2 of the 2017 Budget and Appropriation Bills

As well as Volume 1 of the budget, it has two other volumes[11] and three Appropriation Bills.[12] Under Volume 2 and the Appropriation Bills, the appropriated expenditure amount is K21.40 billion, of which:[13]

- K21.09 billion is for general public services under the *Appropriation (General Public Services 2017) Bill 2016;*
- K0.21 billion is for Judiciary expenses under the *Appropriation (Judiciary Services 2017) Bill 2016*;
- K0.10 billion is for the activities of the National Parliament under the A*ppropriation (National Parliament 2017) Bill 2016.*

[9] This amount does not include amortisation (i.e. repayment of principal).

[10] PSIP = Provincial Services Improvement Program; DSIP = District Services Improvement Program; LLGSIP = Local Level Government Services Improvement Program; WSIP = Ward Services Improvement Program. In the 2017 Budget, the funding for each is as follows: PSIP = K10 million per province (K220 million for 22 Provinces); DSIP = K10 million per district (K890 million for 89 Districts); LLGSIP = K100,000 per LLG (K32.6 million for 326 LLGs); and WSIP = K10,000 per ward (K61.18 million for 6,118 Wards). In total, K1,203.78 million (9% of total budget) will be disbursed under these 'SIPs'.

[11] The documents are: *Volume 2(a): 2017 Budget Estimates of Revenue and Expenditure for National Government Departments* (Department of Treasury, 2016); *Volume 2(b): 2017 Budget Estimates of Revenue and Expenditure for National Government Departments* (Department of Treasury, 2016); *Volume 2(c): 2017 Budget Estimates of Revenue and Expenditure for National Government Departments* (Department of Treasury, 2016); *Volume 2(d): 2017 Budget Estimates of Revenue and Expenditure for Statutory Authorities, Provincial Governments, Debt Services, and Trust Accounts* (Department of Treasury, 2016); and *Volume 3: Public Investment Program, 2017–2021* (Department of National Planning and Monitoring, 2016).

[12] The purpose of the *Appropriation (Judiciary Services 2017) Bill 2016* was "to provide a sum of K207,600,563 for the activities of the Judiciary for the year ending 31 December 2017, as required under Section 209 (2) (b) (iii) of the *Constitution* as amended". The purpose of the *Appropriation (National Parliament 2017) Bill 2016* was "to provide a sum of K106,877,478 for the activities of the National Parliament for the year ending 31 December 2017, as required under Section 209 (2) (b) (i) of the Constitution as amended".

[13] On page 1 of the Appropriation Bill for General Public Services, it states: "The purpose of the *Appropriation (General Public Services Expenditure 2017) Bill 2016* is to appropriate a sum of K21,418,878,496 for expenditure for the year ending 31 December 2017 as required under Section 209 (2) (c) of the *Constitution* as amended".

However, it must be noted that page 1 of the Appropriation Bill for General Public Services states that: "The purpose of the *Appropriation (General Public Services Expenditure 2017) Bill 2016* is to appropriate a sum of K21.42 billion for expenditure for the year ending 31 December 2017 as required under Section 209 (2) (c) of the *Constitution* as amended". This means that out of the sum of the three items above (i.e. K21.40 billion), there is an unexplained amount (K15.82 billion). This needs clarification, whether it was just a typo or otherwise.

Table 5 presents the figures according to the Appropriation Act on General Public Services; that is, the K21.09 billion. It is presented here to explain the difference with the budget in Table 3 (i.e. as presented in Volume 1 of the 2017 Budget).

Table 5: Summary of Appropriation Bill numbers for General Public Services, 2017

Item	Amount	% share
Total appropriation	**21,088,585,213**	**100.0**
Operational	**17,157,785,213**	**81.4**
Acquisition of existing assets.	12,754,671	0.1
Capital formation.	49,330,448	0.2
Debt services.	9,920,598,266	47.0
Goods and services.	1,661,289,440	7.9
Grants, subsidies & transfers.	2,819,503,128	13.4
Personnel emoluments.	2,183,375,354	10.4
Utilities, rentals and property cost.	510,933,906	2.4
Capital	**3,930,800,000**	**18.6**
Direct Government financing.	2,509,865,000	11.9
Estimated concessional loans.	452,835,000	2.1
Estimated donor grants.	968,100,000	4.6

Source: Appropriation (General Public Services 2017) Bill 2016, National Parliament.

As Table 5 shows, 81.4 percent of the total appropriation (or K17.2 billion) is for operational payments with the balance for capital payments. Comparing the figures from this table to those in Volume 1 of the budget (see Table 4), shows that the peculiar figure is that for debt sservices. While in Table 5 the figure is K9.9 billion (or 47 percent of total payments), in Table 4 (Item 3.3) debt services was only K1.4 billion (or 10.4 percent of total expenditure).[14] This implies that a difference of K8.5 billion is for repayment of the debt principal (amortisation). This is reflected in Volume 2a of the budget (p.9). Technically, the repayment of the principal is not an expense for 2017 but is a reflection of a reduction in liability (balance sheet). However, there is still a question of where funding is to be sourced to fund this liability reduction? The K1.4 billion is an interest payment which is an expense for 2017 (see Volume 2a, p.8).

