

AUSTRALIAN MARKETS WEEKLY

The economics of a pandemic – Insights from the Kennedy paper



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Analysis – The economics of a pandemic - Insights from the Kennedy paper

- We have examined a 2006 paper on the economics of a pandemic co-written by now-Treasury Secretary Steven Kennedy, who sits on the Reserve Bank Board and has reportedly played a key role in shaping the government's fiscal response to the COVID-19 pandemic.
- Kennedy used a macroeconomic model to analyse the economic fall-out from a pandemic. The value of the work is not so much the numerical estimates, but rather how it highlights the linkages in the economy. The results suggest that the economy enters a deep recession, with confidence effects on spending, investment and hiring and a temporary reduction in labour supply causing most of the damage.
- This means that the best macroeconomic policy response is to try to restore consumer and business confidence and promote a quick return to work. The paper also recommends supporting business cash flows, particularly in the service sector, and action that quickly stimulates demand. In this way, households and business can recover once the health crisis abates.

The week ahead – COVID-19 – health measures and macroeconomic policy response

- Australia/NZ. The rapid escalation in health measures dominates with New Zealand closing all non-essential businesses and schools and restricting travel for at least four weeks. In Australia, weekly consumer confidence should fall further given the deepening of the health crisis.
- International. All that matters is the ramping up of health measures and the fiscal response. Investors will also focus on company reports of the effect of the virus, such as Nike for insight on Chinese demand and production. The March PMIs should be weak across the board, while US weekly jobless claims should reach a record level.

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Key markets over the past week

	Last	% chg week		Last	bp/% chg week
AUD	0.5791	-5.3	RBA cash	0.25	-25
AUD/CNY	4.11	-4.5	3y swap	0.48	-14
AUD/JPY	63.6	-1.8	ASX 200	4,546	-9.1
AUD/EUR	0.538	-1.6	Iron ore	81	-7.3
AUD/NZD	1.021	0.9	Brent oil	26.4	-12.3

Source: Bloomberg

The economics of a coronavirus outbreak – Insights from the Kennedy paper

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The virus pandemic has seen the Australian economy enter recession

The coronavirus SARS-CoV-2, which is responsible for the infectious respiratory disease named COVID-19, is continuing to wreak havoc across the globe. The current state of health knowledge on the virus is summarised in Appendix A, but the situation is evolving rapidly, triggering a rapid escalation in the public health response. Necessary public health measures aim to limit deaths by mitigating the strain on the health system, but have come at the economic cost of the global and Australian economies entering recession, along with steep falls in share and commodity prices, commodity currencies and wider credit spreads.

Central banks and governments have taken aggressive and unprecedented action to counter this immediate and extensive economic shock. This easing will help the economic recovery once the pandemic is contained and some form of medical treatment is developed, but cannot offset the near-term escalation of containment measures, which seem likely to be in place at least until later this year.

Treasury Secretary & Reserve Bank Board-member Steven Kennedy modelled a severe pandemic back in 2006

Judging the economic impact of the pandemic is difficult as there is no modern precedent for a health-driven downturn on this scale. Locally, though, now-Treasury Secretary Steven Kennedy led Treasury work on the macroeconomic effects of a flu pandemic in the wake of the SARS-CoV epidemic of 2002-03.¹ That work from 2006, co-authored with Jim Thomson and Petar Vujanovic, is highly relevant considering that Kennedy reportedly played a critical role in shaping the government's fiscal response to the coronavirus outbreak and with Kennedy a member of the Reserve Bank Board.²

Kennedy, Thomson and Vujanovic (shortened to "KTV") highlight the overarching human cost of a highly contagious influenza pandemic, emphasising that the "most important effects of population loss ... are not those on GDP, but rather the loss of life for those who die and the social disruption and sense of loss for loved ones". Their analysis touches on this immense social cost, but the focus of the work is on the economic cost of a pandemic.

The KTV analysis assumed a pandemic with a mortality rate – which is the number of deaths as a percentage of the population – of 0.2%. This compares with a mortality rate of 0.65% in the 1957-58 and 1968-70 flu pandemics and the very large 2-5% range estimated for the 1918-19 Spanish flu pandemic.³

The mortality rate of the COVID-19 pandemic is unknown, and the confirmed case fatality rate – which approximates the currently unknown infected fatality rate – varies considerably by country around the global average of 3.4%, depending on public health measures, population characteristics and the extent of public testing. It is also unclear how quickly medical treatment can be developed, although many vaccines are currently under development. That said, the Commonwealth Deputy Chief Medical Officer recently suggested that about 20-60% of the Australian population could be infected and that the infected fatality rate from virus was about 1%.⁴ This indicates that the mortality rate in Australia could range between 0.2 and 0.6%.

