



Reserve Bank of New Zealand Analytical Notes

GDP Plus: An economic activity indicator for New Zealand

AN2020/01

Michael Callaghan and Thomas van Florenstein Mulder

January 2020

Reserve Bank of New Zealand Analytical Note Series
ISSN 2230-5505

Reserve Bank of New Zealand
PO Box 2498
Wellington
NEW ZEALAND

www.rbnz.govt.nz

The Analytical Note series encompasses a range of types of background papers prepared by Reserve Bank staff. Unless otherwise stated, views expressed are those of the authors, and do not necessarily represent the views of the Reserve Bank.

1. Introduction

At the Reserve Bank of New Zealand we rely on gross domestic product (GDP) data to support our assessment of the state of the economy. GDP in New Zealand is measured on a quarterly basis using two different approaches. Production GDP measures the total value of goods and services produced in New Zealand. Expenditure GDP measures the purchases of final goods in New Zealand, and also includes net exports. In theory, these two estimates should be equal. However these measures are created using different data sources and are therefore subject to different measurement errors as well as large revisions.

In this paper we seek to reduce the noise in the current vintage of GDP data by supplementing it with signal from the labour market.

We develop an economic activity indicator for New Zealand using production GDP, expenditure GDP and employment data that is smoother and also less vulnerable to revisions than conventional GDP measures. Our estimation strategy is based on the dynamic factor model of Aruoba et al. (2013).

The estimated indicator, known as GDPplus has several advantages over the published GDP vintages; less volatility, greater predictability, and smaller revision properties.

2. How does this help improve policy at the Reserve Bank?

As discussed above, there is a large amount of noise in the published GDP data. If we can create a measure that reduces this noise then we can attain a clearer picture on the performance of the New Zealand economy. This would help policy makers at the RBNZ to make more informed and accurate policy decisions.

3. What work has been done on this topic before?

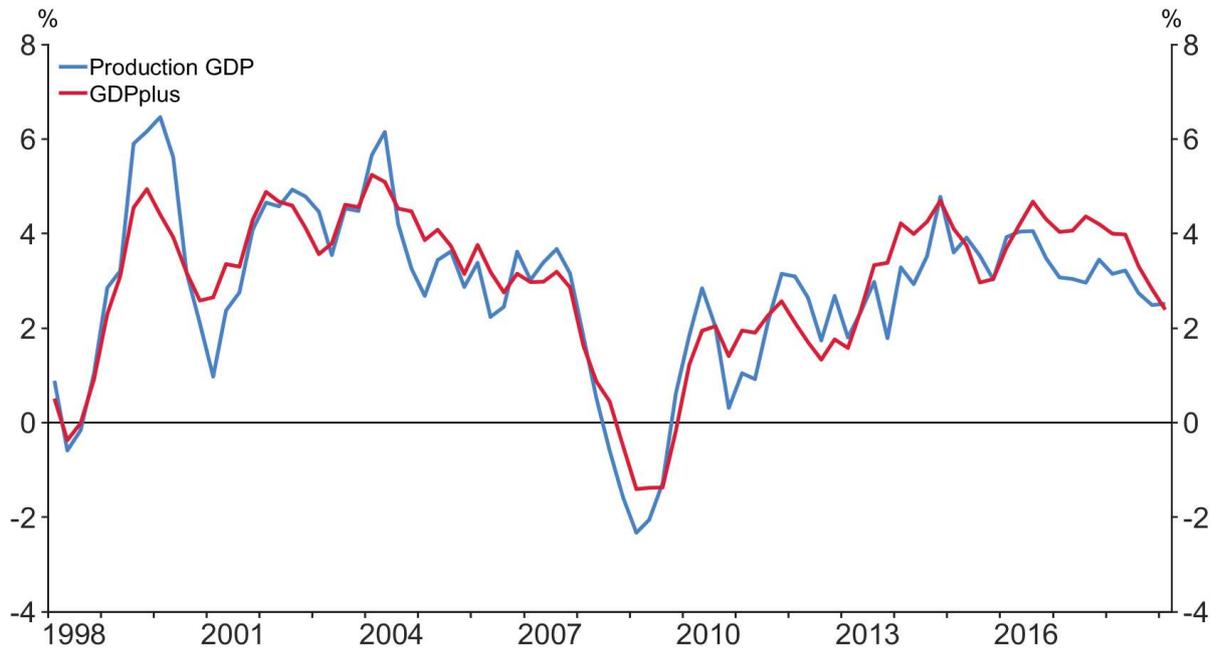
A number of countries have implemented similar work, notable examples of this include Aruoba et al. (2013) for the United States and Rees et al. (2014) for Australia. Put simply these studies (and subsequently this work) use the economic activity signal contained in employment data to help reduce the noise of the early vintage GDP data. A more comprehensive description of our approach is available in the technical appendix.