Context to the study

Following the three previous reports in this series on economic modelling by the PNG NRI (i.e. July 2015, December 2015 and July 2016), the focus is on the funding for the key enablers, as espoused by the key development plans (*PNG Vision 2050, DSP 2010–2030* and medium-term development plans). That is, adequate funding for the key enablers is the foundation for sustained growth and economic and social development. Productivity growth has been the driver of the impressive economic growth seen in PNG's East Asian neighbours, and the mechanism for achieving this has always been public investment in the enablers. The previous three reports have shown that the austerity measures employed by the Government, which commenced in 2015, have meant that

[14] A loan payment consists of both an interest payment and a payment to reduce the loan's principal balance. The interest portion is an expense whereas the principal portion is a reduction of a liability such as loans payable. In this case, out of the K9.9 billion, K8.5 billion is for repayment of principal (see Volume 2a), which represents a reduction in liability, hence only K1.4 billion is an expense for interest payment. This K1.4 billion is reflected in Table 4 under expenditure item 3.3 (Debt services).

the key enablers have not received proper funding, despite the good *policy intentions*.

For 2017, the austerity measures will continue – as can be seen in Table 4 by comparing the 2016 Budget (after Supplementary Budget adjustments) and the 2017 Budget – with reductions in funding for:

- Economic (-12.0 percent);
- Health (-20.6 percent);
- Education (-7.4 percent);
- Transport (-12.5 percent);
- Law and Justice (-8.8 percent);
- Utilities (-40.1 percent).

The only positive growth is in the areas of administration (24 percent), community and culture (33.3 percent), and provinces (12 percent). These appear to be driven by preparations for APEC 2018, the 2017 national elections, and continued support for PSIP, DSIP, LLGSIP and the newly introduced Ward SIP – all under the District Development Authority umbrella. If the funding to the provinces does support the key enablers then that would mitigate the reduction in funding for key enabler items presented above.

There is considerable uncertainty surrounding fiscal and development policy and the path the economy takes is heavily influenced by what the Government chooses to do. Uncertainty is exacerbated by the LNG Project with revenue streams difficult to predict, and policy surrounding these adding to uncertainty. For example, the diversion of the Government's share of LNG income to the state-owned Kumul Petroleum means the extent that these revenues make their way to the budget is left to the discretion of the Board of Kumul Petroleum.

The rest of this paper uses PNGGEM to provide the modelling assumptions and results of the modelling work for 10-year forecasts in the context of the above policy direction and uncertainty.

The 10-year economic outlook for PNG

Assumptions and methodology for the 10-year forecasts

As in previous editions of the NRI series *Review and Forecast of the PNG Economy*, 10-year forecasts for the PNG economy are generated using the economic model PNGGEM. Details about PNGGEM are outlined in the first edition (Levantis & Sanida, 2015). Broadly, PNGGEM is designed in accordance with the building blocks of the economy – particularly households, businesses, Government, foreign trade, employment, land and capital – and incorporates dynamics such as population growth, investment, depreciation and investment-led productivity growth. The forecasts are generated from these dynamics in the model which is in turn influenced by the structure of the building blocks.

In addition, the forecasts are influenced by a number of key assumptions we put into the model, including:

- commodity price forecasts from the IMF and World Bank reported in Table 1;
- forecast production profiles in mining, oil and gas reported in Table 2 (excluding the Papua LNG Project for reasons outlined later);
- the level of Government spending and fiscal deficits – in other words, the extent of fiscal expansion/ contraction;
- public investments in the key economic enablers of education, higher education, transport infrastructure, utility infrastructure, law and order, and land.

Forecasts are generated for two scenarios to reflect alternative approaches to fiscal and development policy. It is considered important to generate these two sets of forecasts because of the considerable uncertainty surrounding fiscal and development policy discussed earlier. The two scenarios are differentiated by the following approaches to fiscal and development policy.

1. Vision forecast scenario – assumes the Government reverts to policies of fiscal expansion and public investment in the enablers in accordance with the development plans of *PNG Vision 2050* and the *PNG DSP 2010–2030* over the forecast period 2017–2026. For this, it is assumed all revenues flowing from the LNG Project make their way to the budget.
2. Austerity forecast scenario – assumes the policy of austerity in place since 2015 will continue for the period 2017–2026. This approach will see LNG Project revenues continue to be diverted to Kumul Petroleum and to debt repayment.

