

Infrastructure for a better future

Construction sector performance

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Please note: the transcript has been edited to make reading as easy as possible.

Introduction: Welcome to the Te Waihanga 'Infrastructure for a Better Future' podcast. A series where we talk to experts both from here and overseas about the infrastructure challenges we are facing. The episodes focus on the key areas of Rautaki Hanganga o Aotearoa, New Zealand's infrastructure strategy. Find out more about the strategy at www.strategy.tewaihanga.govt.nz.

Hannah Ouellet: A few weeks back, Te Waihanga published the report economic performance of New Zealand's construction industry, which highlights the importance of productivity growth in reducing construction costs, addressing workforce capacity issues, and increasing the quantity and quality of construction goods such as houses, pipes and roads.

In this episode of Infrastructure for a Better Future, we explore some of our report's findings. My name is Hannah Ouellet and I'm an economist with Sense Partners currently on secondment to Te Waihanga. I have worked in public policy consulting and have taught Urban Economics at the University level. I'm joined by

my colleague, Peter Nunns, who is the director of our economics team here at Te Waihanga. Peter, do you want to tell us about your background and why construction productivity matters?

Peter Nunns: Thanks, Hannah. In addition to my work in infrastructure, I've done quite a bit of work on housing over the years. And I think that one of the things that everyone is focused on in housing, but not necessarily infrastructure is, how do we make it cheaper? We all need a place to live, we all need infrastructure to support that place to live, we need water, we need electricity, we need transport supplied to us. And in housing, it's very clear that we need to think about how affordable that is, and how we can make that more affordable. In infrastructure, those things are equally important, but not necessarily in focus to the same degree.

What we learned through the work that we did, in developing New Zealand's Infrastructure Strategy, which Te Waihanga released in May this year, was that we have significant infrastructure needs facing us over the next generation. At the moment, we spend about \$1

in every \$20 we earn as a country in building or renewing the infrastructure networks that we rely upon for daily life. The challenges that we face in the sector, fully meeting those with new construction, building new infrastructure, rebuilding infrastructure, would cost us more like \$1 out of every \$10 we earn as a country. That's a big leap. When we look at what it would take to get those resources, get that money, to do that, it starts to look like a fairly unattainable challenge. For me, what that brought into relief was the need to actually work out how to do things more efficiently and more productively to get better value out of the infrastructure that we have and work out how to make it more affordable to get better infrastructure. And that's really where this report comes in. We're having a look at one of the things that can make infrastructure more affordable, which is construction productivity.

Hannah Ouellet: So, Peter, how does construction productivity lifting it actually make our infrastructure more affordable? What's the link there?

Peter Nunn: What's the link there. So, this is going to go back to 1967, when a guy named William Baumol, was looking at data on what was happening in a bunch of different industries in the US. What he noticed was that industries where productivity was growing faster, like say manufacturing, tended to get cheaper over time, the output of those industries tended to get cheaper over time, and industries that weren't enjoying the same rates of productivity growth, like say, healthcare services was a case that he picked up, tended to get more expensive over time, they took up a larger share of our wallets. And we looked at that relationship for New Zealand using data going back several decades and found that the same thing is going on here, the parts of our economy, where productivity is growing faster, get cheaper over time, output from those sectors, the quality and quantity of what's produced goes up faster. And the labour requirements required to produce that output go down over time. And so, in New Zealand, what we found was that the relationship that that William Baumol had observed in the US, it's active here as well. And by implication, if we can leverage that relationship, if we can leverage productivity, we can bring down prices for infrastructure construction, we can help to alleviate our workforce pressures. And fundamentally, we can get more and better infrastructure in the process. So, pay less, get more. So, we found, you know, empirically, that that's something we should chase.

Hannah Ouellet: Can you provide some historical context around productivity in our infrastructure, specifically for New Zealand? How have we performed over time and has this changed or stayed about the same?