4. What are the key results of our approach?

Figure 1 shows the GDPplus growth measure, alongside production GDP growth. GDPplus growth has diverged from production GDP growth over the past two years, however recent

estimates indicate the GDPplus and production GDP are signalling similar levels of economic activity in New Zealand.

Figure 1: Production GDP and GDPplus growth (quarterly, annualised)



Production GDP and GDPplus have similar average quarterly annualised growth rates, but GDPplus has lower variance than official GDP measures and employment growth (table 2). The GDPplus measure also has more persistence, suggesting greater predictability.

Table 2: Descriptive statistics

	Production GDP	Expenditure GDP	Employ. growth	GDPplus
Mean	2.57	2.71	1.47	2.63
S.D.	3.10	4.33	2.71	2.31
AR(1) coefficient	0.32	-0.01	0.41	0.79

Note: Table data is based on average quarterly annualised growth rates. The sample period is 1987Q3:2018Q4.

5. Does GDPplus help increase the signal in GDP growth data?

This section evaluates the GDPplus measure against other measures of activity. We first evaluate the real-time performance of the GDPplus measure, compared to the published GDP data real-time performance.

To examine the real-time performance of our GDPplus measure, we re-estimate the model over an expanding window. This shows what the model would have estimated with the information available at the time.

We start the real-time estimation in 1997Q1, using the real-time vintage of GDP and employment data from 1987Q3:1997Q1. We re-estimate the model each quarter with the next quarter of data, and update the data for any revisions that took place in that quarter.

Figure 2: Production GDP growth (quarterly, annualised)

