



Improving Economic Resilience

Report on a Productivity Commission inquiry

February (Huitanguru) 2024

NEW ZEALAND
PRODUCTIVITY COMMISSION
Te Kōmihana Whai Hua o Aotearoa



The New Zealand Productivity Commission
Te Kōmihana Whai Hua o Aotearoa

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Foreword



E ngā iwi, e ngā mana, e ngā reo. E rau Rangatira ma. Kia ora koutou katoa.

With a mixture of emotions, I submit our report on the Improving Economic Resilience inquiry. There is sadness in that this release marks the conclusion of the last inquiry the New Zealand Productivity Commission | Te Kōmihana Whai Hua o Aotearoa will undertake. While election period protocols and subsequent uncertainties meant it was not possible to fully undertake our typical consultation process, I am proud of how the team overcame these challenges and completed this work.

I want to acknowledge and thank the Commission's inquiry and research teams, and the communications and admin support team, for their resilience in producing a quality report. I also want to thank the wider research community and all those who submitted on the inquiry issues paper – your support and feedback has been a valuable part of this process.

Despite the challenges, it gives me great pleasure to present our findings and recommendations that place resilience alongside innovation at the centre of the table as critical to our efforts to lift productivity and improve wellbeing.

This inquiry found clear and strong connections between the challenges of building resilience, fostering innovation, and raising productivity. Further, an increasingly uncertain and volatile economic and geopolitical world reinforces the need to tackle these challenges head-on. In looking at how best to accomplish this, we have drawn on several earlier Commission inquiries. This highlights the continuity of advice we have given over the years to increase productivity and improve wellbeing.

Our recommendations provide direction to strengthen institutions and focus on the long-term. These recommendations aim to improve resilience, encourage innovation, and also address the productivity wero that remains for all to tackle.

The meaning of the term economic resilience is important. Yes, resilience is about the ability to absorb the impacts of disruptions and thereafter recover or bounce back. But economic resilience cannot solely rely on responding well after a disruption. We must also be proactive in our efforts to invest beforehand in anticipation, preparation, and learning.

In terms of learning, there is much in our own history to build on. Communities and businesses, across formal and informal networks, marae, and local groups, have a proven record of responding well to global and natural disruptions. These networks have played pivotal roles in local economic development, aiding recovery from acute shocks and creating, and transitioning to new opportunities. Our findings in the inquiry emphasise that these well-established networks need to be recognised, deepened, and nourished so they are up and ready to act ready when shocks occur. Such a proactive course of action would be informed by good data and knowledge from within and outside these networks.

In terms of anticipating disruptions, our modelling and simulation exercises not only indicate the quantum of dislocation arising from a range of representative shocks, but also their disparate impacts on industries and communities. A critical insight from this modelling (which should inform preparation efforts) is the importance of the mobility of productive resources (land, labour, and physical capital like machinery, and equipment). Another insight indicated – given the current industry and sector composition of the New Zealand economy – the non-primary component of the manufacturing sector, is relatively less affected to external-trade related disruptions. Negative impacts are lessened when productive resources can move to – or be used in – less affected sectors or industries.

It is naive to expect such large adjustments (of resources and jobs) to occur without costs. Investing before disruptions to help people and other productive resources adjust well when they do occur, can foster the mobility required to build a resilient economy. This includes sectors, businesses, and communities being receptive to change, investing in ongoing capability and capacity building, and exploring innovative product lines and diversified destination markets.

Ultimately, resilience, innovation and productivity are long-term objectives that are closely connected. They require strong and sustained commitment and investments from successive governments, industries, businesses, communities, and institutions.

The future may be uncertain, but what is certain is there will be disruptions. Good governance and proactive investments to improve resilience and foster innovation can help equip New Zealanders to face the challenges that lie ahead. These investments are necessary to lift productivity and enhance the wellbeing of current and future generations of all in Aotearoa.

Nō reira, tēnā koutou katoa.