The differences between these two scenarios are detailed in Table 6. For 2017, the two scenarios are the same because the fiscal stance for 2017 was fixed in by the 2017 Budget. Importantly, it is assumed for the purposes of the modelling that the Papua LNG Project does not proceed by 2026, despite the high likelihood that it will go ahead. The rationale for doing this is that the large scale of the project will lead to significant economic impacts which will only be realistic if we get the timeline right. Given the uncertainty about the timeline for the Papua LNG Project it is thought best to generate forecasts interpreted as *excluding* the Papua LNG Project.

Table 6: Differences in modelling assumptions in the forecast scenarios for 2017–2026

	Vision forecast	**Austerity forecast**
Fiscal policy	Budget assumed to be brought to a tighter deficit of 1% of GDP by 2021 *inclusive* of all LNG tax and income revenues, and then kept constant over 2022–2026.	Spending over 2017–2021 kept in line with the 2017 Budget. For 2022–2026 the budget surplus is assumed fixed at the 2021 level.
Land policy	Consistent with *PNG Vision 2050* and *PNG DSP 2010–2030.*	Unchanged and consistent with *PNG Vision 2050* and *PNG DSP 2010–2030* due to the low cost of implementation.
Law and order policy	Consistent with *PNG Vision 2050* and *PNG DSP 2010–2030* (police strength increases 4-fold by 2030 and crime rates halve).	Initiatives for improving law and order removed due to lack of funding.
Education policy	Consistent with *PNG Vision 2050* and *PNG DSP 2010–2030* (universal education by 2020).	Initiatives for improving education scaled back due to lack of funding. Universal education assumed to be delayed to 2025.
Higher education policy	Consistent with *PNG Vision 2050* and *PNG DSP 2010–2030* (215,000 tertiary graduates over 2015–2030).	Initiatives for improving higher education scaled back due to lack of funding; 135,000 tertiary graduates assumed over 2015–2030.
Electricity infrastructure	Consistent with *PNG Vision 2050* and *PNG DSP 2010–2030* (expand infrastructure to reach 70% of the population by 2030).	Public investments for expanding electricity infrastructure scaled back due to lack of funding.
Transport infrastructure	Consistent with *PNG Vision 2050* and *PNG DSP 2010–2030* (including doubling the national road network by 2025).	Public investments for expanding transport infrastructure scaled back due to lack of funding.

Macroeconomic growth forecasts, 2017–2026

Revenue flows from PNG's mining, gas and oil resources are expected to be relatively weak over the rest of the decade in the face of low commodity prices. This weighs heavily on the budget and the ability to fund Government spending. As discussed earlier, reductions in spending – especially on the enablers of infrastructure, education and law and order – lead to a substantial negative feedback in economic growth as spending is withdrawn from the economy and productivity growth is constrained by slower progress against the enablers. As a result, GDP growth in 2017 is forecast by PNGGEM to be just 1.8 percent (Table 7). Non-mining GDP growth – which is a much better measure for gauging the health of the PNG economy – is forecast to be just 1.6 percent. With population growth at about 2 percent a year, GDP and non-mining GDP growth per capita is expected to decline in 2017.

Under the Vision scenario, non-mining GDP growth is forecast to recover to 4.2 percent in 2018 and average 4.2 percent over the five-year period 2017–2021 (Table 8). This compares poorly to the developing countries of PNG's neighbourhood of East Asia where growth has typically been in the range of 5–8 percent and is expected to stay that way. Things look even worse if the Government continues on the path of the Austerity scenario with forecast non-mining GDP growth of 2.1 percent in 2018 and average growth of 2.7 percent for the years 2017–2021. The substantial difference in forecasts between the scenarios tells the story of the role of Government spending in the fortunes of the economy.

From 2022, economic growth is expected to pick up again in both scenarios. The Vision scenario forecasts average non-mining GDP growth of 6.5 percent for the period 2022–2026, which is on par with the neighbouring countries of East Asia. For the Austerity scenario, tighter fiscal conditions mean that a more moderate pace of growth of 5.1 percent is expected. The healthy economic recovery in these years comes down to two main factors: (1) both scenarios assume no additional fiscal tightening beyond 2021; and (2) stimulus will be provided by new mining projects outlined earlier, including Wafi-Golpu and Frieda River. Given that the Papua LNG Project has been excluded from our forecasts, there is a very good chance that growth will go much higher than this forecast.

The growth forecasts in the 2017 Budget are a little more optimistic than what PNGGEM is telling us (Table 7). According to the 2017 Budget, non-mining growth will reach 3.7 percent in 2018 before tapering back to 3.5 percent by 2021. The 2017 Budget forecasts should correspond to the Austerity scenario since the level of Government spending for the years 2017–2021 in the Austerity scenario is in accordance with the budget. It is possible that the Treasury forecasts do not fully incorporate the impacts of fiscal austerity.