The KTV analysis – linkages matter more than numerical estimates

KTV used the Australian Treasury's TRYM macroeconomic model to analyse six main economic shocks from a global pandemic of a highly contagious influenza virus. The value in using a macroeconomic model was that it

¹ The 2002-03 SARS-CoV outbreak had a damaging short-lived impact on the Hong Kong and Chinese economies, but the effect on Australia was limited to a temporary decline in tourist arrivals from Asia over several months. Jong-Wha Lee and former Reserve Bank Board-member Warwick McKibbin estimated that SARS-CoV had a 2.6% effect on Hong Kong GDP in 2003, with a 1.1% effect on Chinese GDP. The estimated impact on Australian GDP was only 0.1%. See Jong-Wha Lee and Warwick McKibbin, *Estimating the global economics costs of SARS*, Learning from SARS: Preparing for the next disease outbreak, National Academies Press, 2004.

² See Steven Kennedy, Jim Thomson and Petar Vujanovic, *A primer on the macroeconomic effects of an influenza pandemic*, Treasury Working Paper 2006-01, February 2006.

³ The influenza pandemic of 1957-58 initially affected school children with a second wave among the elderly. The 1968-70 pandemic mainly affected the elderly. The 1918 pandemic was unusual in that it had high mortality in younger adults.

⁴ The mortality rate = the percentage of the population infected times the infection fatality rate. The infection fatality rate is the number of deaths as a percentage of all infected persons. The widely-quoted confirmed case fatality rate is a narrower measure as it equals the number of deaths as a percentage of the number of confirmed cases of infected persons. See Commonwealth Deputy Chief Medical Officer Kelly, *Deputy Chief Medical Officer's press conference about COVID-19 on 16 March*, Department of Health, 16 March 2020.

allowed for the interaction between these shocks in teasing out the potential impact on the economy. KTV then considered economic policies to help counter the outbreak.

The main shocks and key assumptions were:

1. **Weaker world demand** – an immediate 20% decline in world demand.
2. **Pandemic deaths** – a 0.2% mortality rate.
3. **Reduced labour supply** – an immediate 20% drop in the workforce.
4. **Reduced consumer spending** – an immediate, confidence-driven 10% fall in consumption.
5. **Reduced business and residential investment** – an immediate confidence-driven 7% drop in business investment and 13% decline in residential investment.
6. **Reduced demand for labour** – a 5% drop in employment on reduced hiring and business shutdowns.

Almost all these shocks were unwound, either by assumption or the interactions within the model. KTV allowed interest rates to respond to the economic fall-out, but not government spending and taxes in the first year, an assumption they acknowledge as unrealistic.

Importantly, we have reported the KTV results differently to how they are published in the 2006 paper (see Appendix B for more detail). We have calculated the *individual* impact of each shock on key economic indicators and added them to report the total estimated effect of the pandemic.

The KTV effects point to deep economic damage from a pandemic

The most important feature of the KTV work is not the numerical estimates of the impact of the pandemic, but how the modelling shows the ways in which the crisis affects the economy and how this should shape the policy response.

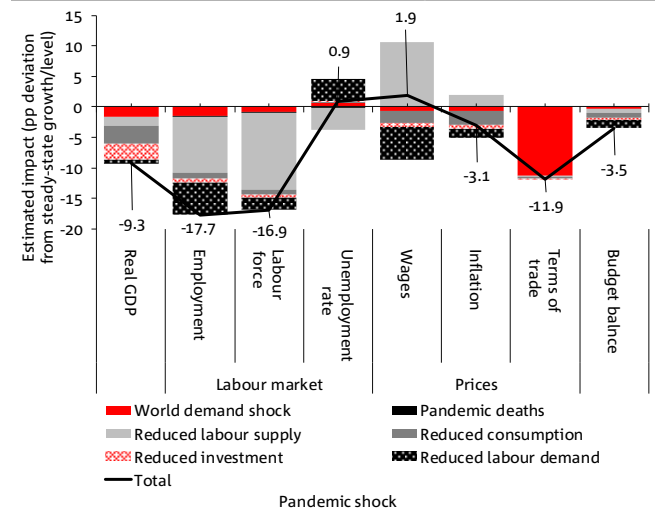
In that context, the main findings of the KTV work is that by the end of the first year:

- **GDP growth is sharply lower, mainly because of a collapse in confidence.** A collapse in confidence has a major effect on consumption, especially services, business investment and residential investment. Spending and investment are also squeezed by a collapse in household incomes and profits. Weaker world demand takes a heavy toll on exports, particularly tourism. Adding the six shocks, GDP growth is 9.3pp below its pre-pandemic benchmark.
- **Unemployment rises, but steep job losses are largely offset by sharply reduced labour supply.** Unemployment is 0.9pp higher than would otherwise be the case. Employment collapses by about 18pp relative to its pre-pandemic growth rate, with people dropping out of the workforce, reduced hiring, and recession-driven and mandated business shutdowns. The labour supply contracts by about 17pp compared with its pre-crisis growth rate. Most of this reduction will be temporary, with many

persons becoming sick, caring for someone who is sick or afraid of becoming sick, particularly in service industries.

- **Wages rise, but inflation falls.** Wages temporarily rise by 1.9pp relative to pre-pandemic growth as the greatly reduced labour supply offsets reduced labour demand. Inflation is 3.2pp lower than before, although some prices might rise in the near term on panic buying and disruptions to supply chains.
- **The terms of trade collapses.** The terms of trade falls about 12% below its pre-pandemic trend given the slump in world demand.
- **The budget widens as the economy weakens.** The budget balance is 3.5% of GDP weaker reflecting the automatic stabilisers of higher welfare payments and health spending and reduced taxes. This assumes no fiscal stimulus in the first year.

Chart 1: KTV’s estimated first year impact of a global flu pandemic on the Australian economy



Note: Impact are calculated as at the end of the first year. The terms of trade is the ratio of export to import prices.
Source: Kennedy, Thomson and Vujanovic (2006), National Australia Bank

Past the first year, KTV estimate that consumer spending and GDP growth have recovered by the end of the second year, although the *level* of output is lower given pandemic deaths. The unemployment rate stays high and does not start falling until the third year as labour supply recovers quickly, but labour demand from business recovers slowly. Persistently high unemployment means wages start to fall, such that there is sustained general price deflation.

The policy response is an extended period of substantially lower interest rates and expansionary fiscal policy to shore up confidence and restore labour supply

KTV note that the “primary policy issue surrounding pandemics is the preservation of life and not the maintenance ... of GDP”, with macroeconomic policy complementing public health policies.

- On **monetary policy**, KTV stress that a pandemic results in an extended period of low interest rates – which eventually produces a strong rebound in housing construction – although the 2006 paper does not report any numbers. Using a standard

Taylor rule as a guide, a 9pp fall in GDP growth and lower inflation indicates that the cash rate needs to be about 6.25pp lower.

- On **fiscal policy**, KTV acknowledge that their results unrealistically assumed no discretionary stimulus in the first year, such that the 3.5% of GDP deterioration solely reflected the work of automatic stabilisers. KTV thought that an aggressive fiscal stimulus would only have a modest effect unless it “could significantly counter the effects of the pandemic on consumer and business confidence”. The other key aim of policy should be to encourage people to return to work, while maintaining the cash flow of business, “perhaps through creative finance arrangements”. Additional policies should aim to stimulate demand.

Qualifications to the KTV analysis

Key qualifications to the KTV analysis are:

- **There may be waves of infection.** The pandemic was assumed to be a one-off, but KTV acknowledged that “it is generally accepted that there are likely to be a total of three or four waves of infections spread out over a period of up to 18 months.”
- **The exchange rate is assumed to be unchanged, but is likely to be sharply lower.** KTV said a pandemic could see a rapid deterioration in global financial conditions. KTV thought any movement in the Australian dollar would depend on the impact of the pandemic on Australia relative to its trading partners. That said, with the modelled terms of trade about 12% below its pre-crisis level, Reserve Bank analysis suggests that the real exchange rate would be about 6% lower by the end of the first year.⁵
- **Asset prices are also likely sharply lower.** KTV thought it very likely that a pandemic would see large falls in both house and equity prices, but did not model a shock to household wealth as part of its analysis. That said, the six existing shocks produce a 16% fall in the TRYM measure of private-sector wealth, which a good proxy for household wealth.
- **Productivity might be affected by the pandemic.** The KTV analysis assumed that productivity was unaffected by the pandemic, but this is unclear. Companies might diversify supply chains by resuming local production rather than rely on imports and hold more inventories. The nature of work could change with some employees working from home for an extended period.
- **There are risks to financial stability that could delay recovery from recession.** Lower asset prices could affect bank balance sheets and a heavily-indebted household sector will be exposed to sharply higher unemployment. This raises the risk that an overhang of debt delays recovery from recession, as seen in many advanced economies during the global financial crisis.

