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The COVID-19 pandemic: losing the race

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Introduction[1]

The first case of COVID-19 arrived in Australia on 19 January 2020 (Hunt 2020). But the beginning of the end of what would become the COVID-19 pandemic occurred just over a week earlier on 11 January. It was on that day that a consortium led by Professor Zhang at Fudan University in Shanghai announced to the world — via a tweet by Eddie Holmes FRSN[2] — that they had sequenced the coronavirus genome from the Wuhan outbreak.[3]

In that DNA sequence lay the building blocks of vaccines against the virus, and with it what would turn a once-in-a-century pandemic into a comparatively routine public health challenge. The journey from a collection of bases that began "attaaaggtt" to near-universal jabs in arms had plenty of steps in between. And those steps weren't simple. Vaccines had to be developed, tested in three different phases of clinical trials, manufactured, distributed and injected. The challenge for policymakers around the world was to transform those steps from being complicated to being inevitable. They needed to convert mass vaccination from a possibility into a certainty.

The good news for Australian policymakers was that the hard parts of this process were either already done, or being done remarkably effectively overseas. Back in 2005, Drew Weissman and Katalin Karikó from the University of Pennsylvania had developed a technique to produce customised "messenger ribonucleic acid" (mRNA) that could instruct cells in the human body to produce any sequence of proteins that scientists wanted. They had patented this technique in 2006 — and that patent was eventually licensed to Pfizer and Moderna to create the COVID-19 mRNA vaccines.[4]

On 15 May 2020, President Donald Trump announced a public-private partnership dubbed Operation Warp Speed to coordinate and accelerate the development of COVID-19 vaccines. This program provided US$11 billion in funding to eight companies to develop and test vaccines. And, crucially, it included so-called "advance purchase agreements," whereby the US government would pledge to purchase a certain amount of the vaccines once they were developed,

1 This is an edited version of Chapter 3 of the authors' *Australia's Pandemic Exceptionalism: How We Crushed the Curve but Lost the Race*, Sydney: NewSouth Publishing, 2024. Reprinted with permission.

2 See Holmes (2021) [Ed.]

3 The full genetic sequence was subsequently posted at GenBank, https://www.ncbi.nlm.nih.gov/nuccore/MN908947.

4 Karikó and Weissman were jointly awarded the Nobel Prize in Physiology or Medicine 2023 for their discoveries that enabled the development of effective mRNA vaccines. [Ed.]

tested, and approved by the Food and Drug Administration (FDA). For instance, on 22 July 2020, the US government placed an advance purchase order of US$2 billion with Pfizer for 100 million doses of its vaccine.

On 12 April 2020, Bill Gates had pointed out that manufacturing facilities needed to be put in place while the vaccines were being developed, rather than waiting to discover which vaccines would work and then scaling-up specific facilities. As he put it (Gates, 2020):

> We aren't sure which vaccines will be the most effective yet, and each requires unique technology to make. That means nations need to invest in many different kinds of manufacturing facilities now, knowing that some will never be used. Otherwise, we'll waste months after the lab develops an immunisation, waiting for the right manufacturer to scale up.

Indeed, the Gates Foundation committed hundreds of millions of dollars to do exactly this — build the vaccine supply chain even before there was vaccine supply (Bill and Melinda Gates Foundation, 2022).

So, the critical elements of successful vaccines had been put in place. There was vaccine development to be done and clinical trials to be run, but the table had been set and drug manufacturers had powerful commercial incentives to move quickly and effectively.

Australia's three tasks

What then, one might well ask, was there left for Australia to do? Three things. First, we had to purchase a sufficient and timely supply of whichever vaccine would turn out to be the most effective. Second, we had to convince the Australian public to get vaccinated. And, third, we needed to quickly and efficiently get jabs into arms. All three elements were essential for Australia to exit the pandemic. On this test for policymakers, there was no partial credit. They had to nail all three.

What the Australian public got from its leaders was a stellar performance on the second and third elements, and abject failure on the first. Since we needed all three, ultimately our government failed us.

This failure unnecessarily prolonged the pandemic in Australia. It cost hundreds of lives. And the additional lockdowns it necessitated cost the nation more than $30 billion in direct economic costs alone — and billions more in indirect costs (Holden & Leigh, 2022). It was a failure that was immortalised in one, succinct, memorable and profoundly stupid phrase from Prime Minister Scott Morrison. On 10 March 2021, Morrison said of the vaccine rollout, "This is not a race." He went on to repeat that phrase four times that month (Taylor, 2021).

But it *was* a race. It was a race to end the pandemic. It was a race to save Australian lives and to reopen the economy. It was a race to put lockdowns behind us. And it was a race that we could have won, but failed to as a result of poor preparation, bureaucratic failure, and an absence of political leadership.

As Jane Halton, secretary of the federal health department from 2002 to 2014, chair of the global Coalition for Epidemic Preparedness Innovations, board member of the government's National COVID-19 Coordination Commission during the pandemic, and head of the 2022 Review of COVID-19 Vaccine and Treatment Purchasing and Procurement, now says:

> It was a race. It was always a race. Manifestly, we had longer lockdowns than

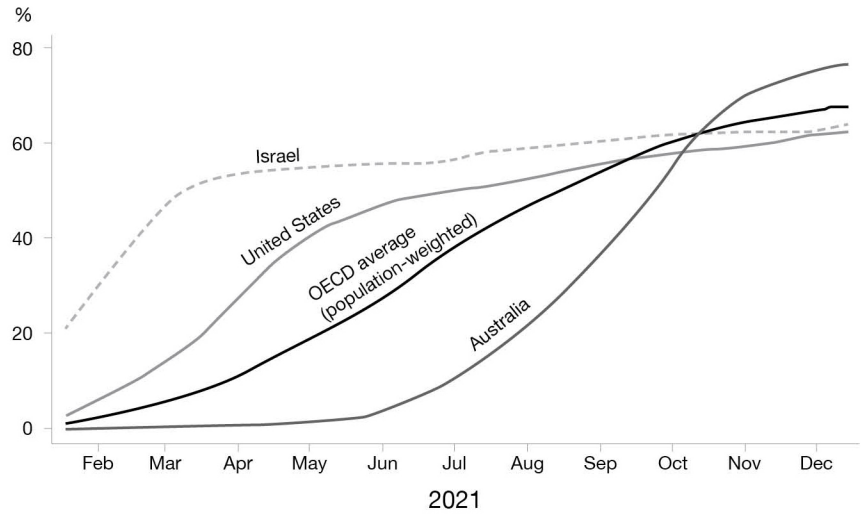

FIGURE 3.1 **Comparative vaccination rates**
SOURCE Holden and Leigh (2022).

NOTE If no children are vaccinated, the adult vaccination rate is approximately 15–20 percentage points higher than the overall vaccination rate.

we actually needed to have because we didn't have supply and rollout as quickly as others.[5]

Once Australia did get moving, our vaccination rates were world leading. As Figure 1 shows, as late as June 2021 Australia had hardly vaccinated anyone, and severely lagged behind countries like the United States and Israel. By October — just four months later — Australia had erased that deficit and continued to vaccinate more and more of the population.