Dr Ganesh Nana

Chair, New Zealand Productivity Commission | Te Kōmihana Whai Hua o Aotearoa

Terms of reference

New Zealand Productivity Commission inquiry into the resilience of the New Zealand economy to supply chain disruptions

Issued by the Ministers of Finance, of Energy and Resources, for Trade and Export Growth, for Economic and Regional Development, for Māori Development and of Commerce and Consumer Affairs (the “referring Ministers”).

Pursuant to sections 9 and 11 of the New Zealand Productivity Commission Act 2010, we hereby request that the New Zealand Productivity Commission (“the Commission”) undertake an inquiry into the resilience of the New Zealand economy to supply chain disruptions.

Purpose

The purpose of this inquiry is to identify policies and interventions that can enhance the resilience of New Zealand’s economy and living standards to persistent medium-term supply chain disruptions. The Commission will apply its independent analytical capacity and engage with stakeholders to select a definition of resilience appropriate to the inquiry, identify industry level supply chain vulnerabilities, and recommend policy responses that assist in anticipating, preparing for, responding to, recovering, and learning from persistent medium-term supply chain disruptions.

Context

Global supply chains deliver goods and services underpinning the wellbeing of New Zealanders. They enable productivity-enhancing specialisation, production, and distribution across the globe. However, the environment that global supply chains relied on for the past three decades is challenged by the emergence of escalating geopolitical, environmental, societal, natural hazards, economic, infrastructural and health risks.

New Zealand, as a small open economy relying on global exchange far from global markets, is exposed to increased risk of disruptions while also having limited power to influence global supply chains. In response to recent supply chain pressures, the Government has initiated a range of workstreams covering various aspects of economic and supply chain resilience (see out of scope section).

Resilience to supply chain disruptions is often best addressed by firms that have incentives, knowledge, and capability to respond to risks. However, the resilience to new or increased risks may be enhanced by various forms of public-private collaboration and interventions at the national, regional, and community level. At the same time, these interventions need to be co-ordinated, well-calibrated, and embedded into existing policies in ways that minimise potentially adverse effects (including distributional impacts on firms, sectors, consumers, and communities), while also maximising opportunities, thereby protecting or enhancing wellbeing overall.

Scope

The inquiry should complement existing agency work by providing an independent view on resilience to persistent disruptions that require economic adaptation in the medium-term. It should cover both fiscal and non-fiscal instruments for enhancing resilience through various policy tools which may include industry transformation plans, infrastructure, energy and any innovation focused strategies, just transition, agile regulation, stewardship practices and market studies. These tools may improve resilience by enhancing competition, diversification, enabling substitution of vulnerable inputs, innovation, stockpiling, or on-shoring (ie domestic production), and help to balance costs and trade-offs that resilience improvements may entail.

For the inquiry the Commission should investigate:

- factors that make New Zealand economy vulnerable to supply chain disruptions within the context of increasing risks and the pandemic experience;

- New Zealand importer and exporter dependencies on global supply chains, to identify vulnerabilities;
- a Te Ao Māori perspective on resilience considering He Ara Waiora dimensions and how it applies within Māori businesses and communities; and
- drivers of variation in firm, sector, and community, resilience to supply chain disruptions.

Drawing on the findings of the above investigation the Commission will develop evidence-based recommendations which should:

- identify possible policy responses and interventions to persistent, medium-term disruptions that can support resilience, productivity and wellbeing in a manner compatible with other relevant policy objectives and New Zealand's particular circumstances;
- identify a framework for targeting support for firm, sector, and community resilience in response to particular vulnerabilities to supply chain disruptions;
- assess whether and how the portfolio of sectoral policies addresses vulnerabilities and dependencies in global and domestic parts of export and import supply chains; and
- assess whether and how resilience objectives are integrated into existing policies and, if necessary, recommend the development of additional or cross-cutting initiatives.