Policies need to restore confidence and encourage persons to return to work

The main message from the KTV work is that confidence effects on spending, investment and hiring and the short-term reduction in labour supply cause most of the damage to the economy. This means that the best macroeconomic policy response is to try to restore consumer and business confidence and promote a quick return to work. KTV also recommend supporting business cash flows, particularly in the service sector, and action that quickly stimulates demand. In this way, households and business can recover once the health crisis abates.

In further work, we will try to use the economic linkages identified by Kennedy and his co-authors to analyse the coronavirus, particularly given current pandemic is more severe given there is no current medical treatment or vaccine for the virus. The aggressive macroeconomic policy response to date is another important point of difference, demonstrating the influence of Kennedy’s work on the government.

Kieran Davies

⁵ For example, see Blair Chapman, Jarkko Jääskelä and Emma Smith, *A forward-looking model of the Australian dollar*, Reserve Bank of Australia Bulletin, December 2018.

APPENDIX A – THE CURRENT STATE OF KNOWLEDGE OF THE CORONAVIRUS

Continually updated information on the coronavirus is published by the Department of Health at www.health.gov.au, including public health advice and key contact phone numbers. State health departments also publish continually updated information on their websites. On current information from the Australian Department of Health, the World Health Organization (WHO) and Chinese and US government authorities:⁶

1. **What is a coronavirus?** Coronaviruses – abbreviated to “CoV” – are a large family of viruses that cause respiratory illness. Coronaviruses are common in people and many different species of animals, including camels, cattle, cats, and bats. The common cold is an example of a coronavirus in people. Rare examples of animal coronaviruses that can infect and spread between people are the Middle East Respiratory Syndrome (“MERS-CoV”), Severe Acute Respiratory Syndrome (“SARS-CoV”) and this new virus.
2. **What is this new coronavirus?** This is a novel – or new – coronavirus that has not been detected in humans before. Like MERS-CoV and SARS-CoV, it originates in bats. MERS-CoV is transmitted to humans by dromedary camels and SARS-CoV transmitted by civet cats. The potential intermediate animal host between bats and humans for this virus is not currently known. This virus has been named “SARS-CoV-2” which is an abbreviation of “severe acute respiratory syndrome coronavirus 2”, and the disease it causes has been named “COVID-19”, which is an abbreviation of “coronavirus disease 2019”.
3. **How did this coronavirus spread?** The virus was first detected in Wuhan in the Hubei province of China. Initially, many patients had some link to a large seafood and live animal market. Later, there was person-to-person spread among patients without exposure to animal markets. Community spread is now occurring across the globe, where people have been infected and it is not known how or when they became exposed.
4. **The virus is highly infectious.** The contagiousness of a disease is measured by the reproduction number. The basic reproduction number, or R_0 , R-nought or R-zero, is the number of additional people that can be infected by one infected person when there is no immunity from either past exposure or immunity, nor any deliberate intervention in disease transmission. R_0 varies across locations because contact rates among people differ due to population density and cultural differences. In contrast, the effective reproduction number is when there is either some immunity or intervention measures in place. The R_0 for SARS-CoV-2 is currently estimated at a relatively high 2-2.5. The R_0 for MERS-CoV was initially estimated at over 1, quickly falling below 1 after containment measures. The R_0 for SARS-CoV was initially estimated around 3, with R falling to near zero after containment measures. Separately, the R_0 for the seasonal flu – where there are vaccines for some strains – is slightly more than 1.
5. **How is the virus spread?** The virus is spread primarily through respiratory droplets from coughs and sneezes from an infected person, usually when showing symptoms. The risk of exposure is changing as the outbreak expands, but is currently highest for healthcare workers caring for patients with COVID-19, family and others in close contact with persons with COVID-19, and persons returning from affected international locations where community spread is occurring.
6. **Most infected people recover from the virus, some become very ill and a small proportion die from COVID-19.** The median time between infection and the appearance of symptoms is 5-6 days. Common signs of infection include fever, dry cough, aches and pains and breathing difficulties, with a very small proportion of people showing no symptoms, at least initially. Most infected people – about 80% – have mild symptoms not requiring medical treatment. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death. About 20% of infected persons require hospital treatment – about 15% have severe respiratory disease and about 5% have critical respiratory disease, septic shock and/or organ failure and require ventilation. The individuals at highest risk include people aged over 60 years and those with underlying conditions, such as hypertension, diabetes, cardiovascular disease, chronic respiratory disease, and cancer.
7. **What is the case fatality rate of COVID-19?** The confirmed case fatality rate, which is the number of deaths as a percentage of confirmed cases of infected persons, is currently estimated by the WHO at 3.4% worldwide, with the rate varying across countries. The infected fatality rate, which is the number of deaths as a percentage of *all* infected cases, is currently unknown, although the Australian Department of Health has suggested it is around 1%. The confirmed fatality rate is highest for the elderly and persons with significant underlying health