Yet for far too long Australia's vaccination rate was dismal. Figure 1 demonstrates that the population-weighted average vaccination rate among advanced economies (the 38 OECD countries) was well above Australia's for the greater part of 2021. Shockingly, in mid 2021 just 6% of the Australian population had been vaccinated, compared to the average among OECD countries of 32%. But even this understates the magnitude of our vaccine failure. For more than two months in 2021 Australia had the very worst vaccination record among all OECD countries.[6] We weren't first. We weren't among the best. We weren't above average. We weren't a bit below average. We were stone-cold last. We did worse than Mexico, Turkey and Portugal, to name just a few countries with far lower levels of economic development and traditionally far less functional administrative states.

Australia did not face significant vaccine hesitancy among its population — some-

5 ABC TV, Nemesis, series, https://iview.abc.net.au/show/nemesis/series/1/video/NS2412H003S00

6 As Holden & Leigh (2022) document, from 12 May 2021 to 26 July 2021, Australia ranked last in vaccination rates among OECD countries.

thing that dogged other countries, like the United States. We didn't have any serious politician expressing the view that Australians should not be vaccinated. We had a long history of compulsory vaccination against childhood diseases like measles, mumps and rubella. Evidently, we had a government willing to marshal massive economic resources to combat the pandemic.

But we pursued a flawed vaccine strategy from the very start. Rather than ensure a large supply of all the possible vaccines, we gambled mostly on just two. We pinched pennies instead of buying insurance at a time when insurance was incredibly cheap and the risks we faced were extremely large. We confused industry policy with health policy in trying to back the University of Queensland vaccine and the manufacturing capabilities of CSL. When it came to our vaccine procurement strategy, we did everything wrong. And this isn't just obvious with 20:20 hindsight: it was abundantly clear at the time. Getting the vaccine purchasing strategy right didn't require specialised medical knowledge or negotiating prowess. All it required is the sort of basic economic logic that is taught to first-year undergraduates.

Australia's vaccine procurement strategy

There were eight companies that were supported in vaccine development under the US government's Operation Warp Speed. In principle, Australia could have placed orders with all of these companies. We could have done so early. And we could have bought enough doses from each of the companies to guarantee that every Australian could be vaccinated as soon as the first successful vaccine was available. To paraphrase former Treasury Secretary Ken Henry's dictum about stimulus during the 2008 financial crisis, that three-pronged strategy could be described as "Go broad, go early, go ample."

Instead, we did the opposite. Our vaccine purchasing strategy was selective — it initially focused on just four vaccines (but principally two). The timing of purchases was sluggish, even for the favoured AstraZeneca and UQ vaccines: those agreements were first announced in September and October of 2020, respectively, while other countries had moved as early as July 2020. That might not sound like a long time, but in the context of a pandemic it absolutely was. Moreover, the first deal with Pfizer for its Comirnaty mRNA vaccine was not reached until November 2020. A deal with Novavax for its protein vaccine was also announced in November. And the initial vaccine purchases were not sufficient to cover the entire Australian population. The initial deal with AstraZeneca was for just 33.8 million doses which, given that two doses per person were required, covered fewer than 17 million Australians (even before considering wastage, spoilage and other factors). Worse still, the initial Pfizer contract was for just ten million doses, covering at most five million Australians. There were no orders at all in 2020 for the Moderna vaccine, and an agreement was not reached until — startlingly — the middle of 2021.

Until 13 May 2021, Australia did not have agreements in place for sufficient doses of what turned out to be by far the most effective COVID-19 vaccines — the mRNA vaccines produced by Pfizer and Moderna — to cover the entire Australian population. That's roughly nine to ten months later than should have been the case under any competent vaccine procurement

strategy. In the context of a pandemic, that's an eternity.

As a group of Geneva-based epidemiologists put it (Choiseul et al., 2021):

> [G]iven the very aggressive and initially successful response of Australia to the COVID-19 epidemic, the government's investment in the vaccination campaign is relatively low … It could have been expected that Australia would take all possible measures to immunize its population as soon as possible.
>
> Observing the vaccine strategies of other high-income, high-resource countries over the same time makes it clear that Australia could have invested its money into vaccine acquisition more wisely … The choice of entering into advance-purchase agreements with only three manufacturers … was risky.

The auditor-general's report on Australia's vaccine rollout documents this in precise detail, and makes for excruciating reading (Australian Auditor-General, 2022). The key table from that report provides the timeline of Australia's vaccine purchases, and it is reproduced in Table 1.

The obvious response to this critique of Australia's vaccine procurement strategy is that it looks at the situation in hindsight. Indeed, as noted earlier, Prime Minister Scott Morrison described those who were critical of Australia's vaccine procurement as "hindsight heroes"(Gould, 2021). But, as we pointed out at the time, the real issue wasn't being right in hindsight. It was the staggering lack of foresight by the government that was the root of all our problems (Hamilton & Holden, 2022).

In fact, even thinking that hindsight could be a factor here reveals the mindset that led to our calamitous strategy in the first place. Start with the basic facts surrounding vaccine purchases in early 2020. First, there were as many as eight credible candidate vaccines and it was unclear which of these were going to turn out to work, how high the efficacy was going to be, and on what timeframe the development would occur. Second, the social and economic benefit of effective vaccines was going to be extremely large relative to the cost. The costs of lockdowns, deaths, social dislocation, loss of education, and the need for ongoing fiscal support added up to billions of dollars *per month*. The cost of the best (mRNA) vaccines was about US$30–$39 per dose. That's less than A$2 billion to cover all 25 million Australians, without deaths, social dislocation, loss of education, and the need for ongoing fiscal support added up to tens of billions of dollars *per month*. The cost of the best (mRNA) vaccines was around US$30–$39 per dose (Lelani et al., 2022). That's less than A$2 billion to cover all 25 million Australians, without trying to negotiate a discount[7]. Even if we assume that cost for all eight potential vaccines, we're talking about $16 billion — or less than two months' worth of the social and economic costs. Third, we were in competition with other countries to get doses fast. A race, if you will. European regulators were talking about export controls. The United States was acting decisively. Canada bought six

7 The true cost would almost surely have been substantially lower. As Holden & Leigh (2022) report: Pfizer's former president of global research and development, John LaMattina, observed that "In the case of Australia, enough vaccine to inoculate its entire population over the age of 18 should have been done at once. Assuming that is about 20 million Australians, this would have cost about US$780 million."

