Introducing the New Zealand Economic Uncertainty index (NEU)

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Key points

Covid-19 is an unprecedented shock to economic uncertainty…

- Right now, firms are dealing with a massive hit to demand at a time when supply chains are also fragile.
- The future structure of the economy is unclear and we don't know when and where further outbreaks of COVID-19 will occur.
- We construct a New Zealand Economic Uncertainty index (NEU) – using the fraction of articles in New Zealand media articles that contain specific terms related to economic uncertainty.
- That index shows Covid-19 represents an unprecedented shock to uncertainty over recent generations, far outstripping the Global Financial Crisis (GFC).

…our modelling shows large impacts of uncertainty on the economy

- Firms delay investment and hiring decisions under uncertainty.
- Rather than make hard-to-reverse decisions to invest in expensive capital and hire workers, they put off making a call until the outlook is clearer.
- We use standard macroeconomic models to show how uncertainty, measured by the NEU index, affects economic activity.
- As expected, firms reduce investment and hire fewer new staff after a shock to uncertainty. Households cut back their spending.
- These impacts persist: the economy is much weaker several quarters after the uncertainty shock hits.

COVID-19 uncertainty will be a big hit to private investment

- COVID-19 uncertainty generates a large decline in private sector investment – it could be $2.5 billion lower by the end of 2021 than without the uncertainty from COVID-19.
- By June 2021, uncertainty takes 0.5 percent off economic growth.
- The estimates are indicative but the declines in GDP, investment, consumption and new hiring are statistically significant.

Gauging economic uncertainty could help show the recovery path

- Now, more than ever, it is important to understand how firms and households respond to uncertainty.
- Monitoring uncertainty can help suggest a likely path of the recovery phase and inform fiscal, monetary, and other policy actions.
- Governments can help reduce uncertainty by having and following clear plans under different scenarios.

Monitoring uncertainty can also improve policy in normal times

- Forecasts of economic activity from our uncertainty index are competitive with forecasts from leading economic indicators.
- But the gold comes from combining our NEU index with standard indicators of the economic cycle. This works well since our index seeks to measure a driver of the cycle rather than the cycle alone.
- We can also produce our NEU index at a high frequency – weekly or rolling monthly estimates – and in real-time, the day after articles are collated, producing a quick read on conditions.
- Including text-based measures of economic uncertainty beside standard indicators will deepen understanding of the economy.

1. Motivation

Why uncertainty matters

When firms are uncertain about the future and likely returns on investment, they delay making costly decisions that can be hard to undo.[1] Instead, the option value of waiting increases.

This reduces investment in plant, machinery, equipment and technology. Hiring of new workers can also be affected. After a shock to uncertainty, output will decline since lower investment reduces the future productive capacity of the economy.

Households facing uncertainty over employment and future incomes in turn reduce spending on durable goods like cars, home appliances and furniture.

COVID-19 makes everything feel uncertain

In normal times, firms work hard to understand future sales to manage their supply chains.

But under COVID-19, firms also need to consider the outlook for the entire economy, the economies of their suppliers, the chance of border closures or reopening, and additional lockdown periods. All are unknown.

Under COVID-19, firms and households can be expected to be facing heightened uncertainty, if not outright angst.

[1] See Marshak 1949 and Bernanke 1983 on irreversible investment. Guthrie 2009 provides insights into option values.

2. Measuring uncertainty

We need new tools to measure uncertainty

Uncertainty is almost by definition unobserved. To measure it, we need to find some quantitative proxy of uncertainty experienced by firms and households. Several measurement approaches have been used:

- Disagreement about the future from surveys of firms' beliefs about future demand
- Financial market trades that relate to the range of expected outcomes in the following month. The popular VIX measure of US stock market volatility is one example
- Consumer surveys on whether now is a good time to purchase large consumer items, such as a car or other durable goods[2]
- Text-based measures of uncertainty that count the number of specific words that occur in the media.

We develop a text-based uncertainty index, since this approach exploits new data relative to existing firm-based surveys (such as the QSBO), is available in real-time, is comparable to existing international approaches[3], and can explore alternative sources of uncertainty such as policy.