⁶ See:

- (1) Moira Chan-Yeung and Rui-Heng Xu, *SARS: epidemiology*, Official Journal of the Asian Pacific Society of Respirology, 14 November 2003.
- (2) Australian Department of Health, *Using mathematical models to assess response to an outbreak of an emerged viral respiratory disease*, April 2006.
- (3) World Health Organization, *Consensus document on the epidemiology of severe acute respiratory syndrome (SARS)*, 2003.
- (4) World Health Organization, *What is a pandemic?*, 24 February 2010.
- (5) World Health Organization, *MERS monthly summary*, November 2019.

- (6) World Health Organization, *WHO MERS Global Summary and Assessment of Risk*, July 2019.
- (7) World Health Organization, *Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19)*, 16-20 February 2020.
- (8) Marco Cascella, Michael Rajnik, Arturo Cuomo, Scott C. Dulebohn, and Raffaella Di Napoli, *Features, Evaluation and Treatment Coronavirus (COVID-19)*, US National Center for Biotechnology Information, updated 8 March 2020.
- (9) US Centers for Disease Control and Prevention, *Situation summary*, updated 12 March 2020.
- (10) Commonwealth Deputy Chief Medical Officer Kelly, *Deputy Chief Medical Officer's press conference about COVID-19 on 16 March*, Department of Health, 16 March 2020.

issues. In comparison, the confirmed case-fatality rates for MERS-CoV and SARS-CoV are 34% and 10%, respectively, with significant variation across country. The fatality rate for the seasonal flu is estimated at less than 1%.

8. **Treatments are still being developed.** There are currently no anti-viral treatments or vaccines for COVID-19, although many vaccines are in development. It is also unclear whether the virus will fade with the northern summer and/or if there will be additional significant waves of infection.

APPENDIX B – DETAILED KTV MODELLING RESULTS

Interpreting the published KTV estimates

On a technical note, KTV reported their findings by undertaking each of the above six shocks in succession and reporting the results for key economic indicators over the course of the first year. As each shock was undertaken, the reported results for that shock were added to the impact of the preceding shocks.

Critically, the results for each indicator were calculated relative to each indicator’s steady state growth rate (or level in the case of rates and ratios). In the TRYM model, the steady state growth rate of a series where growth settles in the long run when there are no further shocks to the economy.

In our examination of the KTV results, we backed out the *individual* contributions from the six shocks on key economic indicators. These were then added to calculate the total estimated impact of all six shocks. These calculations can be added to a pre-pandemic benchmark for each series to estimate growth (or the level or ratio) for the key economic indicators.

As an example, this meant that by the end of the first year, together the six shocks caused a 5.7% fall in GDP. However, in 2006 the TRYM model assumed that steady state growth was 3.6%. This meant that the total estimated impact of the pandemic on GDP relative to its steady state was -9.3pp (i.e., -5.7% minus 3.6%).

Viewed from 2020, many of the TRYM model steady state growth rates are clearly unrealistic. For example, the 3.6% steady state growth rate for GDP was already on the high side in 2006 and in the post-global financial crisis years steady state growth is more likely to be 2-2.5%. This means that applying the KTV results to this lower steady rate would see GDP contract by 6.8-7.3% over the first year (i.e., 2-2.5% plus -9.3%).

Modelling the first year of a pandemic

The dynamics of the six main channels of the pandemic in the first year were:

1. Sharply weaker world demand.

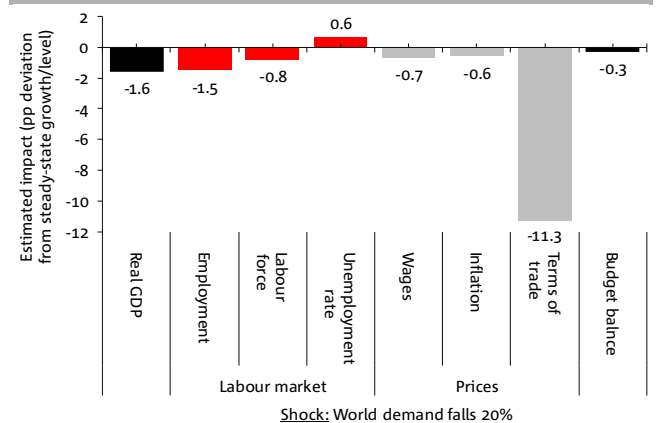
A global pandemic immediately reduces the demand for Australian exports, particularly tourism. A pandemic can also disrupt supply chains, including the closure of transport linkages, and stop many Australians from travelling overseas.