Table 7: Forecast real GDP and non-mining GDP growth, 2017–2026

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
GDP growth										
Vision scenario	1.8	3.2	3.5	3.8	5.7	6.7	8.8	8.1	5.9	4.9
Austerity scenario	1.8	1.6	2.3	2.5	4.2	5.7	8.0	7.1	4.6	3.4
2017 Budget forecast	2.8	2.6	2.6	2.5	2.6					
Non-mining GDP growth										
Vision scenario	1.6	4.2	4.5	4.9	5.8	6.2	7.3	7.0	6.2	6.0
Austerity scenario	1.6	2.1	3.0	3.2	3.8	4.9	6.1	5.7	4.7	4.3
2017 Budget forecast	2.3	3.7	3.6	3.6	3.5					

Sources: PNGGEM modelling and Table 1 of the 2017 Budget, Volume 1 for the budget forecasts.

National income is an important measure of how well PNG is doing because it takes the total GDP numbers and deducts the net proceeds of GDP that accrue to foreign beneficiaries. Given the high intensity of foreign ownership in mining, oil and gas, the level of national income is much lower than the level of GDP. According to PNGGEM, GDP in 2016 was K67.4 billion compared with national income of just K55.5 billion. This means that K11.9 billion of national production – that is, 18 percent of GDP – accrues to foreign interests. Average annual real national income growth for the years 2017–2026 is expected to match GDP growth at 5.3 percent in the Vision scenario and 4.0 percent in the Austerity scenario (Table 8).

For private consumption, growth exceeds that for national income and GDP, reaching an average of 6.4 percent in the Vision scenario for 2017–2026 and 4.7 percent in the Austerity scenario. The opposite is the case for Government spending, averaging 4.8 percent and 2.8 percent, respectively. PNGGEM is therefore predicting a gradual shift in the structure of the demand side of the economy away from Government and towards consumers.

Export volumes, which are dominated by mining, oil and gas commodities, are expected to grow moderately under both scenarios at 1.9 percent and 1.4 percent a year on average over 2017–2021. This is in keeping with the moderate growth in mineral production expected for this period (Table 2). The rapid pick up in mineral exports early next decade is expected to lead to average growth in total export volumes of 8.0 percent for the Vision scenario in the years 2022–2026, and 7.6 percent in the Austerity scenario (Table 8). The alternative fiscal positions of the two scenarios play little role in the activities of the mining, oil and gas businesses which remain enclave in nature. Therefore, it is not surprising to see little difference in export volumes for the two scenarios.

Table 8: Forecasts for key macroeconomic variables, real percentage changes

	2017		2018		Average 2017–21		Average 2022–26		Average 2017–26	
	Vision	Austerity	Vision	Austerity	Vision	Austerity	Vision	Austerity	Vision	Austerity
GDP	1.8	1.8	3.2	1.6	3.6	2.5	6.9	5.8	5.2	4.1
Non-mining GDP	1.6	1.6	4.2	2.1	4.2	2.7	6.5	5.1	5.4	3.9
National income	1.2	1.2	3.5	1.7	3.7	2.4	6.8	5.6	5.3	4.0
Consumption	5.1	5.1	7.9	9.2	6.9	6.6	5.9	2.7	6.4	4.7
Investment	3.1	3.1	2.6	1.3	4.4	3.7	7.7	7.1	6.1	5.4
Government spending	-6.2	-6.2	4.3	-6.2	2.2	-4.1	7.4	9.6	4.8	2.8
Export volumes	3.5	3.5	0.4	-0.3	1.9	1.4	8.0	7.6	4.9	4.5
Import volumes	5.7	5.7	4.3	3.6	5.3	4.5	7.3	6.1	6.3	5.3
Source: PNGGEM modelling.										

Weak economic growth is expected to be spread across the four regions in 2017, especially in the Southern region where non-mining growth of just 1.3 percent is expected (Table 9). With the National Capital District located in Southern region, it is no surprise to see its economy lagging over the period of belt tightening. This would explain the weak average forecast growth of 3.8 percent and 2.5 percent respectively for the Vision and Austerity scenarios during 2017–2021. Over the 10-year forecast period of 2017–2026, non-mining growth is otherwise expected to be consistent across the remainder of PNG. However, when mining is included, PNGGEM is forecasting much higher average growth of 6.9 percent for both Momase and Islands regions in the Vision scenario as a result of the new mines coming on stream.

Table 9: Forecasts for non-mining gross regional product

	2017		2018		Average 2017–21		Average 2022–26		Average 2017–26	
	Vision	Austerity	Vision	Austerity	Vision	Austerity	Vision	Austerity	Vision	Austerity
Southern region	1.3	1.3	3.9	2.0	3.8	2.5	6.1	4.8	5.0	3.7
Highlands region	1.6	1.6	4.1	2.0	4.2	2.8	7.1	5.9	5.7	4.3
Momase region	2.3	2.3	3.9	1.7	4.2	2.7	6.2	4.8	5.2	3.7
Islands region	1.7	1.7	5.0	3.3	4.8	3.4	6.5	4.3	5.7	3.9
Source: PNGGEM modelling.										