Peter Nunn: We do a couple of things in the report other than investigate the theories of William Baumol. One of those is we look back at the last 60 years of what's happened in the construction industry as a whole – looking at both vertical construction (so building construction) and horizontal construction (so infrastructure) – grouping those two things together, because it's easier to measure them together. What we found looking back to the early 1960s, was that construction productivity has been pretty uneven over time, there was a period of rapid growth and construction productivity from the 1960s to the mid-1970s, then around the time of the oil shocks in the 70s, that comes to a screeching halt. And we get approximately 30 years, where productivity and construction cycles up and down around recessions but doesn't really go anywhere. What's happened more recently, though, is quite interesting. In the wake of the Global Financial Crisis (GFC), which had a big impact on the building industry, we start to see productivity grow and sustain growth over a period of about a decade. And this is really the first sort of sustained productivity growth that takes us beyond the productivity levels that we enjoyed in the late 1970s. You've got some other things going on the Canterbury earthquakes, which really shook up the construction industry in the South Island. But we do seem to have had something unexpectedly positive happen to construction productivity since around 2008. We look a little bit more into that in the report. And Hannah, I think you had some thoughts about what we found there in the differences in different parts of the building industry.

Hannah Ouellet: What actually quite surprised me was the rhetoric around construction productivity in New Zealand. You always hear that it's so poor, that we do so badly. But once we broke it down between those two separate categories, one being, your building construction, which represents houses, apartments and hospitals versus your civil construction, which represents, your roading, and pipes and bridges, there was just a really big difference in productivity growth. So, buildings' productivity actually was, I think, 23% over the past 20 years, compared to only a 5% growth in productivity for our traditional infrastructure. So, I was thinking to

myself, why would you see such a big difference? And I've come up with a few hypotheses that we kind of touched on in the report, but there's definitely more room for research to understand well, how can we take the great construction productivity of our buildings and put that on to our infrastructure so we can get better outcomes? Some of the things that are different between buildings and infrastructure is that infrastructure projects are often more complex. And with complexity, there are more rules and regulations to those. Rules and regulations aren't necessarily a bad thing, but it's really important that we investigate them and their efficacy to see if they actually stand up for the barriers that they might put in place.

Peter Nunns: One of the things we picked up when we were talking to people in the sector, about this research was the role of the role of workforce capability and productivity growth in different parts of the sector. Some of the people we talked to described infrastructure projects as a leap into the unknown. You can plan them, you can design them, and then you start digging into the ground and figuring out what's down there. Sometimes what you find is unexpected in a way that halts productivity. You discover that actually the pipes that you thought you're going to be relocating are in a different place. So, you have to dig a whole bunch of additional holes to find them, and you discover that the ground conditions are more complex. There are things that can be done to plan ahead for those issues, but oftentimes, they seem to rely upon having experienced people with the right capabilities. We know that that's a challenge for the industry in New Zealand – recruiting and retaining good people in the face of international competition for talent. The question there, if we want to get productivity and we want to deal with those issues that might cause us to lose productivity on these jobs, how do we make sure we've got the right workforce for it? How do we make sure we've got a system that actually develops that talent and retains it? It's a pretty complex area, with no simple answers, unfortunately.

Hannah Ouellet: We didn't really touch on this in the report, but I think it would be good to do future work on it is the pipeline of incoming talent. How can we train our younger New Zealanders to be competent in this space. Also, once they're in there that we're not losing them to other sectors, because when you have construction, going up and down in terms of its demand, you can lose people to different types of work. So, smoothing out our demand for building and having countercyclical investment through the government as well are things that are quite interesting to investigate or would be interesting to investigate further.

Peter Nunns: That's the sort of bigger question of how do we actually build and retain the workforce that we need? Right? What's all the different things we have to do to make that work? It's not easy and it's not necessarily the only thing that we need to get right as you mentioned, regulation and permitting processes alluded to.

Hannah Ouellet: I think I'd also be interesting to talk about, well, how does New Zealand compare to other OECD countries in the research? Do you mind talking a little bit about some of our findings? Are there any lessons that we can learn from other countries?

Peter Nunns: Yes, this was another thing that really surprised me in the report. We did a bit comparing New Zealand's record of construction productivity growth with other OECD countries. Going into that my thought was okay, well, we know that we've got an issue. We know that other people talk about having issues – this whole series of reports from, say the US in the UK, bemoaning the slow pace of productivity growth. And going into that I was thinking, well, if they're worried about this issue, it must be really, really bad here by comparison. And that wasn't necessarily what we found in that bit on international comparisons. So, we looked back 20 years and looked at how productivity had been growing in the construction industry as a whole – building construction and infrastructure construction in different countries – and what we found there was that New Zealand was decidedly mid pack.