KTM focused only on the impact on exports of an assumed 20pp fall in growth in major trading partner demand, which was slowly unwound as output recovered to a weaker long-run level, scaled by the number of deaths overseas.

This steep drop in foreign demand triggers a slump in exports that spills over to weaker domestic demand, particularly weaker business investment. GDP growth is 1.6pp lower over the first year. Employment falls sharply, and unemployment increases by 0.6pp. Wage growth and inflation are about 0.6-0.7pp lower. The terms of trade is 11% lower and there is a slight deterioration in the budget balance.

In addition to the deep contraction in trade flows, KTV point out that capital flows and financial markets could be severely disrupted by a pandemic.

Chart 2: The estimated impact of a collapse in world demand



Source: Kennedy, Thomson and Vujanovic (2006), National Australia Bank

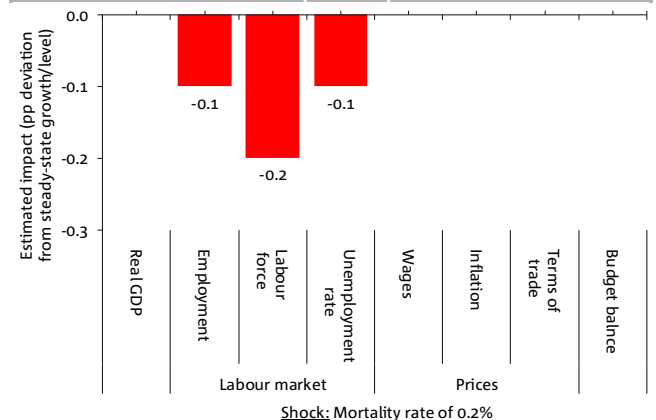
2. Pandemic deaths.

KTM’s 0.2% mortality rate was assumed to occur immediately. The mortality rate was reflected across all age groups, such that the growth in the working-age population is 0.2pp lower.

Pandemic deaths have little effect on GDP in the short term, reducing GDP slightly in the long term. There is a small fall in the unemployment rate as the fall in the working age population exceeds a small fall in the unemployment rate.

KTV also noted that the pandemic could affect the population if net migration falls during the outbreak and there is no catch-up once the pandemic has passed.

Chart 3: The estimated impact of pandemic deaths



Source: Kennedy, Thomson and Vujanovic (2006), National Australia Bank

3. A sharply reduced labour force.

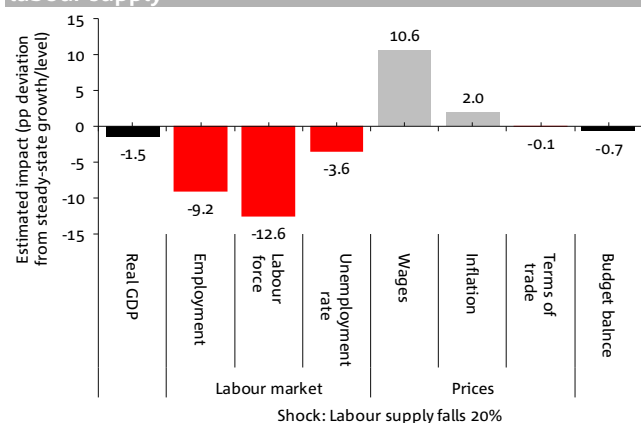
The pandemic is assumed to immediately reduce the labour supply by 20%, with supply recovering as people rejoin the workforce. This reduction reflects absenteeism, where a significant number of people are either sick, caring for someone who is sick or afraid of becoming sick in later waves of infection, particularly persons in the non-health/community

services service sectors dealing with the public. The impact would be worse if key staff are absent from the workforce in essential industries, such as healthcare, utilities, manufacturing and retail. It also reflects government-mandated shutdowns to stem the spread of the pandemic.

The steep decline in the labour supply is temporary, but persistent, with growth in the labour force still 13pp lower by the end of the first year. Employment falls by less than the labour force, with growth down 9pp so the unemployment rate falls by 3.6pp. The reduction in labour supply strongly boosts wage growth by 11pp — which places upward pressure on interest rates — with inflation up 2pp.