Sectoral economic performance, 2017–2026

Fiscal restraint in 2017 means that the Government sector of the economy is forecast to contract by 3.3 percent (Table 10). This weakness will spill over to the construction sector as public investments are wound back. The remaining sectors are forecast to have subdued growth with commerce and transport leading the way at 3.7 percent and 3.6 percent, respectively.

Under the Vision scenario, the rural sector is expected to flourish with average growth of 5.3 percent over the forecast period 2017–2026 (Table 10). This is a consequence of investment in the enablers of infrastructure and education which would benefit rural areas the most. These investments are scaled back in the Austerity scenario with the consequence that forecast average rural sector growth drops to 2.5 percent over 2017–2026.

For mining, oil and gas there is little to no difference between the scenarios. The pattern of growth for this sector can best be understood by referring to the expected production levels outlined in Table 2. In 2018, no growth is expected as production profiles remain flat. However, growth is expected to continue for the rest of the forecast period as a result of the new mines coming on stream discussed earlier. For the period 2022–2026, average annual growth of 8.2 percent is expected, and this is excluding the anticipated Papua LNG Project. It is therefore expected that PNG will enter another mining boom at the beginning of the next decade.

Solid growth is expected across the services sector in the Vision scenario as we move into the next decade and the tight fiscal policy is eased off. Services are predominantly an urban-based activity, particularly around Port Moresby and the health of the services sector relies heavily on Government spending. Tighter spending in the Austerity scenario will mean much lower sectoral output forecasts across the range of services, although the impact will not be quite as much as is expected for the rural sector.

Table 10: GDP growth by sectors

	2017		**2018**		**Average 2017–21**		**Average 2022–26**		**Average 2017–26**	
	Vision	Austerity	Vision	Austerity	Vision	Austerity	Vision	Austerity	Vision	Austerity
Rural	1.1	1.1	5.8	3.1	4.8	2.7	5.7	2.3	5.3	2.5
Mining, Oil & Gas	2.2	2.2	0.3	0.3	1.6	1.5	8.2	8.2	4.9	4.9
Manufacturing	3.1	3.1	4.2	3.9	4.3	3.8	5.7	4.3	5.0	4.1
Construction	1.3	1.3	3.1	0.4	3.8	2.2	7.4	7.2	5.6	4.7
Commerce	3.7	3.7	4.6	3.4	5.0	4.0	7.2	6.1	6.1	5.1
Transport	3.6	3.6	6.3	4.8	6.3	4.8	8.6	5.2	7.5	5.0
Government	-3.3	-3.3	2.2	-3.7	1.5	-2.0	4.4	2.7	3.0	0.3
Other services	3.0	3.0	4.3	3.2	4.5	3.5	6.5	4.7	5.5	4.1

Source: PNGGEM modelling.

The fiscal outlook, 2017–2026

It is thought that tax and income revenues accruing to the Government are being directly diverted to debt repayment on loans related to the LNG Project. Normal accounting procedure would see these funds being channelled through the budget; however, this does not appear to be the case. In an effort to bring some clarity to the fiscal numbers, Table 11 brings in estimates of the LNG revenues to the bottom line. This provides a clearer picture of the true budget surplus/deficit and debt outlook. The 'unaccounted' LNG revenues in Table 11 are based on an estimate for 2016 which is calculated from information provided in the 2016 Annual Report of Oil Search. The calculations are based on the US$95 million in tax paid by Oil Search in 2016 which mostly comprises tax on income for the Oil Search share of the LNG Project.

The 2017 Budget takes a particularly pessimistic view of the level of Government revenue and spending in the outlook period 2018–2021 (Table 11). Spending is expected to be about the same in 2021 as it was in 2016. After accounting for inflation, this would translate into sharp reductions in real spending and in turn would have a substantial impact on the delivery of core services and infrastructure development. The pessimistic outlook for spending is in turn drawn from pessimistic forecasts of revenue.

It would appear that the 2017 Budget revenue forecasts do not properly take account of inflation or economic growth, nor do they account for any LNG revenues. Under the Austerity scenario—which is designed to track the spending outlook presented in the 2017 Budget—PNGGEM forecasts a stronger revenue outlook, albeit inclusive of LNG revenues, reaching K15.9 billion in 2021 compared with the budget forecast of K13.6 billion (after incorporating unaccounted LNG revenue). The Austerity scenario forecasts translate to a revenue to GDP ratio of a relatively constant 16 percent of GDP. In contrast, the 2017 Budget is predicting a sharp reduction to 13 percent of GDP by 2021, which would appear unrealistic. The story is different for 2017. Whereas the 2017 Budget forecasts revenue of K12.1 billion (after including an estimated K650 million of unaccounted LNG revenue), PNGGEM is forecasting K11.7 billion.

