Written by Geoffrey Dell, Associate Professor/Discipline Leader Accident Investigation and Forensics, CQUniversity Australia

Australia's decision to suspend all Boeing 737 Max 8 flights in and out of the country appears to be a prudent precaution.

It comes after two fatal accidents overseas involving the aircraft. On Sunday, 157 people died when Ethiopian Airlines flight JT610 crashed minutes after takeoff . In October last year 189 people died when Lion Air's
flight ET302
crashed off the coast of Indonesia
.

Australia's Civil Aviation Safety Authority (CASA) says no Australian airlines operate the Boeing 737 MAX – although Virgin Australia has several on order – but two foreign airlines fly these aircraft to Australia.

Read more: ***The internet is now an arena for conflict, and we're all caught up in it***

Singapore-based SilkAir has already suspended operation of its 737 MAX 8 aircraft . Fiji Airways
is the only other operator that will be affected by CASA's temporary suspension.

Other countries – including New Zealand – have also suspended flights of the 737 MAX 8 , so people no doubt want to know if it's safe to fly on the aircraft.

There are several vital questions that need to be answered.

Early days for investigators

Although investigation of the Ethiopian Airlines crash is only just beginning, available radar data seems to suggest similar flight profile characteristics with that of the Lion Air crash.

After the Lion Air crash, questions were raised about the aircraft's Manoeuvring Characteristics Augmentation System (MCAS), designed to prevent the aircraft from stalling.

If the data from the recovered flight recorders of both aircraft confirm issues with sensors in the MCAS (sending spurious signals to the flight management computers and resulting in the autopilot automatically pushing the nose of the aircraft down), then several questions will arise:

- why weren't the pilots able to manually counter the actions of the autopilot, previously a safe design characteristic of aircraft autopilots in general?

- why didn't the pilots disconnect the autopilot as soon as the trouble began, something that can be done quickly with the push of a button?

The same question applies in relation to disconnecting the auto throttle system. The Boeing 737 flight manual includes a procedure for pilots to counter any problems in the aircraft's automatic trim system by disconnecting the autopilot and auto throttle systems.

If the problems continue they can switch off the automatic trim system and then fly and trim the aircraft manually for the remainder of the flight.

This was the crux of a Boeing circular to airlines after the Lion Air crash, which was made an Airworthiness Directive

by the US Federal Aviation Authority.

This required airlines to instruct pilots on applying the checklist if they have difficulty controlling an aircraft that's being pushed into a nose-down position by the autopilot.

The question then arises: if this latest crash is proven to have been caused by the aircraft's systems doing just that, did the pilots apply the checklist procedure? If not, why not? And if they did, why didn't it work?

Updates to software

Until the flight recorders from the Ethiopian Airlines aircraft are read out, much of what is being discussed in relation to cause is conjecture.

Boeing says it will soon issue a software upgrade for the 737 MAX 8 , presumably in response to its own investigation of the Lion Air crash.

If the second crash is shown to have been caused by the same issues, then sadly it comes too late for passengers and crew of the Ethiopian Airlines aircraft.

But there is always a lead time in relation to changes to anything that can affect the safety or operation of aircraft systems that are critical to assuring safe flight. Premature implementation of ill-considered changes can have the exact opposite outcome to that intended.

So I would expect Boeing to have done rigorous and extensive testing to ensure that the software upgrade fixes, rather than exacerbates, the problem and doesn't introduce any new ones.

A lot of emphasis in the Ethiopian Airlines crash investigation will be centred on what can be learned from the flight data recorders. If the recorders are undamaged, investigators should gain

an understanding of what transpired leading up to the crash very soon, in the next few days.

Then real and effective comparisons can then be made with what is known about the cause of the Lion Air disaster. Investigators ought to be able to answer the question of whether the similarities in apparent vertical speed and altitude fluctuations of the two flights had similar causes.

The flight recorders were recovered quite early from the sunken wreckage last year, although the final report is yet to be finalised and released.

A popular aircraft

The Boeing 737 has been a safe and stable workhorse of global airlines for more than 50 years. Much of the 737 MAX 8 aircraft and its systems are common to earlier variants.

The MCAS introduced in the new model was clearly intended by Boeing to be an enhancement to assure and improve safety. Usually we see step changes in safety improvement with the advent of new technologies in airliners – Ground Proximity Warning Systems (GPWS) and Traffic Collision Avoidance Systems (TCAS) being two clear examples.

But in this instance it is possible that some anomaly existed in the programming of the MCAS which may have led to these two crashes.

If so, it will be anomalies that went undetected through the rigorous and exhaustive flight and systems testing of the aircraft prior to being granted a certificate of airworthiness by the US Federal Aviation Administration, required before the type could have entered service with the airlines.

Boeing has issued a statement saying it is “deeply saddened” by the latest crash and will do what it can to help in the investigation.

Read more: ***Lessons learned from the Essendon air crash: the importance of pilot checklists***

I am sure everyone is keen to see the results of both investigations, so that targeted action can be taken to assure the ongoing safety of flight.

Meantime, there is no evidence at all that the travelling public should have any concerns about the safety of other Boeing 737 aircraft types, the types that most of our Australian airlines currently operate.

They do not have the new MCAS and feature tried and true technologies that have been the linchpin of Australia's enviable airline safety record for more than 40 years.

For the record, I flew home in a Boeing 737 from Melbourne last Monday, and I'll be flying in one again very soon.

Geoffrey Dell does not work for, consult, own shares in or receive funding from any company or organisation that would benefit from this article, and has disclosed no relevant affiliations beyond their academic appointment.

Authors: Geoffrey Dell, Associate Professor/Discipline Leader Accident Investigation and Forensics, CQUniversity Australia

Read more http://theconversation.com/flights-suspended-and-vital-questions-remain-after-second-boeing-737-max-8-crash-within-five-months-113272