Hannah Ouellet: Yeah, very, very middling. I was expecting it to be all the way one side of the graph.

Peter Nunns: We weren't at the bottom of the table, we weren't at the top, either. We were right in the middle. And in some of the places that we think of as being good practice examples, the US or the UK or Japan, actually were behind us in terms of construction productivity growth. And I found that really confusing. And it took me a while to sort of get to grips with it, but as far as I can tell, this does seem to be a real thing.

Hannah Ouellet: So, what type of characteristics did the top performers have in terms of having the best productivity growth?

Peter Nunns: Well, the places that had the fastest construction productivity growth over the last 20 years are overwhelmingly Eastern European transition economies. And my suspicion is that what's happening there is that they're going through this period of catch-up growth. There were some other things that we picked up when we looked at what factors are associated with faster, slower construction productivity growth in different OECD countries. One interesting thing there, we've talked about catch-up growth potential, that seems to be a real thing. Another thing that we found was that all else equal, countries that had slower and more cumbersome construction permit processes, as measured by The World Bank, tend to experience slower construction productivity growth. And I think this is really interesting, it should probably be looked at further. I'm not going to say this is definitive, it's a correlation, we don't know what's causing what. But, on the face of it, it suggests that if you have a process that makes it really difficult to permit building projects and makes it quite inefficient to figure out whether you can build something new that might actually constrain productivity growth, that might limit your ability to bring new designs to market that might be cheaper or more efficient to build, it might limit your ability to use new building techniques, use new equipment, and so on and so forth. And over time, that's going to sort of eat into productivity and thus raise costs in your sector. To the extent to which that's happening in different countries, that's something that countries can do that, that they might be able to look at, to sort of lift productivity growth.

A couple of other things that we found that were quite interesting one was that we didn't find a lot of evidence that there were a lot of economies of scale that drove faster productivity growth. All else equal, smaller countries actually tended to have faster productivity growth than larger countries.

Hannah Ouellet: That's a bit different to your kind of common rhetoric isn't it.

Peter Nunns: Yeah. Totally different. And again, this made me think, right, because this is the opposite of what I expected to find. And I guess one thing is maybe larger countries in theory can get larger projects and a larger pipeline, but actually those countries are internally fragmented. I think maybe the straightforward conclusion there is well let's not bemoan our small size. Let's look for how we can use our size to the best extent, which might mean sort of aligning and streamlining at a national level. When you do a similar building project anywhere in New Zealand, you're dealing with the same set of rules, the same set of processes. We've got potential to do some things that can lift productivity across the country, if we organise ourselves right. The other thing that we found there that was really surprising was that we looked at kind of boom-and-bust dynamics. Whether countries had bigger construction booms and then busts after the Global Financial Crisis and as far as we can tell there wasn't really any relationship between those boom-and-bust cycles and the magnitude of those and construction productivity growth. You have some countries that experienced these massive crashes in construction activity and some countries that didn't, and it didn't particularly seem to matter for construction productivity growth, which was surprising to me.

Hannah Ouellet: That is super surprising. Do you have any kind of hypothesis or thoughts as to why when the construction output or demand for construction just plummets, why doesn't productivity as well? Because I would have thought that people would leave the construction sector and you'd have to build it back up over time to bring the labour back in. So, what are your emerging thoughts on that?

Peter Nunns: Well, my main thought is you probably need to look at a different data set. Look at what's happening down at the firm level. Some researchers from the Motu Institute have looked at firm-level data in the past and what might be happening in there is some selection, you might have a few things that are offsetting each other. The straightforward problem with a big boom-and-bust cycle is it destroys your incentives to invest in equipment, in skills and training, and so on and so forth. And you'd expect that you can do that one year and then you're not sure whether you're going to be washed out and have to write off that investment the next year. And all else equal, that should reduce productivity growth. But the other thing that might happen is that there might be some competitive pressures that operate in an environment with volatile demand. You might actually have some firms look at the environment and say, I'm going to have to invest in really good systems for managing a variable workload, for planning ahead, for forecasting, for scaling up and down my business in a really friction-free way.