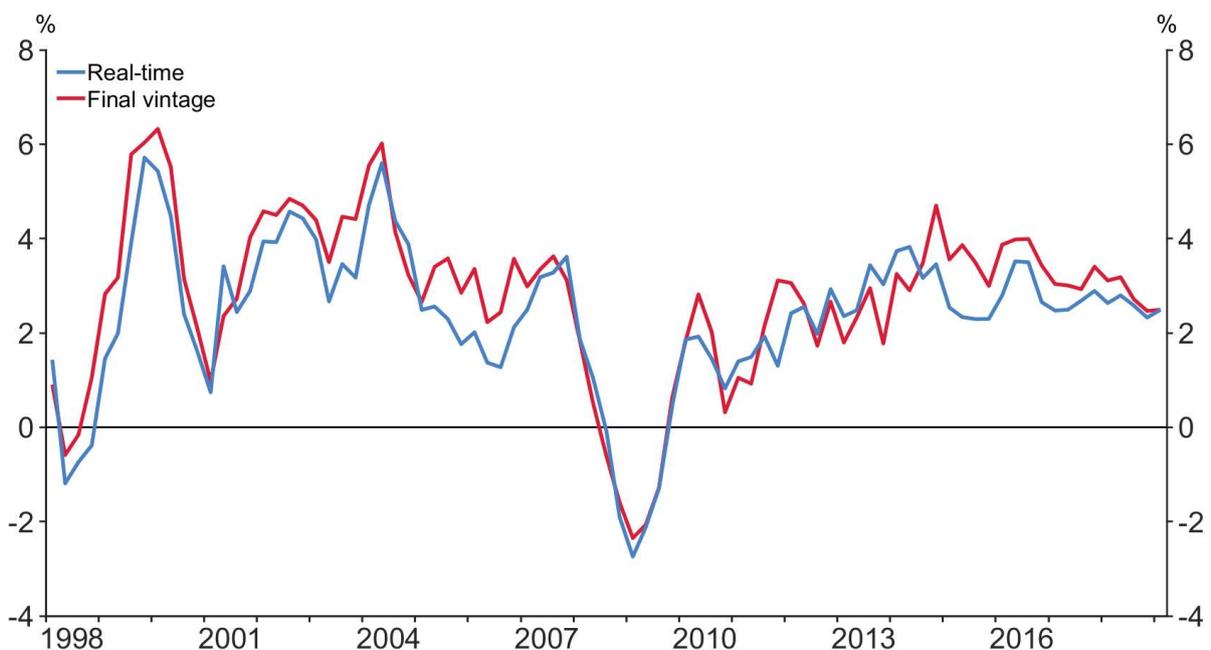
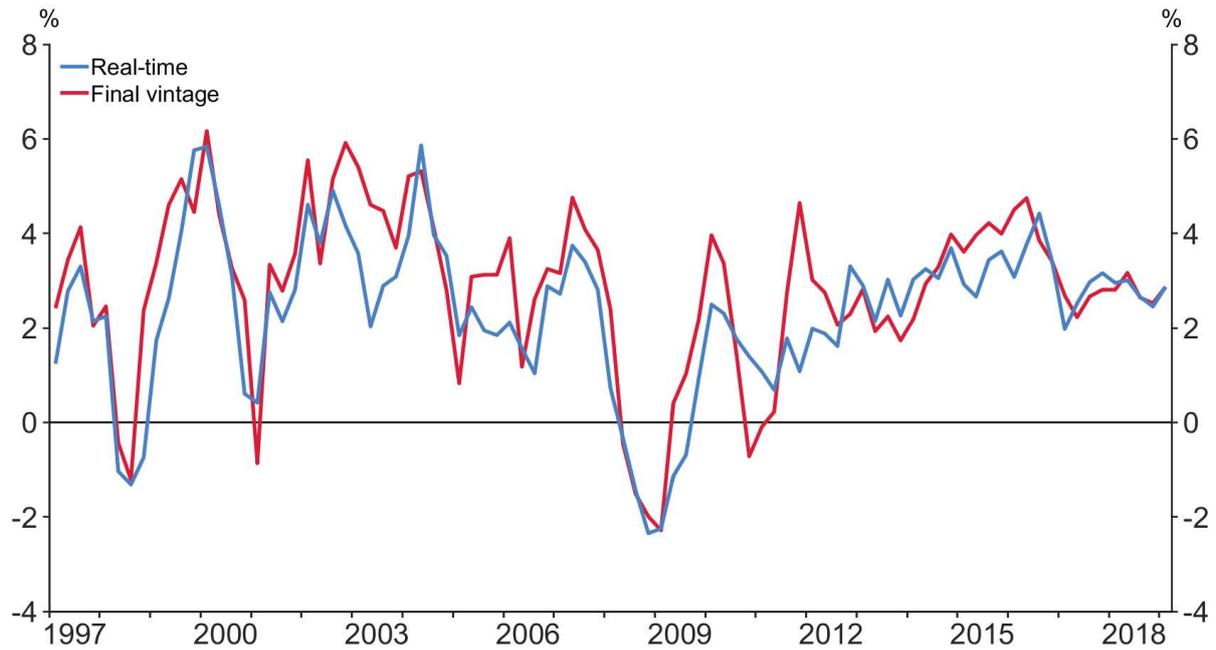
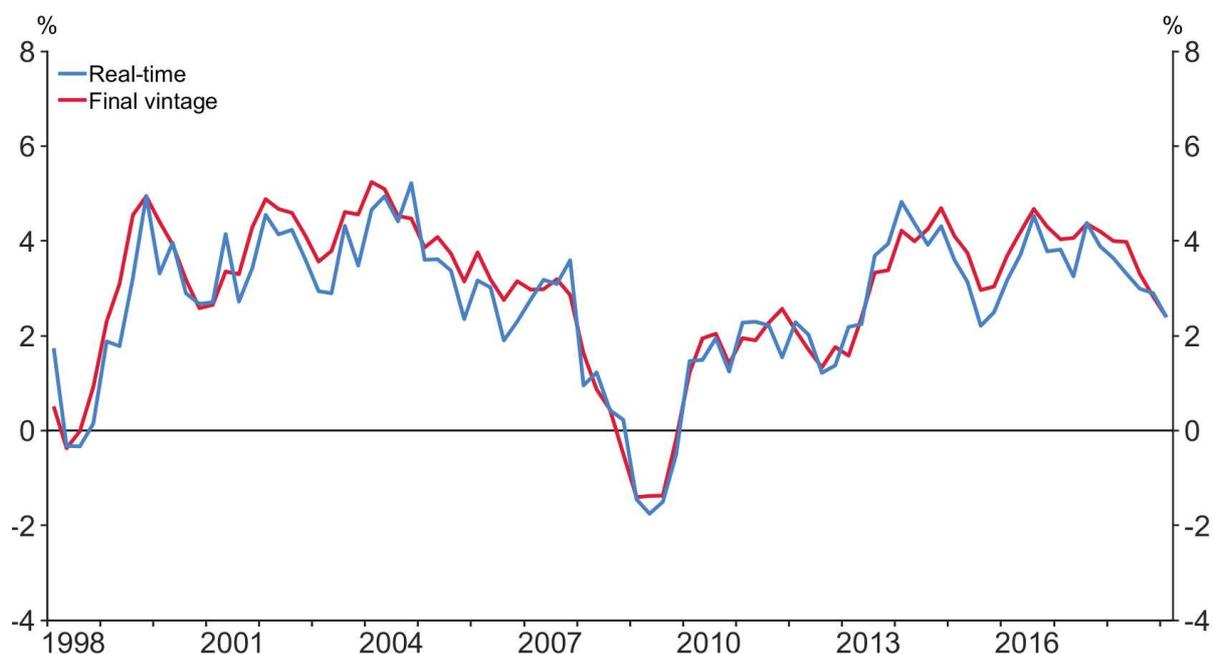