How our text-based measure of uncertainty works

We use today's document storage and search functionality to produce measures of uncertainty from a set of newspapers and other media that is

[2] See Eberly 1994.
[3] See Baker et al. 2016.

consistent over time. We adopt a standard method by tracking over time the proportion of articles that meet specific criteria related to uncertainty:

> "concern*, fear*, pressure*, confusion, turmoil, challenge*, uncertain*, risk*, dubious, unclear, dispute*, issue*, potential*, probabl*, predict*, and danger*."

And the economy:

> "economic" OR "economy".

This approach replicates existing methods that find uncertainty reduces investment and economic growth for the US and other advanced economies.[4]

3. Our uncertainty index

Introducing our approach

To construct our New Zealand Economic Uncertainty index (NEU), we restrict ourselves to New Zealand media. While some events such as the GFC or the US-China trade war are global events, captured in international media, we believe using New Zealand media acts as a filter, approximately capturing the impact of uncertainty associated with these global events on New Zealand firms and households.

Since we normalise the index value by dividing the number of articles with economic uncertainty terms by the total number of articles published, and have available to us an electronic search engine, we can work with a large number of newspapers and other media that includes Fairfax, NZME, Stuff and Radio New Zealand.

Our approach is complementary to existing research (see Rice et al. 2018) that suggests uncertainty can drive economic conditions.

In principle, we can present the index at a range of frequencies but choose to produce a monthly index to provide a timely read on uncertainty.

Our search-engine includes articles from the mid-1980s, but the volume of articles is sparse.[5] We instead choose a start date of 1995.

Our measure of uncertainty since 1995

Figure 1 shows the NEU alongside the index average and shaded bands that represent periods of recession. The index spikes aggressively in October 2008 – immediately after the fall of Lehman Brothers on September 15 during the Global Financial Crisis. The collapse of global trade at the beginning of 2009 then pushes uncertainty higher.

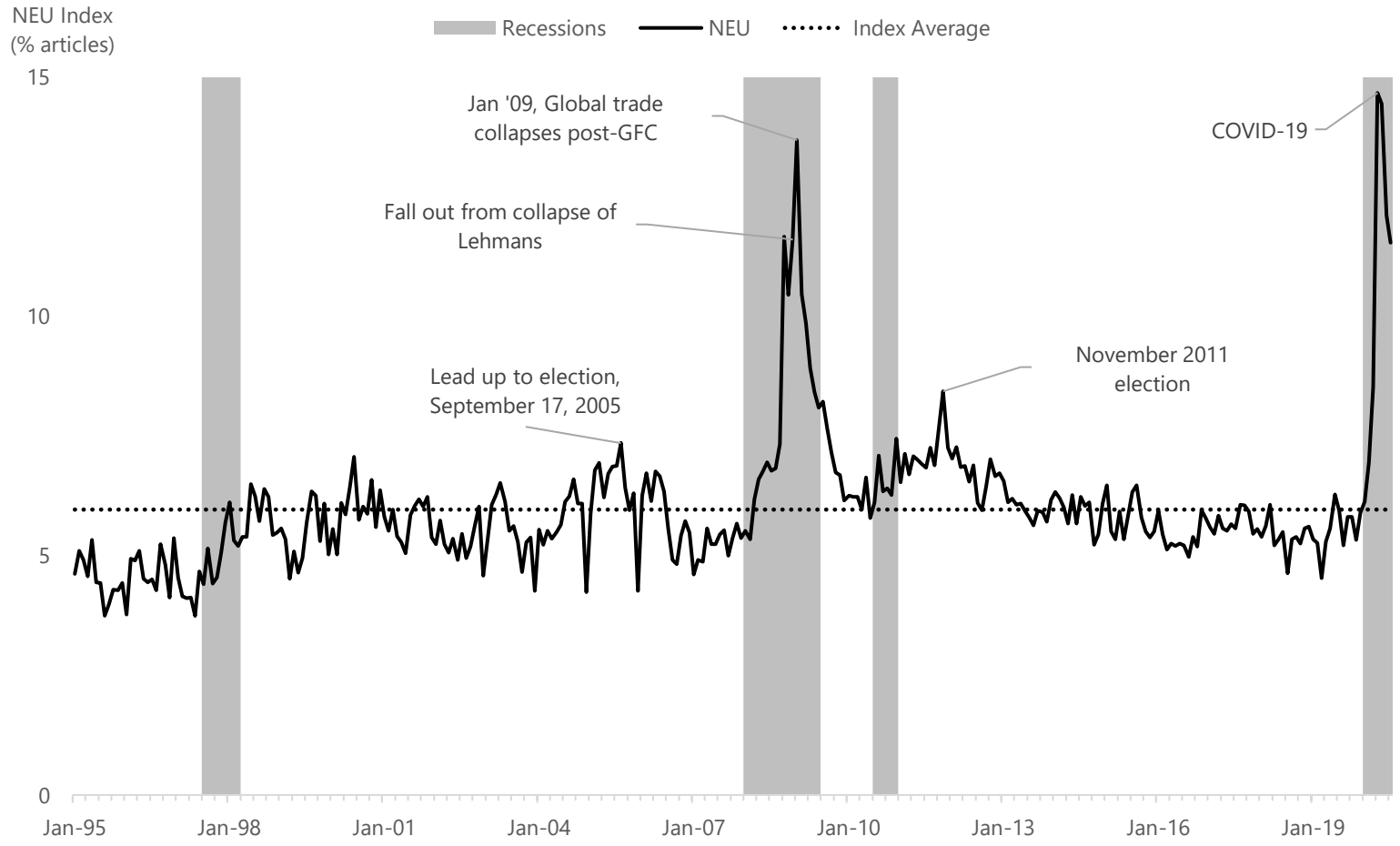
Smaller spikes are evident around elections, but the index leaps in April 2020, immediately after New Zealand entered lockdown level 4 at 11:59 pm on March 25. During this month we associated almost 15 percent of articles in the New Zealand media with economic uncertainty.