From 2022–2026, the budget surplus is assumed to continue at a constant level in the Austerity scenario, leading to a reduction in Government debt to just 3.7 percent of GDP in 2026. In contrast, Government debt is forecast to be 19.4 percent in the Vision scenario as a result of running budget deficits instead of surpluses. With spending in the Vision scenario directed towards the enablers – in accordance with the Government's development plans – the fiscal stimulus and productivity benefits ultimately lead to much higher tax revenues. In 2021, revenue is forecast to be K0.8 billion higher than the Austerity scenario, growing to K2.8 billion higher in 2026. This pattern of spending being recycled into revenue gains is in keeping with the experience of developing countries that invest in the enablers – particularly in the countries of neighbouring East Asia.[15]

Table 11: Fiscal forecasts, 2017–2026 (K million)

	2017	2018	2019	2020	2021	2026
<u>2017 Budget</u>						
Spending	13,350	12,978	13,216	13,425	13,607	
Revenue	11,473	11,139	11,646	12,210	12,907	
Budget surplus	-1,877	-1,839	-1,570	-1,215	-700	
Unaccounted LNG revenuea (estimated)	650	650	650	650	650	
Estimated true revenue	12,123	11,789	12,296	12,860	13,557	
Estimated true budget surplus	-1,227	-1,189	-920	-565	-50	
Net Government debtb	21012	22201	23121	23686	23736	
<u>Vision scenario</u>						
Spending	13,334	14,481	15,395	16,586	18,297	32,052
Revenue	11,698	12,884	13,878	15,048	16,735	30,490
Budget surplus	-1,636	-1,598	-1,517	-1,539	-1,562	-1,562
Net Government debt	21,421	23,018	24,535	26,074	27,636	35,446
Net debt % of GDP	28.9%	28.4%	27.9%	27.4%	26.3%	19.4%
<u>Austerity scenario</u>						
Spendingc	13,334	13,079	13,231	13,384	13,522	25,283
Revenue	11,698	12,706	13,551	14,520	15,903	27,664
Budget surplus	-1,636	-374	320	1,136	2,381	2,381
Net Government debt	21,421	21,794	21,474	20,338	17,957	6,051
Net debt % of GDP	28.9%	27.3%	25.1%	22.2%	18.1%	3.7%

Source: Budget numbers for 2017–2021 come from the 2017 Budget.

Note *a*: The level of unaccounted LNG revenue is assumed to be based on estimates for 2016, which is in turn estimated based on information in the Oil Search Annual Report 2016.

Note *b*: It is unclear whether net government debt is inclusive of debt related to LNG. Here it is assumed that it is inclusive and that unaccounted for LNG revenues are being used to pay down that debt.

Note *c*: Spending in the Austerity scenario is assumed to be the same as in the 2017 Budget, but rounding in the modelling process means that they are approximate to each other.

Outlook for employment, 2017–2026

Employment creation is perhaps the best measure of economic progress for PNG. It is not only a key indicator of economic growth, but is a measure of the level of economic participation and social welfare. More than 30,000 jobs a year are expected to be created in the Vision scenario from 2017–2021, rising to more than 47,000 jobs a year from 2022–2026 (Table 12). This includes both wage jobs and self-employment in micro businesses, which is especially important in rural PNG. Of the 389,000 jobs expected to be created from 2017–2026, nearly 212,000 are in rural-based industries. It is not surprising that most job creation will occur in rural areas since

[15] For example, see Commission on Growth and Development (2008).

this is where most of the population are already economically engaged and where most gains will be made from investment in the enablers. The other key area of job creation is the urban-based services sector, which is expected to gain 132,000 jobs over 2017–2026. Despite the large new developments in the vast mining, oil and gas sector, employment generation is expected to be a more modest 31,000 by 2026.

For the Austerity scenario, the growth in mining, oil and gas employment is expected to be much the same. However, just 89,000 jobs are expected to be created in services and only 71,000 in rural industries – one-third the level of rural job creation of the Vision scenario. In total, 201,000 jobs are expected to be created in the Austerity scenario, leaving about 188,000 people missing out on work they would have had in the Vision scenario. Putting these numbers in context, the working-age population of PNG grows by about 100,000 each year.

Table 12: Employment creation by sectors, 2017–2026

	2017	2018		Average growth 2017–21		Average growth 2022–26		Average growth 2017–26		TOTAL 2017–26	
		Vision	Austerity	Vision	Austerity	Vision	Austerity	Vision	Austerity	Vision	Austerity
Rural	-5,574	24,769	10,794	18,784	8,041	23,523	6,081	21,153	7,061	211,532	70,610
Mining, Oil & Gas	8,401	171	-271	2,179	1,972	4,009	4,016	3,094	2,994	30,943	29,940
Manufacturing	356	714	482	771	609	1,197	971	984	790	9,840	7,902
Services	67	7,383	-843	8,208	3,253	18,157	14,513	13,182	8,883	131,824	88,831
Urban informal	387	604	646	551	522	486	288	519	405	5,188	4,052
Total	3,636	33,641	10,808	30,494	14,397	47,372	25,869	38,933	20,133	389,328	201,334

Source: PNGGEM modelling.