Lower employment feeds into a 1.5pp fall in GDP growth, as lower incomes induce a sharp fall in consumer spending. Housing construction is also lower, but business investment increases as firms respond to fewer workers and higher wages by substituting capital for labour. The budget balance deteriorates by 0.7% of GDP.

Chart 4: The estimated impact of a steep fall in the labour supply



Shock: Labour supply falls 20%

Source: Kennedy, Thomson and Vujanovic (2006), National Australia Bank

4. A collapse in consumer confidence and spending.

The dominant economic impact of the pandemic is assumed to be a large drop in confidence, which is captured by an assumed immediate 10pp drop in growth in consumption that triggers a recession. The collapse in confidence also reduces investment, which is discussed in the next point.

The fall in consumer spending is concentrated in services, such as hospitality, travel, recreation and the arts. Spending partly recovers over time and growth is down 7pp over the first year. Lower spending underpins a 3pp fall in real GDP growth. Housing construction also falls and net exports add to growth as imports slump.

Employment growth falls by 1pp and labour supply growth is 0.8pp lower, such that the unemployment rate increases by 0.2pp. Wage growth and inflation are 2.0-2.3pp lower, placing downward pressure on interest rates. The budget balance is 0.8% of GDP weaker.

KTV note that a pandemic was also likely to trigger a sharp fall in household wealth, with large falls in both house and stock prices. However, they did not explicitly model this additional shock to consumer spending. KTV also note another channel, where extreme uncertainty causes households to increase their precautionary saving, which would also lower spending.

Chart 5: The estimated impact of a collapse in consumer spending



Shock: Consumer spending falls 10%

Source: Kennedy, Thomson and Vujanovic (2006), National Australia Bank

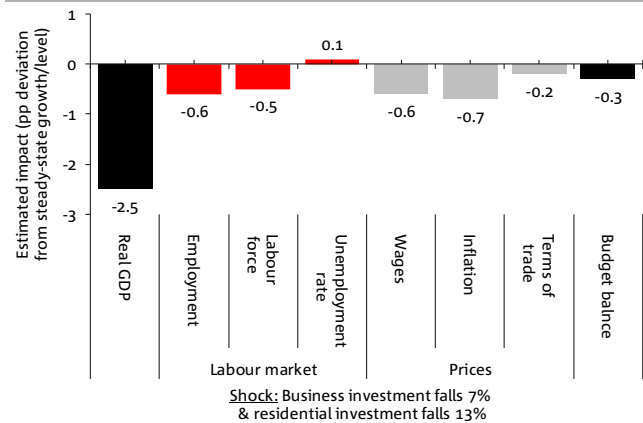
5. A collapse in business confidence and business and residential investment.

A slump in business confidence is expected to underpin a 7pp decline in business investment growth and a 13pp fall in residential investment growth.

Consistent with history, the shocks to investment are persistent, building in the short term. Business investment growth is 11pp lower at the end of the first year and residential investment growth is 16pp lower. GDP growth falls by 2.5pp. Consumer spending growth is down 0.5pp, while a big fall in imports underpins a 1.4pp contribution from trade to growth.

Employment growth falls by 0.6pp and labour supply growth is 0.5pp lower, such that the unemployment rate increases by 0.1pp. Wage growth and inflation are 0.6-0.7pp lower and the budget balance is 0.3% of GDP lower.

Chart 6: The estimated impact of a slump in business and residential investment



Source: Kennedy, Thomson and Vujanovic (2006), National Australia Bank

- The unemployment rate stays high and does not start falling until the third year as labour supply recovers quickly, but labour demand from business recovers slowly.
- Persistently high unemployment means wages start to fall, such that there is sustained general price deflation.

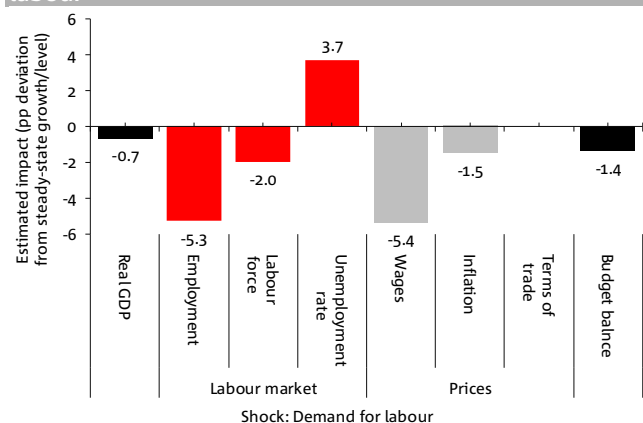
6. Reduced hiring and business shutdowns.