The NEU index remained high in May, before retreating a little in June. The July reading remains at elevated levels. We continue to monitor uncertainty levels.

4 These methods tend to focus on policy uncertainty (for example, see Baker et al. 2016), but there are other applications including trade policy uncertainty (see Caldara et al. 2019) and the impacts of events such as Brexit (Bloom et al. 2019) and COVID-19 (Baker et al. 2020).

5 This means we miss, for example, uncertainty related to the mid-1980s reform period such as the unilateral reduction of tariffs and subsidies or Closer Economic Relations negotiations.

FIGURE 1: THE NEW ZEALAND ECONOMIC UNCERTAINTY INDEX SHOWS LARGEST SPIKES AT THE GFC AND THE LEVEL 4 COVID LOCKDOWN



4. What are the impacts?

Uncertainty decreases investment, consumption & output

To test if our index picks up the impact of uncertainty in delaying or cancelling investment and consumption decisions, we use a series of simple macroeconomic models to trace the paths of investment, consumption, output and hiring after a shock to the uncertainty index.[6]

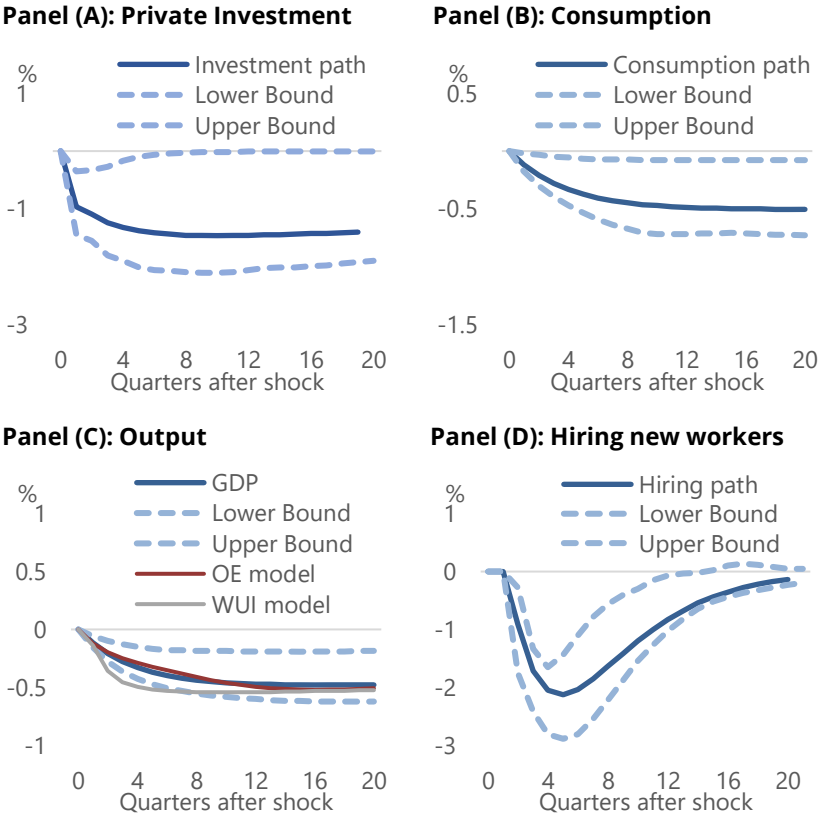
Our approach is consistent with existing methods in the literature but should be interpreted as indicative estimates using an uncertainty lens rather a complete picture of the economic outlook.