Conclusions

This December 2016 issue of the NRI's modelling report on the PNG economy uses the 2017 Budget and its key assumptions as the context and provides forecasts of key economic variables for the period 2017 to 2026. The forecasts were generated by PNGGEM – an economy-wide model of the PNG economy. Two scenarios were modelled. The first one was the Vision forecast scenario which assumes that the Government reverts to policies of fiscal expansion and public investment in the enablers in accordance with the development plans of *PNG Vision 2050* and the *PNG DSP 2010–2030* over the forecast period 2017–2026. A key assumption under this scenario is that all revenues flowing from the LNG Project make their way to the budget. The other scenario is the Austerity forecast which assumes that the policy of austerity in place since 2015 will continue for the period 2017–2026. With this approach, LNG Project revenues will continue to be diverted to Kumul Petroleum and to debt repayment.

The main modelling results and conclusions are as follows:

- In terms of non-mining GDP growth (the most suitable measure of the performance of the PNG economy), under the Vision scenario, it is expected to average around 4.2 percent annually from 2017 to 2021 and improve to 6.5 percent from 2022 to 2026. This contrasts with the Austerity scenario, where the average annual non-mining GDP growth for 2017–2021 is only 2.7 percent and with recovery to 5.1 percent for the 2022–2026 period (but still lower than the Vision scenario).
- For national income, which is a vital measure of how well PNG is doing (i.e. what accrues to Papua New Guineans out of the total income or GDP), the average annual growth under the Vision scenario for 2017–2016 is 5.3 percent compared with the lower average of 4 percent for the Austerity scenario. This implies that the austerity measures would penalise Papua New Guineans in terms of income losses.
- In terms of the demand side of the economy, PNGGEM is predicting a shift away from Government towards consumers. Average private consumption growth for the forecast period (2017–2026), is 6.4 percent under the Vision scenario and 4.7 percent under the Austerity scenario. In contrast, Government consumption is expected to grow slower at 4.8 percent for the Vision scenario and 2.8 percent for the Austerity scenario.
- For exports, the alternate fiscal positions of the two scenarios play little role given the enclave nature of the mining industry which dominate PNG exports. Average growth is 1.9 percent and 1.4 percent for 2017–2021 for the two scenarios, respectively, while it is 8 percent and 7.6 percent for the 2022–2026 period.
- In terms of sector performance, in 2017, the overall conclusion is that the sectors are expected to perform better under the Vision scenario than under the Austerity scenario. This is because under the Vison scenario, the higher spending by Government will have positive flow-on effects in terms of investment in the key enablers which in turn positively affect the economy. On the other hand, under austerity conditions, cuts in Government spending would adversely affect the positive flow-on effects. The mining and petroleum sector is the only sector that would not be directly affected by Government spending changes, given the enclave nature of the sector.
- In terms of fiscal outlook, the 2017 Budget takes a grim view of the level of Government revenues, which translates to grim spending forecasts. This grim view appears to be due to the budget not properly accounting for inflation, economic growth and LNG revenues. PNGGEM forecasts a more optimistic outlook (inclusive of LNG revenues) with total revenue reaching K15.9 billion in 2021 (budget forecast is K13.6 billion) under the Vision scenario. For the Austerity scenario, PNGGEM forecasts a revenue to GDP ratio of 16 percent of GDP, which is more optimistic than the budget forecast of 13 percent of GDP, by 2021. For the 2022–2026 period, under the Vision scenario, the fiscal stimulus and productivity benefits lead to higher tax revenues growing to K2.8 billion higher than the austerity case. This mirrors the experience in developing economies that invest in key enablers which recycles into revenue gains, especially in neighbouring East Asia.
- Finally, for employment creation – which is a key indicator of economic growth, economic participation

and social welfare – the outlook is again better under the Vision scenario than the Austerity one. Under the Vision scenario, about 389,000 jobs are expected to be created for the 2022–2026 period. In contrast, under the Austerity scenario, only 201,000 are expected to be created for the period, which implies that about 188,000 people will miss out on work they would have had under the Vision scenario.

As in the previous papers in the series, the key message from the modelling results is that focus on the key enablers is vital for economic growth and development, consistent with the experience in the developing economies where investment in the key enablers has been a priority. In PNG's case, the funding arrangements under the various development plans (e.g. *PNG Vision 2015, DSP 2010–2030*) represent the better scenario to achieve development outcomes compared with the austerity measures in recent times.

References

Asian Development Bank. (2015). *Key Indicators for Asia and the Pacific*. Retrieved from http://www.adb.org/publications/series/key-indicators-for-asia-and-the-pacific (accessed May 2015).

Barrick Gold Corporation. (2017). *Barrick Gold Corporation Annual Report 2016*. Retrieved from http://barrick.q4cdn.com/808035602/files/annual-report/Barrick-Annual-Report-2016.pdf (accessed May 2017).