Hannah Ouellet: So, they're flexible. They have high degrees of flexibility and they've learned to work and high levels of uncertainty.

Peter Nunns: Yeah. And there's some evidence from say the Spanish construction industry that that might happen. So, it's an interesting area that definitely needs a closer look in my view. But it's not as simple as this. Just like with the economies of scale thing. It's not as simple as the simple story we tell ourselves. There might be some other more complicated stuff going on.

Hannah Ouellet: Speaking of firms, we did do also a little bit of an analysis on how the New Zealand construction sector performed during COVID-19.

Peter Nunns: We had firm-level data on a set of construction firms, they tended to be larger than the average they were doing a mix of vertical construction, civil construction, largely government facing. We had firms that were working for say, the Ministry of Education, for Waka Kotahi, so not a representative sample, but firms that were engaged in public infrastructure and fairly critical to our ability to build that on an ongoing basis. So, walk us through the analysis and the findings.

Hannah Ouellet: We found that through the early stages of COVID-19, the construction sector appeared to weather the storm of COVID-19 quite well. But like most businesses, that was largely a function of the government's financial support during that time. On average, we saw that revenue and profit was stable with net profit actually improving in both 2020 and 2021 by quite a lot. We also didn't see a spike of construction firm liquidations. Because what you see in the construction industry is often these quite alarming headlines, saying mass liquidations in the firms, but those numbers, although high, are fairly consistent over time. So, we didn't see those spikes during the early COVID times.

Peter Nunns: But you did pick up some baseline levels of risk, right? That were fairly high in terms of risks to firms not being able to continue trading?

Hannah Ouellet: Yeah, it's not all rainbows and sunshine. Construction firms are currently facing some serious challenges like cost escalations, delays, and labour shortages. And when we looked at some long-term and short-term financial health indicators of the construction industry, although the changes weren't big, the actual levels that they were sitting at for debt-to-equity ratios, or interest cover ratios, or networking capital (which is your current assets minus your current liabilities) is that their actual level was relatively concerning, compared to what you would expect for a healthy firm.

Peter Nunns: So that's pretty important that we keep monitoring that, so we don't see people falling off in large numbers.

Hannah Ouellet: Yeah. Because in 2021, 12% of firms had negative net working capital. So, they had more current liabilities than they had current assets and 34% of firms that we looked at had debt-to-equity ratios over two, but in the construction sector, that might be a number that you'd want to lift because they buy a lot of expensive – capital intensive industries tend to have those higher debt to equity ratios, but it's still an indicator that it is something that we should keep an eye on over time.

Peter Nunns: Watch this space. So, summing up a bit that the picture that we got of the construction industry here was one that's healthier than commonly assumed. An industry that especially in building construction is actually managing to lift productivity substantially. That's come through the GFC and come out of it with a boost in productivity rather than a decline, which is good news. And that's weathered the early stages of the COVID-19 pandemic in 2020 and 2021. You know, not in perfect health, but at least it hasn't entered during those phases, it hasn't been in declining health. So, there's actually some good news stories here and in construction in the report. But I think against that there's that ongoing solvency and liquidity risks that you've identified, Hannah. So, there's a need to keep a close eye on the industry to ensure that it isn't slipping beneath the surface financially. There's the fact that productivity growth has been uneven in different parts of the sector, it's been more concentrated in building construction, vertical construction, and much slower and heavy and civil construction, which we rely upon to produce infrastructure. So that's something that we need to take a closer look at.

Hannah Ouellet: And that's not just in New Zealand, it's all across the world with civil construction being less productive it seems than building.

Peter Nunns: Seems to be a common theme of slow productivity growth in there. We've seen that in the data for a couple other countries. So, there's some risks we have to keep an eye on, but there's actually some good news stories and some opportunities for improvement. Any other thoughts to wrap up?

Hannah Ouellet: No. Thank you so much, Peter.

Peter Nunns: All right. Thanks, Hannah. And thanks everyone for listening.

Narrator: Thanks for listening to Infrastructure for a Better Future. To find out more about the infrastructure challenges we are facing, visit www.strategy.tewaihanga.govt.nz.