Figure 2 shows our uncertainty shock, as measured by our index, reduces private investment (panel A), consumption (panel B), output (panel C) and hiring of new workers by firms (panel D).[7] Each panel shows the path of the key variables following the shock relative to trend and an 80% confidence interval: the paths are generally statistically different from 0.

Some researchers (Leduc and Lu 2016, Bachmann et al. 2013) suggest the impacts of uncertainty are sometimes difficult to disentangle from general declines in global economic activity. For a small open economy like New Zealand, the measures may also tend to pick up declines in global activity.

So we include results for the impact of uncertainty on output from an open economy model (the OE model) that also includes prices, interest rates and the exchange rate and a model that includes a measure of global uncertainty (the World Uncertainty Index from Ahir 2018 that we label the WUI model). Panel C shows both models show declines in output that are significantly different from 0 (we omit their confidence intervals).

FIGURE 2: UNCERTAINTY DECREASES PRIVATE INVESTMENT, CONSUMPTION, OUTPUT AND HIRING DECISIONS BY FIRMS



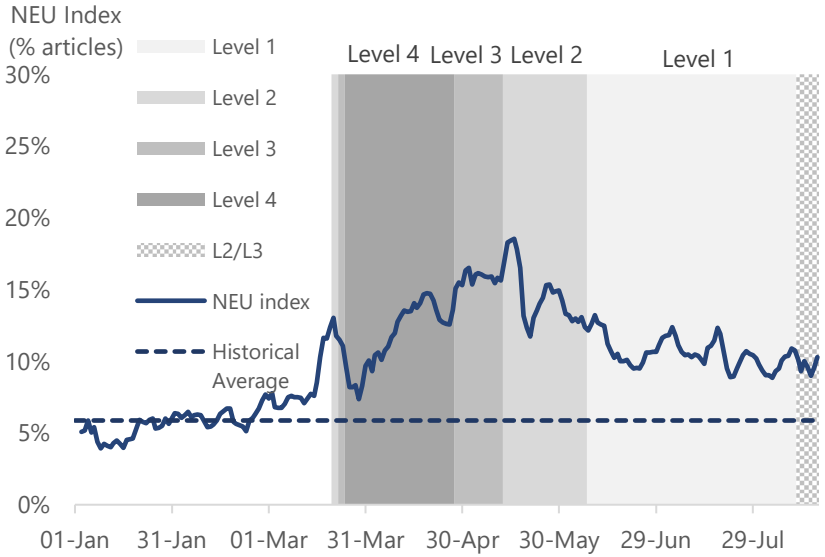
[6] These are bivariate Vector-Auto-Regressive (VAR) models that use the uncertainty index and key macroeconomic variables, estimated over 1995-2019.

[7] These findings are similar to other papers that find uncertainty shocks can reduce output and employment (see Bloom 2009 for the US case).

The impact of COVID-19 uncertainty

We intentionally stop our estimation at the end of 2019 – before the impact of COVID-19, so we can then apply the model to explain the likely impact of COVID-19. We first calibrate an uncertainty shock based on average uncertainty in the index in the June quarter of 2020.

FIGURE 3: LOCKDOWNS INCREASED UNCERTAINTY MASSIVELY



That COVID uncertainty shock is 2.3 times the standard deviation of a typical shock. We then then insert that shock into our economic models and calculate impacts.