Bougainville Copper Ltd. (2017). 'Project Status – Bougainville Copper Ltd'. Retrieved from http://www.bcl.com.pg/investors-2/legal/ (accessed May 2017).

Commission on Growth and Development. (2008). *The Growth Report: Strategies for Sustained and Inclusive Development.* Washington: World Bank.

ExxonMobil. (2016). *ExxonMobil 2016 Summary Annual Report.* Retrieved from http://cdn.exxonmobil.com/~/media/global/files/summary-annual-report/2016_summary_annual_report.pdf (accessed May 2017).

Harmony. (2017). *Harmony Investor Brief May 2017*. Retrieved from https://www.harmony.co.za/investors/reporting (accessed May 2017).

Highlands Pacific. (2017). *Quarterly Activities Report – period ended 31 March 2017*. Retrieved from http://www.highlandspacific.com/financial-reports (accessed May 2017).

International Monetary Fund. (2017a). *World Economic Outlook, April 2017.* Retrieved from http://www.imf.org/external/pubs/ft/weo/2016/01/pdf/text.pdf (accessed 16 May 2017).

International Monetary Fund. (2017b). 'IMF primary commodity prices'. Retrieved from http://www.imf.org/external/np/res/commod/index.aspx (accessed 16 May 2017).

IRC. (2016). 'Incentives for mining and petroleum designated projects'. Retrieved from http://irc.gov.pg/tax-information/tax-incentives/ (accessed December 2016).

KPHL (Kumul Petroleum Holdings Limited). (2017). 'Kumul Petroleum Holdings Ltd Home Page'. Retrieved from http://kumulpetroleum.com/ (accessed May 2017).

Kula Gold Ltd. (2017). *Kula Gold Ltd 2016 Annual Report*. Retrieved from http://clients3.weblink.com.au/pdf/KGD/01844213.pdf (accessed May 2017).

Levantis, T. (2004). PNGGEM: ABARE's Model of the Papua New Guinea Economy. Canberra: Australian Bureau of Agricultural and Resource Economics.

Levantis, T., & Sanida, O.O. (2015). *Mid-year review and forecast of the PNG economy: July 2015 Issue* (PNG NRI Discussion Paper 144). Port Moresby: Papua New Guinea National Research Institute.

Levantis, T., & Sanida, O.O. (2016). *Review and forecast of the PNG economy: December 2015 Issue*, (PNG NRI Discussion Paper 147). Port Moresby: Papua New Guinea National Research Institute.

Levantis, T., & Sanida, O.O. (2017). *Mid-year review and forecast of the PNG economy: July 2016 Issue*, (PNG NRI Discussion Paper 153). Port Moresby: Papua New Guinea National Research Institute.

Nautilus Minerals Inc. (2017). *Annual Information Form for the Year Ended 31 December 2016*. Retrieved from http://www.nautilusminerals.com/irm/PDF/1892_0/AnnualInformationFormforfiscalyearendedDecember312016 (accessed May 2017).

Newcrest Mining Ltd. (2017). *Newcrest Mining Ltd Half Year Results FY17*. Retrieved from http://www.newcrest.com.au/media/market_releases/2017/HY17_Market_Release.pdf (accessed May 2017).

Oil Search. (2017). *10 Year Summary*. Retrieved from http://www.oilsearch.com/investors/10-year-summary (accessed May 2017).

Oil Search Ltd. (26 August 2016). *The power of partnership: Annual Report 2016*. Retrieved from http://www.oilsearch.com/__data/assets/pdf_file/0003/7788/170407-OSH-2016-Annual-Report.pdf (accessed February 2018).

Pruaitch, P. (2016). 2017 *National Budget. Volume 1: Economic and Development Policies.* Retrieved from http://www.treasury.gov.pg/html/national_budget/files/2017/2017%20Budget%20Volume%201%20Economic%20and%20Development%20Policies.pdf (accessed February 2018).

St Barbara Ltd. (2017). *St Barbara Ltd Annual Report 2016*.Retrieved from. http://www.stbarbara.com.au/fileadmin/user_upload/documents/annual-reports/St_Barbara_Limited_Annual_Report_2016.pdf (accessed May 2017).

World Bank. (2017). *Commodity Markets Outlook, April 2017*. Retrieved from http://www.worldbank.org/en/research/commodity-markets (accessed May 2017).

THE NATIONAL RESEARCH INSTITUTE
PAPUA NEW GUINEA

inquire, inform, influence

The National Research Institute, PO Box 5854, Boroko, Port Moresby, National Capital District 111, Papua New Guinea; Telephone +675 326 0300; Email: pngnri@nri.org.pg

This and other NRI publications are available from www.pngnri.org.

“This publication is supported by the Australian Government in partnership with the Government of Papua New Guinea.”

PNGAus Partnership