Table 1: Australia's vaccine purchases

Vaccine	Number of doses per agreement [a] (millions)	Total number of doses per vaccine (millions)	Date agreement announced	Vaccine type	Approved by TGA
AstraZeneca (Vaxzevria)	33.8		2020-09-07	Viral vector	2021-02-15
	22.5	56.3	2020-12-11		
University of Queensland	51.0	51.0	2020-10-08	Protein	no [b]
Pfizer (Comirnaty)	10.0		2020-11-05	mRNA	2021-01-25
	10.0		2021-02-04		
	20.2		2021-04-09		
	0.5 [c]		2021-05-13		
	85.0		2021-07-25		
	1.0		2021-08-15		
	0.5 [d]		2021-08-31		
	4.0 [e]	131.0	2021-09-03		
Novavax (Nuvaxovid)	40.0		2020-11-05	Protein	2021-01-19
	11.0	51.0	2021-12-11		
Moderna (Spikevax)	25.0		2021-05-13	mRNA	2021-08-09
	1.0 [f]	26.0	2021-09-01		
Total number of doses purchased (millions): 315.3					
Total number of doses purchased that received TGA approval (millions): 264.3					

Source: Australian Auditor-General (2022).
Note a: Agreements include advance purchase agreements with vaccine manufacturers and agreements with nations to purchase additional vaccine stock.
Note b: The University of Queensland vaccine did not proceed past human trials in December 2020.
Note c: 513,630 Pfizer doses purchased from the COVAX facility.
Note d: 500,000 Pfizer doses were "swapped" with Singapore in August 2021 and repaid in November 2021.
Note e: Four million Pfizer doses were "swapped" with the UK in September 2021 and repaid in late 2021.
Note f: One million Moderna doses were purchased from EU member states in September 2021.

times the number of doses required for its population. Fourth, "excess" vaccines weren't going to be wasted. They could easily have been resold. Better still, being able to distribute those doses as foreign aid to less wealthy countries in the Asia-Pacific would have been both a diplomatic triumph and, well, the right thing to do.

None of these four factors required hindsight. They were all completely obvious in early 2020. The government could simply have heeded Bill Gates' crystal-clear advice back in April 2020. Yet Australia somehow managed to bungle it. Remarkably, the story doesn't end there. It was subsequently revealed that it wasn't just Australia failing to be appropriately proactive. We were given a second opportunity by Pfizer. It was reported in early September 2021 that "Pfizer contacted the health department on 30 June 2020 to request a formal meeting with Health Minister Greg Hunt to discuss supply contracts. Instead, it was taken by a bureaucrat ten days later" (Gould, 2021). Clearly it wasn't a priority.

Stephen Duckett, health economist and former secretary of the federal health department, agrees that the government's strategy was risky, and that this would have been obvious at the time to anyone who understood economics:

> I was critical of it because most other countries were doing a portfolio strategy, hedging their bets, investing in a number of vaccines. We had a very narrow strategy, which is a risky one. And it turned out to be very risky. You've got to be careful about hindsight. We didn't know at the time whether mRNA would work; we didn't know which vaccines might work, which might not. But even at the time, looking forward, most other countries had more options. Many countries took multiple options. And we didn't, we took a very narrow set of options. And you would have known at the time that that's unlikely to be a good strategy because of economic theory.[8]

Moreover, it simply cannot be claimed that the government didn't receive fair warning. In June 2021, a slide deck prepared for the government by consulting firm McKinsey & Company (of which Greg Hunt was a former employee) was released under freedom of information (McKinsey & Company, 2020). Delivered on 27 August 2020, the month before the government announced its first orders, the document laid out comprehensively the race the government faced, including timelines for the availability of all vaccine candidates and the orders already placed by different countries by that time. And Jane Halton says she warned the then health minister of these risks:

> I was seeing on a weekly basis what was happening in the vaccine supply chain world, which showed progressively more and more of the potential supply of vaccines being hoovered up by other countries. And so I was saying to people in government that this was very worrying. And I certainly told Greg Hunt.[9]

On every dimension that mattered for vaccine procurement, Australia got the cost-benefit analysis badly wrong. It might, at first glance, seem expensive to buy all eight

8 Stephen Duckett, Zoom interview, 2 April 2024.

9 ABC TV, Nemesis, series, op. cit.

candidate vaccines. Wasteful, even. Why not just buy one? The answer, of course, is that it was unclear which vaccine would be best — or would even work at all. A basic tenet of investing is that it is best to diversify one's portfolio. This is why it is wise to buy a basket of stocks, rather than bet on just one. Indeed, it is the rationale for buying the entire stock market index rather than trying to pick individual stocks. And it is why "stock picking" active funds rarely systematically beats a broad stock-market index. Anyone who has studied undergraduate finance, or who has even received basic financial advice, would understand that betting on just two out of the eight potential vaccines was a bad idea. But even if nobody involved in Australia's vaccine purchasing possessed this basic knowledge, surely they knew of the adage "don't put all your eggs in one basket."

Now it might have seemed wasteful to have 50 million doses of *both* candidate mRNA vaccines. After all, if the Pfizer mRNA technology worked, then there was a pretty good chance that the Moderna mRNA technology would also work out. After all, they were both based on the same underlying approach. Indeed, this was part of the thought process — to the extent that there was one — behind the decision to purchase just one vaccine from each of the major categories. We bought Pfizer over Moderna (mRNA vaccines); AstraZeneca over Johnson & Johnson (viral vector vaccines); and, after the University of Queensland vaccine fell over, Novavax over Sanofi (protein vaccines) (Hamilton & Holden, 2021a). This implicitly assumed that the success of vaccines within a particular technology was perfectly correlated. In other words, if AstraZeneca's vaccine succeeded, then Johnson & Johnson's would also succeed with 100% probability. That ignored the differences in approaches among vaccines that used similar underlying technology. It ignored the differences in speed to market among different vaccines. It ignored the differences in manufacturing processes that could lead to different success profiles. It ignored inevitable differences in distribution. And it ignored the potential differences in the eventual efficacy of vaccines using the same underlying technology. In short, the "buy one from each category" approach treated apples and mangoes as if they were interchangeable just because they are both types of fruit.

What about timing? One might argue that it wasn't necessary to commit to vaccine purchases while they were still in development and going through lengthy clinical trials. But this misses the fact that vaccines were always going to be in limited supply soon after approval and those countries that got in early were going to be first in the queue. By the time it was clear which vaccines were going to be successful, it would be too late to purchase significant quantities quickly. Moreover, the advance purchase agreements provided much-sought-after funding for the companies involved, as they went through clinical trials, which could cost into the billions of dollars.[10]

So why did Australia make such grave errors when it came to vaccine procurement? There's no question that Prime Minister Scott Morrison and Health Minister Greg Hunt bear ultimate responsibility. They were the leaders charged with making

10 For instance, the Pfizer phase-3 clinical trial involved more than 46,000 participants at 153 sites in six countries, https://www.pfizer.com/science/coronavirus/vaccine/about-our-landmark-trial

the extremely consequential decisions about vaccine procurement. They might have received lousy advice, but they absolutely should have known better.

And what about that advice? Chiefly responsible for the vaccine rollout was federal Chief Medical Officer Brendan Murphy. Indeed, it was Murphy who first used the "it's not a race" metaphor (Hamilton & Holden, 2021e). He made that remark in early March 2021 when people were finally starting to ask questions about our off-the-rails vaccine rollout. As we noted at the time (Hamilton & Holden, 2021c):

> Confronting delays in the COVID-19 vaccination program this week, federal Health Department secretary Brendan Murphy said: "We're not like the US or UK." He's right, but not in the way he intended.

And although Murphy justified this approach by saying that the vaccine rollout should proceed "as quickly and carefully and safely as we can" — which seemed to imply that moving at a comparable pace to other competent countries around the world was unsafe — he was acting less as an adviser and more as a politician. He seemed almost to be covering for the government's flailing vaccine rollout. He was making a subjective statement about policy trade-offs, not providing objective medical advice.