We find material impacts on key macroeconomic variables. According to our estimates:

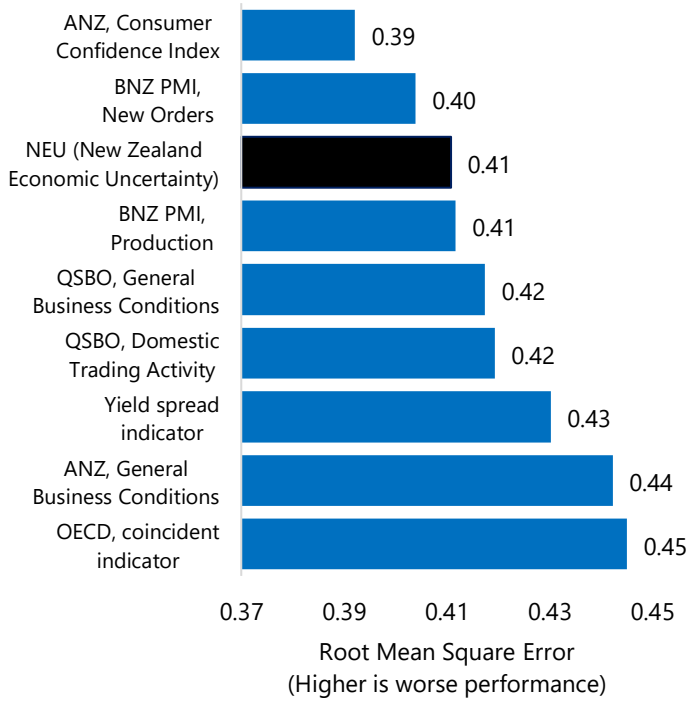
- The cumulated impact on private investment is a $2.5 billion decline by the end of 2021
- The aggregate economy shrinks by a similar margin ($2.4 billion)
- New hires are 2 percent lower by mid-2021 and total jobs are 30,000 lower than without the impact of uncertainty.

Head-to-head comparisons with standard economic indicators

We test the performance of the NEU index to predict GDP from March 2013 to December 2019. We construct bivariate Bayesian VARs between each indicator and GDP over the period March 2004 to December 2019.

Figure 4 shows using the NEU index to forecast GDP growth produces smaller errors than many other standard macroeconomic indicators.

FIGURE 4: NEU INDEX IS COMPETITIVE WITH OTHER INDICATORS

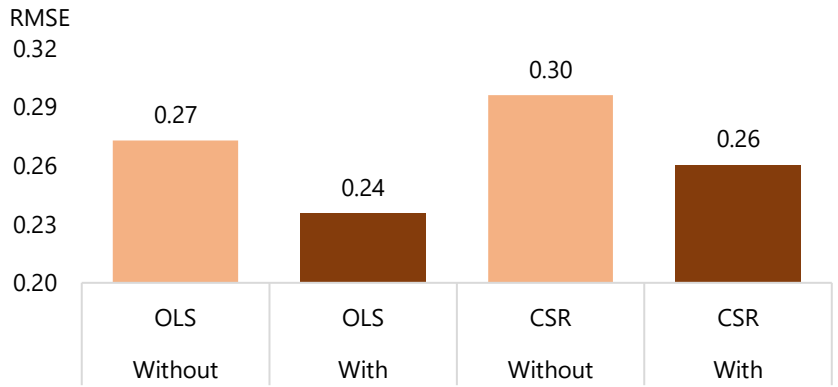


Combining our news index with standard indicators boosts accuracy

Rather than choose between indicators we can integrate the NEU index with the other indicators to improve performance. Figure 5 shows that averaging forecasts that include the NEU index reduces the average magnitude of errors compared with forecasts that exclude the index.[8]

These differences are statistically significant. This works because our NEU index targets a driver of the business cycle rather than the cycle alone.

FIGURE 5: COMBINE FOR BETTER FORECAST PERFORMANCE
RMSE (Root Mean-Square Error), higher numbers show poor performance



Forecasting combinations, with and without the NEU index combined by OLS and Complete Subset Regresstions (CSR)

Timeliness is a virtue

We can also produce our NEU index at a high frequency, providing weekly or rolling monthly estimates. Relative to most other indicators, these measurements are real-time, the day after articles are collated, enabling a quick read on conditions.

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[8] NB. We combine forecasts using OLS methods (Granger and Ramanathan 1984) and Complete Subset Regressions or CSR (see Graham et al. 2013).

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