Figure 3: Expenditure GDP growth (quarterly, annualised)



Figures 2, 3 and 4 show the annual GDP growth estimates in real-time, compared to their current vintage estimates (2018Q4), for production GDP, expenditure GDP and GDPplus respectively. Table 4 shows that over this period the GDPplus measure exhibits lower mean absolute revision compared to the two current GDP estimates. This indicates that GDPplus may be a more reliable estimate of economic activity in real-time compared to the traditional activity measures.

Figure 4: GDPplus growth (quarterly, annualised)



The smaller revisions for the GDPplus measure seen in the figures are confirmed by the statistics in table 4. GDPplus, in both annual and quarterly terms, tends to be revised less over time than the other GDP measures.

These results suggest that incorporating labour market data alongside the GDP data produces an activity estimate that is revised less over time.

Table 4: Revision statistics

	Production GDP	Expenditure GDP	GDPplus
Quarterly annualised			
Root mean squared revision	1.82	2.61	1.45
Absolute mean revision	1.43	2.01	1.12
Annual			
Root mean squared revision	0.88	1.21	0.66
Absolute mean revision	0.77	0.95	0.58

Note: The sample period is 1997Q1–2018Q4; revisions are calculated as the difference between each measure's quarterly annualised or annual growth in real-time versus the current (2018Q4) vintage estimates.

6. Conclusion

We estimate a measure of economic growth that incorporates signals from both GDP data and the labour market. This measure has greater predictability, lower variance, and is revised less than production and expenditure GDP. This measure improves the noise ratio compared to other activity indicators and suggests that the GDPplus measure is a useful indicator of economic activity in real-time. This measure could help policymakers assess the state of the economy by providing an alternative, less noisy view of economic activity.

References

Aruoba, S.B., F.X. Diebold, J. Nalewaik, F. Schorfheide, and D. Song, (2016), 'Improving GDP Measurement: A Measurement-Error Perspective,' *Journal of Econometrics*, 191 (2016), pp. 384-397.

McDonald, C. (2017), 'Does past inflation predict the future?', Reserve Bank of New Zealand *Analytical Note Series*, AN2017/04.

Rees, D. M., Lancaster, D. and Finlay, R. (2015), 'A State-Space Approach to Australian Gross Domestic Product Measurement,' *Australian Economic Review*, 48: 133-149.

Aruoba, S.B., F.X. Diebold, J. Nalewaik, F. Schorfheide, and D. Song, (2012), 'Improving GDP Measurement: A Forecast Combination Perspective,' In: Chen X., Swanson N. (eds) *Recent Advances and Future Directions in Causality, Prediction, and Specification Analysis*. Springer, New York, NY.

Dennis J.F & J. Nalewaik, (2010), 'News, Noise, and Estimates of the "True" Unobserved State of the Economy,' BEA Working Papers 0068, Bureau of Economic Analysis.

Durbin J. & S.J. Koopman, (2001), 'Time Series Analysis by State Space Methods,' Oxford: Oxford University Press.