Stephen Duckett believes an "optimism bias" driven by inside-the-bubble thinking in the health department ultimately led to the failure:

> I think major investment in two vaccines and not hedging your bets is stupid. So I've been trying to work out: why did they do it. You've got to go back to where they were sitting in 2020 when these vaccine decisions were being made. If you are sitting there, you will say CSL has a track record of delivery in vaccines. So if we invest heavily in CSL that is very, very safe. And so do we really need to have any insurance in those other strategies? I think that was an error.
>
> And don't forget the impact on their psyche of the Melbourne research establishment, of which CSL is part. The people they were talking to would have been saying: "CSL can do this, we've got these huge vats, we can make unlimited numbers." The chief scientific officer of CSL would have been talking to Brendan Murphy; they would know each other. And Brendan would have felt reassured that CSL knew what they were doing and were able to do it. And this was safe. But that doesn't mean you don't invest in it anyway. The fact that they didn't have a backup? I have no idea why they went for such a narrow strategy.[11]

What emerged from that rich brew of optimism bias, bad advice, and self-congratulation, completely devoid of basic economic logic, was a dangerous level of groupthink that not only excused Australia's vaccine failures but celebrated them. Rather than admit to mistakes and acknowledge the need to improve, the Morrison-Hunt-Murphy triumvirate rewrote history in real time. This put Australia in an incredibly dangerous position. Our vaccine strategy wasn't conservative and it wasn't safe. It was dangerously unsafe. We were effectively gambling on there not being a major outbreak or a new strain of the virus emerging for another six months. Again, this was clear

11 Stephen Duckett, interview.

at the time. We noted these risks in early March 2021, commenting on the Murphy-Morrison "it's not a race" dogma (Hamilton & Holden, 2021c):

> If that thinking extends to a lack of ambition about the proportion of Australians we vaccinate, then at best we'll squander a remarkable opportunity, and at worst risk another major outbreak and threaten the nation's prolonged economic recovery. If it reflects any complacency about the urgency of the vaccination program, it is terribly dangerous.

Australia had a remarkable opportunity in early 2021. Unlike the United Kingdom and the United States, we did not have significant caseloads. Those countries had to vaccinate to save lives in the short term. By contrast, Australia had the potential to vaccinate enough of the population to achieve so-called "herd immunity" — the point at which a sufficient proportion of the population had been vaccinated that an exponential outbreak could not take off.[12] What it would have taken to achieve that enviable outcome — herd immunity without the extreme human toll stemming from mass infection — was to have enough doses of the best vaccines ready to go, and an efficient distribution mechanism in place to get needles into arms.

At this point in the evolution of the pandemic, it was clear that Australia's defective vaccine strategy was causing major practical problems. Having failed to purchase nearly enough of the mRNA vaccines, we were left with the AstraZeneca vaccine, which had been shown to have lower efficacy. Much better than nothing, to be sure, but not close to as effective as the mRNA vaccines that we had not ordered nearly enough of. This had a direct impact on the proportion of the population that needed to be vaccinated in order to achieve herd immunity and eliminate the possibility of an exponential outbreak.

Epidemiologists had long understood the link between the efficacy of a vaccine and the proportion of the population that needs to be vaccinated to achieve vaccine-induced herd immunity. As early as December 2020, UNSW Kirby Institute epidemiologists MacIntyre, Costantino, and Trent released a pre-print showing exactly how the herd-immunity threshold varies with vaccine efficacy. They showed that at 95% efficacy just 63% of the population would need to be vaccinated to achieve herd immunity. But if the vaccine in question only had an efficacy of 70%, then the vaccination threshold required for herd immunity rose to 86% (MacIntyre et al., 2020).

These numbers were extremely pertinent. The AstraZeneca vaccine — on which Australia had largely pinned its hopes — had an efficacy in clinical trials of 72% (although some early "real-world" data around that time showed higher rates of efficacy). By contrast, the Pfizer mRNA vaccine had a stunningly high efficacy of 95%. Yet in March 2021 we had only ordered enough

12 As we put it in March 2021: "As of Friday, about 130,000 Australians — or one in 200 — had received a first-dose COVID-19 vaccine. And this week the government admitted it would not meet its target to complete the vaccination program by the end of October. Countries with significant caseloads, such as Britain, the US and much of Europe, are vaccinating to save lives today rather than reach for so-called 'herd immunity' — the point at which so many people have been vaccinated that another exponential outbreak can't occur. Australia, by contrast, has a real chance to achieve herd immunity. Whether we do so will be determined by government policy." (Hamilton & Holden, 2021c).

of the Pfizer vaccine to cover at most 40% of the population (without accounting for wastage, spoilage and overdosing, all of which were both commonplace and already occurring). And Australia had failed to order a single dose of the other extremely high-efficacy mRNA vaccine, produced by Moderna. With the mix of vaccines we had at that point, we needed to vaccinate about three-quarters of the population in order to achieve vaccine-induced herd immunity.

This made our vaccine race even longer. Rather than having to vaccinate just 63% of the population, we needed to vaccinate 75% of the population. That amounted to an additional three million people who we needed to convince to get vaccinated, get them to show up to a vaccine hub, and get them to come back several weeks later for their second shot. Even if we could be sure a sufficient number would show up, that would inevitably take time, so this lower efficacy simply pushed out the date by which we could reach an adequate level of protection to avoid lockdowns. This put us at risk of another wave arriving in the meantime. In the end, as Table 1 (above) highlights, it wasn't until 9 April 2021 that the federal government got its act together to purchase an additional 20 million doses of the Pfizer vaccine (enough for ten million Australians), and not until 13 May that it ordered 25 million doses of the Moderna vaccine.

The cost of Australia's vaccine debacle

It would turn out that the months between when mRNA vaccines were available (and countries that had made sound purchasing decisions were vaccinating their populations) and when Australia finally had enough doses of those vaccines to cover the Australian population were crucial months. To get a sense of the economic impact of our dismal vaccine rollout, consider what might have happened had we been as competent as Israel in procuring vaccines.[13]

Israel's last lockdowns ended in February 2021, so it is reasonable to think that, had our vaccine procurement been comparable to Israel's, then we, too, could have avoided lockdowns from this point on. What did that cost in a pure, but rather narrow, economic sense? More than $30 billion.

To see why, start with this. The Australian Treasury has estimated that the economic cost of nationwide lockdowns was $3.2 billion per week (Australian Treasury Department 2021). It's important to remember that this is the cost of lockdowns relative to a counterfactual scenario where there was no lockdown *and no pandemic*. It is emphatically not the cost of lockdowns compared to just "letting it rip" in the middle of a pandemic. This is also — and Treasury duly acknowledges this — an underestimate. It focuses only on direct economic effects, and doesn't factor in indirect effects like drops in consumer confidence (which reduce economic activity by making consumers reluctant to spend), supply-chain disruptions (which reduce economic activity by making it harder for consumers to spend even if they want to), and it ignores the economic cost of government support programs.