The pandemic is also assumed to sharply reduce the demand for labour given a substantial reduction in business hiring and widespread business shutdowns, reflecting both temporary government-mandated closures and a deep recession.

The assumed decline is not disclosed by KTV, but employment growth is 5.3pp lower by the end of the first year. Labour supply growth is down 2pp and unemployment increases by 3.7pp. Higher unemployment feeds into a 5.4pp drop in wages growth and inflation is 1.5pp lower.

Weaker employment and wages sees consumer spending growth drop 1.8pp with GDP growth down 0.7pp. Shutdowns reinforce the cash-flow squeeze on business. There is a significant deterioration in the budget balance, which is 1.4% of GDP lower.

Chart 7: The estimated impact of a reduced demand for labour



Source: Kennedy, Thomson and Vujanovic (2006), National Australia Bank

Beyond the first year

The KTV paper does not report estimates for key economic indicators beyond the first year, although KTV note:

- Consumer spending and GDP growth have recovered by the end of the second year.

CALENDAR OF ECONOMIC RELEASES

Country	Economic Indicator	Period	Forecast	Consensus	Actual	Previous	GMT	AEDT
Monday 23 March 2020								
EC	Consumer Confidence	Mar A		-14		-6.6	15.00	2.00
Tuesday 24 March 2020								
JN	Jibun Bank Japan PMI Mfg	Mar P		--		47.8	0.30	11.30
GE	Markit/BME Germany Manufacturing PMI	Mar P		40		48	8.30	19.30
EC	Markit Eurozone Manufacturing PMI	Mar P		41		49.2	9.00	20.00
UK	Markit UK PMI Manufacturing SA	Mar P		49		51.7	9.30	20.30
US	Markit US Manufacturing PMI	Mar P		45		50.7	13.45	0.45
US	New Home Sales	Feb		750		764	14.00	1.00
Wednesday 25 March 2020								
NZ	Trade Balance NZD	Feb	457	--		-340	21.45	8.45
GE	IFO Business Climate	Mar F		--		87.7	9.00	20.00
UK	CPI YoY	Feb		1.7		1.8	9.30	20.30
US	Durable Goods Orders	Feb P		-0.8		-0.2	12.30	23.30
Thursday 26 March 2020								
EC	M3 Money Supply YoY	Feb		5.1		5.2	9.00	20.00
UK	Retail Sales Inc Auto Fuel YoY	Feb		0.6		0.8	9.30	20.30
UK	Bank of England Bank Rate	Mar 19		0.1		0.1	12.00	23.00
UK	BOE Asset Purchase Target	Apr		--		435	12.00	23.00
US	Wholesale Inventories MoM	Feb P		--		-0.4	12.30	23.30
US	GDP Annualized QoQ	4Q T		2.1		2.1	12.30	23.30
Friday 27 March 2020								
NZ	ANZ Consumer Confidence Index	Mar		--		122.1	21.00	8.00
JN	Tokyo CPI YoY	Mar		0.3		0.4	23.30	10.30
US	PCE Core Deflator YoY	Feb		1.74		1.600004	12.30	23.30
US	U. of Mich. Sentiment	Mar F		94		95.9	14.00	1.00
Upcoming Central Bank Interest Rate Announcements								
UK, BOE		Mar 26	0.10	0.10		0.10		
Australia, RBA		Apr 7	0.25	0.25		0.25		
Canada, BoC		Apr 15	0.25	0.25		0.75		
Japan, BoJ		Apr 28	-0.10	-0.10		-0.10		
US, Federal Reserve		Apr 29	0/0.25	0/0.25		0/0.25		
Europe, ECB		Apr 30	-0.60	-0.60		-0.50		
New Zealand, RBNZ		May 13	0.25	0.25		0.25		

GMT: Greenwich Mean Time; AEDT: Australian Eastern Daylight Time

FORECASTS

Note that NAB has suspended publishing economic forecasts until there is more clarity on currently-escalating public health measures designed to mitigate the impact of the coronavirus and their economic cost.

CONTACT DETAILS

Market Economics

Kieran Davies
Chief markets economist
+61 2 9237 1406
kieran.davies@nab.com.au

Tapas Strickland
Senior Economist
+61 2 9237 1980
tapas.strickland@nab.com.au

Kaixin Owyong
Economist, Markets
+61 2 9237 1980
kaixin.owyong@nab.com.au

Markets Research

Ivan Colhoun
Global Head of Research
+61 2 9237 1836
ivan.colhoun@nab.com.au

Group Economics

Alan Oster
Chief Economist
+61 3 8634 2927
alan.oster@nab.com.au

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