The lockdowns that took place between March and December 2021 — which could have been avoided had our vaccination strategy and rollout been up to scratch — were

13 The following method of calculating the economic costs that could have been avoided follows Holden & Leigh (2022).

the equivalent of a 68-day nationwide lockdown (Holden & Leigh, 2022). At a direct economic cost of $3.2 billion a week this shakes out to $31 billion.

Not only does this lower-bound estimate exclude the important indirect economic effects mentioned above, it also excludes the social impact of the vaccine-avoidable lockdowns. While it is hard to quantify exactly how large these were, there were some very tangible effects. Perhaps the most obvious was the school closures that resulted from the lockdowns. Not only did this damage the human capital of all school students, it also reduced the productivity of parents who were attempting to work from home while simultaneously acting as de facto teachers. There is some reason to believe that many students managed to recover the learning loss from this period, but parental productivity, by its very nature, was permanently lost.

Taking together the direct economic effects, the indirect economic effects, and the school-closure effects of the lockdowns that our substandard vaccine strategy caused, the cost to the Australian economy was almost surely north of $50 billion. Perhaps well north of that. As such, it was easily the single largest public policy mistake in Australian history. Indeed, at around 10% of GDP, the vaccine debacle was more than half as large as the 17% drop in GDP during the Great Depression of 1929–31 (SGS Economics & Planning, 2020). So, as an economic matter, that makes Australia's great vaccine debacle almost surely the single most costly *economic event* in Australian history. And unlike the Great Depression, or the World Wars, or the financial crisis of 2008, it was completely self-inflicted. An unforced error of the gravest kind.

Plenty of blame to go around

As if the federal government's bungling wasn't enough, other officials managed to undermine vaccination efforts by damaging public confidence. The most serious example was Queensland Chief Health Officer (and now state Governor) Jeannette Young. In a June 2021 press conference, Young managed to raise serious doubts — at least in some people's minds — about whether they should be vaccinated.

The ostensible issue, to the extent that there was an issue, was the possibility of the AstraZeneca vaccine potentially causing blood clots in young men. The key remark that Young made in her press conference was the following (Zillman, 2021):

> I don't want an 18-year-old in Queensland dying from a clotting illness who, if they got COVID, probably wouldn't die.

This would turn out to be a profoundly misguided remark. At the time Young made it, there had been two Australian deaths linked to the AstraZeneca vaccine, from a rare clotting disorder known as thrombosis with thrombocytopenia syndrome, or TTS. The first two deaths from TTS were a 48-year-old woman in April 2021, and a 52-year-old woman in June (Davey, 2021b). The rate of TTS was very low, and continued to be very low. In September 2021 the Therapeutical Goods Administration (TGA) reported that TTS occurred in just two people out of every 100,000 who received the AstraZeneca vaccine (DHAC, 2021e). And most of those TTS cases were both treatable and were treated, with a vanishingly small number resulting in death. The TGA currently summarises that, from an individual's perspective, "The protective benefits of vaccination against COVID-19 continue to far

outweigh the potential risks of vaccination" (DHAC, 2023).

Not only was vaccination in an individual's own interest, despite the small chance of TTS, it was also in the social interest. By preventing the spread of COVID-19 to others, vaccination would reduce overall COVID-19 deaths. So not only was Young giving bad medical advice to individuals, she was giving absolutely terrible public health advice. And giving sound public health advice was, well, her one job.

But it was all too understandable that if you were an 18-year-old listening to her advice — or a 50-year-old for that matter — you might hesitate to get vaccinated. And that was precisely the damage. Officials like Young had tremendous power to shape public opinion during these frightening times. And in light of the mistakes that the federal government was making, it was even more important that state chief health officers were aiding the vaccination effort, rather than hindering it.

Rather than remedy her mistake, Young then both doubled down and made a further mistake. In a clumsy attempt to defend her remarks, Young said (Smee, 2021):

> I am giving my advice. I am a doctor. I've been involved in Australia's vaccination program now for 16 years. I have the vaccination rate here for our little ones up to five years old up to 95%. I am on the record as supporting vaccination. But I want the right vaccine to go to the right person … This is my advice. People, of course, can go and get their own advice. They can get it from wherever they wish to get it, but my advice is very, very clear.

And she later went on to say (Layt, 2021):

> I firmly believe that younger people — and I said 18-year-olds in that comment — should be getting Pfizer … I do not think they should be getting AstraZeneca. And we have plenty of Pfizer and they can come out and get Pfizer, or Moderna.

The stocks of Pfizer obviously depended on how many people wanted to access them. And if people suddenly became afraid of taking AstraZeneca at that time, then there would not have been "plenty of Pfizer." In fact, anti-vax posters quickly emerged in Melbourne with a picture of Young and her words "I don't want an 18-year-old in Queensland dying from a clotting illness who, if they got COVID, probably wouldn't die." Young had played right into their hands (Layt, 2021).

It would be remiss of us not to mention that federal Health Minister Greg Hunt played his own part in slowing vaccination by casting doubt on the AstraZeneca vaccine and sending the message that it was OK for those under 50 to wait until later in the year to be vaccinated. In May 2021, Hunt told ABC radio host Michael Rowland (Davey, 2021a):

> Right now, we want to encourage everybody over 50 to be vaccinated as early as possible. But we've been very clear that, as supply increases later on in the year, there will be enough mRNA vaccines for every Australian.

In just two sentences — speaking with the authority of the federal health minister and with the imprimatur of knowledge — Hunt had managed to undermine the vaccine rollout. And, like Young, his efforts — such as

they were — to clean up his remarks were likely ineffectual. Bells can't be unrung.

Australia's medical-regulatory complex

The Therapeutic Goods Administration is the body charged with, as they put it themselves, "evaluating, assessing and monitoring products that are defined as therapeutic goods. We regulate medicines, medical devices and biologicals to help Australians stay healthy and safe."[14] And the Australian Technical Advisory Group on Immunisation (ATAGI) is charged with advising "the Minister for Health and Aged Care on the medical administration of vaccines available in Australia" and consulting with "relevant organisations in implementing immunisation policies, procedures and vaccine safety."[15]

The regulation of pharmaceuticals is important. Only the most hardline libertarians deny any role for regulation in this area. Almost all mainstream economists — of which the present authors are two — believe that one of the key settings in which regulation can play an important role is when there are large and important information asymmetries between buyers and sellers in a market. Pharmaceuticals are a classic case. Drug makers have a sophisticated understanding of the efficacy of their products, as well as their potential side effects. Or, at least, they are in a position to collect such information through clinical trials. Indeed, so-called "Phase 3" clinical trials (as well as their smaller-sample precursors, Phases 1 and 2) are required by the FDA before drugs are approved in the United States. International regulators have typically adopted similar approaches.

Among the most famous papers in all of economics — published by George Akerlof in 1970 and titled "The market for 'lemons'" (Akerlof, 1970) — concerns how markets function poorly and can break down completely in the presence of asymmetric information. Akerlof's motivating example was the market for used cars (possible "lemons"), where a seller typically knows a lot more about the quality of their car than does a prospective buyer — but it applies to any market with asymmetric information. Indeed, the market for pharmaceuticals is much larger and more consequential than the market for used cars. It is precisely because the drug market would function very poorly, or completely break down, that regulators like the FDA in the United States and the TGA in Australia exist. So we're not "anti-TGA." But that doesn't mean that regulators aren't deserving of their fair share of criticism.

The TGA's key failure during the pandemic was that it was too slow to approve vaccines for use in Australia. This wasn't just a one-off: it did it again and again with different vaccines. Now you might ask: "What do you mean by too slow? Doesn't that involve a trade-off between risk and reward, between speed and safety?" Indeed, it does. But the TGA wasn't the only regulator making these same decisions. American and European regulators were also balancing speed and safety, and they made very different decisions than did the TGA. Indeed,

14 See Department of Health and Aged Care, Therapeutic Goods Administration (TGA), https://www.tga.gov.au

15 See Department of Health and Aged Care, Australian Technical Advisory Group on Immunisation (ATAGI), https://www.health.gov.au/committees-and-groups/australian-technical-advisory-group-on-immunisation-atagi?language=und

the TGA was persistently behind the curve relative to its international peers.

Toward the end of 2020, vaccines were being rolled out en masse in the United States and Europe. Regulators allowed this by issuing what is known as an "emergency use authorization" (EUA). An EUA is essentially a shortcut to the approval process, allowing approval of a drug (in this case a COVID-19 vaccine) when a large proportion of a Phase-3 trial has been completed (typically more than 3,000 participants), in a public health emergency. It acknowledges the fact that during a pandemic a sensible regulator should adjust the speed-safety trade-off because the costs of delay are so large.[16]

Yet the TGA dithered. It did not approve the Pfizer vaccine until 25 January 2021, more than six weeks after the FDA had approved it. And it didn't approve the AstraZeneca vaccine until 16 January 2021, nearly seven weeks after the UK regulator. And in August 2021 the TGA belatedly approved the Moderna vaccine, a staggering *eight months* after the FDA. This dithering also extended to approvals for children, and for looser cold-storage requirements. The TGA was consistently tardy.

As we wrote at the time, these delays might not sound like much, but they mattered a great deal. The whole point about being in a pandemic is that every moment counts. A major outbreak can be just a day away. Complacency is never OK, but in a pandemic it's deadly. Writing in 2021, we put it this way (Hamilton & Holden, 2021e):

> In case you're wondering "what difference does six weeks make?" think again. Were our rollout six weeks faster, the current Sydney outbreak would likely never have exploded, saving many lives and livelihoods. In the face of an exponentially spreading virus that has become twice as infectious, six weeks is an eternity.
>
> It [the TGA] approved looser cold storage requirements for the Pfizer vaccine, which would allow the vaccine to be more widely distributed and reduce wastage, on April 8, six weeks after the FDA. And it approved the Pfizer vaccine for use by 12 to 15-year-olds on July 23, more than 10 weeks after the FDA.

16 The FDA is explicit about exactly how this trade-off is adjusted. See US Food and Drug Administration, Emergency use authorization for vaccines explained, https://www.fda.gov/vaccines-blood-biologics/vaccines/emergency-use-authorization-vaccines-explained, where it emphasises that: "For an EUA to be issued for a vaccine, for which there is adequate manufacturing information to ensure quality and consistency, FDA must determine that the known and potential benefits outweigh the known and potential risks of the vaccine. An EUA request for a COVID-19 vaccine can be submitted to FDA based on a final analysis of a phase 3 clinical efficacy trial or an interim analysis of such trial, i.e., an analysis performed before the planned end of the trial once the data have met the pre-specified success criteria for the study's primary efficacy endpoint.

"From a safety perspective, FDA expects an EUA submission will include all safety data accumulated from phase 1 and 2 studies conducted with the vaccine, with an expectation that phase 3 data will include a median follow-up of at least 2 months (meaning that at least half of vaccine recipients in phase 3 clinical trials have at least 2 months of follow-up) after completion of the full vaccination regimen. In addition, FDA expects that an EUA request will include a phase 3 safety database of well over 3,000 vaccine recipients, representing a high proportion of participants enrolled in the phase 3 study, who have been followed for serious adverse events and adverse events of special interest for at least one month after completion of the full vaccination regimen.

"Part of FDA's evaluation of an EUA request for a COVID-19 vaccine includes evaluation of the chemistry, manufacturing, and controls information for the vaccine. Sufficient data should be submitted to ensure the quality and consistency of the vaccine product. FDA will use all available tools and information, including records reviews, site visits, and previous compliance history, to assess compliance with current good manufacturing practices."

Sadly, ATAGI was arguably even worse. It issued overly cautious advice about the AstraZeneca vaccine because of concerns about TTS. On 8 April 2021, it advised that Australians aged 16 to 50 should not get the AstraZeneca vaccine, but rather wait (for who knows how long) for Pfizer.[17] Then, on 17 June 2021 it updated this advice to say that those aged 16 to 60 should get Pfizer instead of AstraZeneca (DHAC, 2021d).

ATAGI put far too much weight on a small number of recent events, rather than taking an appropriate statistical view of the risks involved in taking the AstraZeneca vaccine. In the language of statistics, it acted like a *frequentist* rather than a *Bayesian*. Bayesians have a belief based on the existing evidence (known as the "prior probability") about the likelihood of an event, and then update that belief based on whatever new evidence they encounter. Frequentists, on the other hand, ignore the existing evidence and simply require enough data to distinguish signal from noise in judging whether the event will happen. But what if you don't have enough new data and nevertheless must make a decision? Vaccine decision-makers had to make a decision — and a prompt one at that. The only relevant question was how best to make it.

There were four big unknowns when it came to the AstraZeneca vaccine. The first was the probability of an individual (with certain personal characteristics) getting TTS. The second was the probability, conditional on getting TTS, of it not being treated effectively. The third was the probability of contracting COVID-19, conditional on not receiving the AstraZeneca vaccine. And the fourth was the probability of infecting others, conditional on becoming infected.

Doctors and medical scientists knew a lot about the prior probabilities of all of those events. Sure, it was correct to update based on new evidence. But ATAGI went full-tilt frequentist — pretending that it knew nothing about the physiology of TTS or COVID-19, and just ignoring the possibility of an individual infecting others altogether.

As we put it at the time (Hamilton & Holden, 2021e): "This overlooks the fact its recommendations translate into actual protection with a significant lag — eight or more weeks, by which time public health orders inevitably restrain the exponential spread. This has led to frequent and radical updates in advice, leaving the public with whiplash, confused and sceptical."

This was clear from the language ATAGI itself used in its advice. ATAGI's 17 June statement said (DHAC, 2021d):

> From early April to 16 June 2021, 60 cases of confirmed or probable TTS have been reported in Australia. This includes an additional seven cases reported in the past week in people between 50–59 years, increasing the rate in this age group from 1.9 to 2.7 per 100,000 AstraZeneca vaccine doses … TTS is a serious condition in a proportion of individuals who develop it. The overall case fatality rate in Australia (3%; 2 deaths among 60 cases) is lower than has been reported internationally. This is likely to reflect increased detection due

17 Australia's deputy chief medical officer from March to October 2020, Dr Nick Coatsworth, told us in an interview that this decision around the age guidance for AstraZeneca was a significant mistake and hugely consequential. Coatsworth is also of the view that there was a downside to providing an emergency use authorisation in terms of public confidence, which is a legitimate counterpoint to our concern about how critical a six-week delay can be during a pandemic — and indeed was in Australia's case.

> to heightened awareness, as well as early diagnosis and treatment. A spectrum of severity of illness has been reported in Australia, from fatal cases and those with significant morbidity, to relatively milder cases.

Not only was ATAGI getting the cost-benefit analysis wrong purely from the perspective of individuals, it was failing to factor in the impact on other Australians of deterring younger Australians from being vaccinated. In the language of economics, ATAGI, like the TGA, was failing to account for the negative externalities of non-vaccination. In fact the mid-2021 Sydney outbreak, which precipitated the major lockdown, was caused by a limousine driver who had decided not to be vaccinated because — this would be funny if it weren't tragic — he was waiting for Pfizer (Stevens & Parsons, 2021). This led to hundreds of deaths — none of which ATAGI had factored into its analysis.

So it wasn't just that ATAGI was overly focused on individuals rather than the community as a whole. It wasn't just that ATAGI put far too much weight on recent data in Australia compared to the entire stock of scientific knowledge and recent international experience. And it wasn't just that ATAGI ignored the importance of the AstraZeneca vaccine supply given federal government purchasing mistakes. It was that all of these things interacted and compounded. This can be summed up in a single sentence that we wrote of ATAGI in August 2021 (Hamilton & Holden, 2021e):

> At one point, staggeringly, it recommended young people take AstraZeneca — but only if they lived in one of a few local government areas in south-west Sydney.

Vaccine distribution

Procuring vaccines is one thing, but actually getting people vaccinated is another. Both are essential, but they require different skills and approaches. Procurement is largely strategic; distribution and delivery is largely logistical. And while the federal government didn't bungle vaccine distribution as badly as it did vaccine procurement — that would seem impossible — they didn't exactly cover themselves in glory here either. That had consequences.

The federal GP plan

The federal health department and Health Minister Greg Hunt decided early on that Australia's large network of general practitioners (GPs) was the best and most effective means of vaccine delivery. On 7 March 2021, Hunt announced (DHAC, 2021b) that Phase 1b of the vaccine rollout — essentially the vaccination of older Australians and those with serious underlying health conditions — would be conducted through the GP network.

On first inspection, there was a certain logic to this approach. There are more than 6,000 general practices around Australia. GPs have an existing relationship with many of their patients. They are trained professionals, in a position to answer questions and provide reassurance about vaccines. But there were two glaring mistakes that should have been clear well in advance. The first concerned speed. Once vaccines were available, there was a tremendous premium on getting people vaccinated quickly. The GP network, while valuable, was never going to be of sufficient scale to meet the size of the vaccination challenge. Overseas, large sporting venues were being used to vaccinate people at an industrial scale. For instance,

in the United States, Dodger Stadium in Los Angeles was contributing to a vaccination rate of three million people per day as early as March 2021. And that was in a country with serious vaccine hesitancy (Hamilton & Holden, 2021d).

Pharmacies that routinely delivered flu shots were not being used in the early days of the vaccine rollout. Incredibly, there was discussion about using pharmacies (of which there were 5,800 across the country) but the federal government was dragging its heels. Hunt announced on 31 January 2021 (DHAC, 2021a) that "Community pharmacy will be an important partner in the rollout of COVID-19 vaccines." What did that mean exactly? It meant that an expression of interest process would soon begin, with the goal of having pharmacies start to deliver shots in May. Hunt seemed to understand the importance of pharmacies, saying that it would "ensure the general population have broader access to COVID-19 vaccinations, provide choice in where the community receive a vaccine, and address barriers to access in some parts of rural and regional Australia."

But then Hunt emphasised the need for caution, making the obvious statement that pharmacies needed to be able to deliver vaccines safely (DHAC, 2021a). Given their track record of safely and successfully delivering other vaccines, this was never really an issue. As Pharmacy Guild of Australia President George Tambassis pointed out (DHAC, 2021a):

> Some 94 per cent of pharmacies are members of the pharmacy profession's quality assurance program, QCPP, and the robustness of this program underpins the sector's ability to meet the challenges of the pandemic and the delivery of COVID-19 vaccinations, while maintaining the levels of service and medicine delivery critical to their role as frontline healthcare professionals.

But Hunt genuflected to the medical-regulatory complex with the following remarks (DHAC, 2021a):

> [P]harmacies will need to demonstrate they meet the highest safety standards and have capacity and capability to deliver COVID-19 vaccines, as well as ensuring they continue to provide important services to their local communities. These standards have been informed by the expert medical advice from the Australian Technical Advisory Group on Immunisation (ATAGI).

The second problem was economics. The government's GP plan involved the peculiar consideration that GPs not "profit" from the vaccination campaign. Why that would be a problem was never made clear. When there is massive demand for services, people are going to make money. As we discuss in Chapter 4 of Hamilton & Holden (2024), testing companies made plenty of money providing PCR tests throughout the pandemic. And, we discuss in Chapter 2, the government put massive resources into economic support programs like JobKeeper.

GPs were required to bulk-bill vaccination appointments, and the reimbursement rates were lower than for standard GP appointments.

For the first six months of the vaccine rollout, there was a so-called Practice Incentives Payment (PIP) program in an attempt to compensate GPs for having to bulk bill. But this was only available to certain "accredited" practices, and the compensation was a mere $10 for giving both of the first

two COVID-19 shots to a patient (Wright et al., 2022).

In effect, GPs were being told they needed to shift capacity from higher-remunerating appointments to vaccination appointments. At a time when general practices were already under financial pressure, GPs were being told that they had to take a pay cut to vaccinate Australians — just the opposite of what was needed to catch up after our botched start.

On top of this, the problems with vaccine procurement also impacted GPs, both financially and in terms of their ability to vaccinate their patients. The unpredictability of vaccine supply to GPs led to rescheduling of appointments, lost revenue for GPs, and in some cases missing out on the small PIP bonus by not being able to deliver both of the first two shots (Wright et al., 2022).

In the first month of Australia's vaccine rollout, we were vaccinating only half as many people as were the United States, United Kingdom and European Union in their first months. Having botched vaccine procurement, Australia then went on to start botching the vaccine rollout. As we wrote in March 2021 (Hamilton & Holden, 2021d):

> While we've administered about 250,000 doses, we've imported well over 1.25 million. As challenging as it may be, getting needles in arms isn't rocket science — as overseas experience shows. We had more than six months to plan. There's simply no excuse for anything other than production to be the limiting factor.

The states to the rescue

Stephen Duckett believes the failure of the vaccine rollout ultimately comes down to the federal government's politicisation of it in a bid to wrest the limelight from the states:

> The politics of this were paramount. What we saw every day in the media in 2020 and the first part of 2021 was the Premier and the state Chief Health Officer fronting a news conference. The Commonwealth role was in the economics and the business support, and to a lesser extent summarising nationally what was happening.
>
> What then happened was the Commonwealth saw an opportunity for it to take responsibility for vaccines and vaccinations. So the vaccination strategy became a political strategy. They wanted that to be a Commonwealth-led initiative so that the Commonwealth could get the credit. One of the problems with that is they have more or less no feet on the ground. The states have public hospitals, community health centres, public health units scattered across the state, nurses; so the states had an ability to mobilise a workforce that the Commonwealth didn't have.[18]

When the vaccine rollout finally reached the point of getting jabs in arms, the states stepped up. This would produce one genuine bright spot in the form of the mass vaccination hubs set up by state and territory governments. For instance, on 10 May 2021, New South Wales opened a mass vaccination hub at Sydney Olympic Park. This coincided with adults aged 40 to 49 becoming eligible for the Pfizer vaccine. Staffed with more than 200 registered nurses and operating six

18 Stephen Duckett, interview.

days a week, the hub played an important role in the vaccine rollout. Premier Gladys Berejiklian's remarks at the time demonstrated the appropriate level of urgency:

> We've worked hard to get our systems up and running to make sure we use up every dose we've been given … We want to make sure that if we have any excess doses or we suddenly get doses we didn't anticipate, that we're able to draw on 40 to 49-year-olds that can register from today.[19]

Victoria was similarly effective in setting up vaccination hubs, quickly opening three. The first was opened on 21 April 2021 at the Melbourne Convention and Exhibition Centre, the second in Carlton and the third in Geelong. A fourth was added shortly afterwards in Bendigo. A year into the vaccine rollout, around 20.5 million doses had been delivered at vaccine hubs, on top of the 33.8 million delivered in GP clinics.[20]

In a sense, this wasn't all that surprising. The Australian administrative state had always excelled at practical and logistical tasks. Anyone who has tried to get a driver's licence in both the United States and Australia can attest to Australia's comparative competence: it's a basic matter of state capacity. Establishing vaccine hubs was something that Australian states and territories were well positioned to do quickly and effectively. And, of course, since the states run their health systems, it made sense that they, rather than the federal government, would take the lead here.

Lessons from Australia's vaccine debacle

The chief fault behind our vaccine debacle was the failure to apply basic economic thinking to the problem. In a narrow sense, vaccination was a public health issue. But vaccination really involved risk management and cost-benefit analysis. Yet the reasoning provided behind major decisions — such as the portfolio of vaccines Australia purchased — bore no resemblance to the way economists would think about such problems. It was a most extraordinary false economy. Pennies were pinched in vaccine procurement without any thought that the benefits forgone might be 1,000 times larger. A few million dollars might have been saved by focusing on two vaccines, while tens of billions were lost in the lockdowns — not to mention thousands of lives.

Defenders of the vaccine rollout invariably point to all of the bad luck the government ran into along the way. And it certainly ran into its fair share. If only the UQ vaccine had panned out. If only the Europeans hadn't blocked the export of Australia's contracted AstraZeneca doses. If only the clotting issues hadn't arisen with AstraZeneca. But this "bad luck" is in fact the clearest evidence we have of the government's failure.

It is precisely because some amount of bad luck is bound to occur while delivering vaccines at breakneck speed during a pandemic that we absolutely had to buy ample insurance. It's no use blaming the tree you ran into in an uninsured car. The fact that the bad luck *mattered* is ultimately on the government.

19 Quoted in Xiao (2021).

20 Australia Covid vaccine tracker by source, COVIDLIVE, https://covidlive.com.au/report/vaccinations-source

It is tempting to think that the absence of economic thinking was the product of the absence of economists in the room at the time these crucial decisions were made. Was this just a case of a demarcation dispute between the departments of Health and Treasury? This is what we had assumed, but it has since been confirmed to us by multiple sources that Treasury was absolutely in the room when these crucial decisions were made. This raises the question of why Treasury failed to speak up.

Another key failure of the vaccine procurement strategy is common to many other large public procurements in Australia: the irresistible temptation of a bit of industry policy. The two horses that the Australian government put almost all its money on were, in one way or another, home-grown. First, the UQ-developed vaccine, which would come to fail, had been intended to be produced by CSL in Victoria. Second, the British-developed AstraZeneca vaccine was also capable of being made under licence by CSL, and indeed would come to be so. It is simply undeniable, based on the format of Australia's initial vaccine procurement plan, that domestic manufacturing capability was the government's number-one priority. Australia had no domestic mRNA manufacturing capability, and so we ordered little-to-no mRNA vaccines. The UQ and AstraZeneca vaccines could be produced in Victoria, and so that's what we ordered.

On 12 February 2021, Scott Morrison donned a hairnet and his trademark Australian-flag face mask and toured CSL's manufacturing facilities with Greg Hunt, a gaggle of press photographers in tow. In an uncharacteristic act of speed and decisiveness, the TGA approved local manufacture by CSL little more than a month later, on 21 March 2021 — just five days after approving the overseas-manufactured version of AstraZeneca (DHAC, 2021c). Two CSL sites in Melbourne were involved, with the CSL Behring site in Broadmeadows manufacturing the active raw ingredients for the vaccine, and Sequiris in Parkville manufacturing the final vaccine, filling vials and packaging them.

There is absolutely some good sense in investing in a domestic manufacturing capability. In fact, it was possibly the sole example of sound risk management in the whole vaccine rollout. Global supply chains were being stretched logistically during the pandemic. There was a legitimate risk that Australia would not be able to get contracted for doses of vaccines that were being manufactured in the Northern Hemisphere. On top of that, there were serious concerns about so-called "vaccine nationalism."

In the first week of March 2021, Italy blocked the export of a quarter of a million doses of the AstraZeneca vaccine that Australia had contracted for. Italian Foreign Minister Luigi Di Maio made the surreal argument that Australia had a comparatively low infection rate and so Europe needed to be prioritised, contract be damned. He said: "As long as these delays remain, it is right for the countries of the European Union to block exports toward nations that are 'not vulnerable' as a response to the failure of companies to respect commitments." And French Health Minister Olivier Véran seemed to concur: "I understand [Italy's view]. We could do the same thing." (Hamilton & Holden, 2021b).

The risks were real. Having a domestic manufacturing capability was a means of buying an insurance policy against exactly this kind of behaviour. But it needn't

have been a case of either/or. Developing a domestic manufacturing capability did not in any way preclude the government from also buying insurance — in the form of redundant mRNA orders — against other possibilities, such as the domestically produced AstraZeneca vaccine running into trouble (as it did). Ultimately, the government needed to buy insurance against a whole raft of unforeseen events.

A much less sound motivation was the notion that manufacturing AstraZeneca in Australia could also provide a boost to CSL and the Australian economy. This could be a way of killing two economic birds with one proverbial policy stone. Added to that was the appeal of the UQ vaccine which, ultimately, turned out to be unviable as it caused false-positive HIV test results. While it would have been a great story to have had an Australian-developed vaccine, and it was a good insurance policy to have a domestic manufacturing capability, the federal government was clearly overly taken with these possibilities. It had one job: getting Australians vaccinated so the country could reopen. That ought to have been the federal government's number-one priority. It would turn out to be one hell of an own-goal to back Aussie jobs by favouring domestically produced vaccines, when doing so would end up delaying the vaccine rollout at a cost of more than $50 billion to the Australian economy. And, in the end, the vast majority of administered doses would come from abroad anyway.

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