Out of scope

While the inquiry may reference policies that enhance individual and household resilience such as social unemployment insurance and similar welfare state arrangements, its primary focus is on fiscal and non-fiscal instruments for enhancing resilience through various policy tools. While the inquiry will need to consider the wider context and impact of the existing government work programme on resilience, the inquiry will complement, but not replicate, ongoing initiatives on resilience to supply chain disruptions, including the work on:

- the long-term development of transport infrastructure underpinning supply chains (Ministry of Transport and Infrastructure Commission);
- Ministry of Foreign Affairs and Trade led inter-agency work on supply chain resilience, including the identification of essential goods (and services) that New Zealand needs to be able to access, and policy options for dealing with six-month to one-year scenarios (Ministry of Foreign Affairs and Trade, Department of Prime Minister and Cabinet, The Treasury, Ministry of Primary Industries, Customs, Ministry of Business Innovation and Employment, Ministry of Health, Pharmac and National Emergency Management Agency);
- International environmental and human rights standards (currently led by Ministry of Foreign Affairs and Trade, and Ministry of Business Innovation and Employment) are out of scope, except insofar as implementation affects the resilience or efficiency of New Zealand supply chains.

Consultation Requirements

In undertaking this inquiry, the Commission should:

- consult with key interest groups and affected parties (including firms; industry peak bodies; Māori trusts, incorporations, and enterprises; and trade unions) working alongside other agencies where possible;
- engage with relevant government agencies, international organisations, and experts; and
- draw from international research, perspectives, and experience.

Timeframe

The Commission must publish a draft report and/or discussion paper(s) on the inquiry for public comment, followed by a final report or reports, which must be submitted to each of the referring Ministers by 15 February 2024.

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Executive Summary

Economic resilience is the capacity of industries and associated communities to anticipate, prepare, absorb, recover, and learn from supply chain disruptions.

The 53rd Government directed the New Zealand Productivity Commission | Te Kōmihana Whai Hua o Aotearoa (the Commission) to investigate the policies and interventions that can enhance the resilience of Aotearoa New Zealand's economy to persistent supply chain disruptions. The scope of the inquiry focuses on medium-term economic adaptation to persistent disruptions. The Terms of Reference ruled out a focus on short-term critical supplies, long-term infrastructure issues, as well as international environmental and human rights standards.

Global trends point to a more volatile and uncertain future.

Changing patterns in international trade, increasing geopolitical tensions, and emerging impacts of climate change indicate that New Zealand should expect more frequent disruptions in the near future.

New Zealand industries and communities are materially exposed to supply chain disruptions.

Evidence shows that New Zealand's imports and exports have become more concentrated over the past 15 years. Urban and rural communities are dependent on concentrated imports and exports. Diversifying to new import or export markets may not reduce trade exposure if, in turn, these new markets also indirectly depend on the same market we aim to reduce our exposure to.

Simulated supply chain disruptions can have significant macroeconomic impacts and welfare losses. Computable General Equilibrium modelling of three representative shocks to New Zealand's economy estimates reductions between 1.4 and 7.5 percent in Gross Domestic Product and between 24,000 and 112,000 in jobs affected. Research on the labour market outcomes of involuntarily laid-off workers indicates that only 50% of laid off workers can find new jobs immediately post-layoff, while one-third of workers exit the labour market entirely (through retirement, relocation, or long-term unemployment). Post-layoff earnings are substantially below pre-layoff earnings even for those re-employed, with earnings taking almost three years to recover to pre-layoff levels.

Proactive investments in economic resilience can reduce the impacts of disruptions.

Since the exact type, timing and magnitude of disruptions cannot be entirely predicted, investments in generic sources of economic resilience are crucial. These include strengthening relationships and networks focused on resilience and innovation, building institutions and policy settings to support more effective information sharing, implementing more effective supply-chain management, promoting focused innovation, and establishing effective bottom-up decision-making in times of disruption. Specifically, the Commission recommends that the Government:

- Build the capability for firms and industries to identify trade exposures and undertake risk analysis in their supply chains through proactive sharing of trade data and information.
- Coordinate proactive investments in economic resilience by strengthening networks between industry and government to align investment intentions.
- Leverage focused innovation policy to support firms to export high-value products at scale, enabling New Zealand businesses to diversify export markets and increase resilience towards trade shocks.
- Sharpen the focus on economic resilience in existing industry-facing growth and innovation funds.
- Develop a strategic focus on economic resilience in the longer-term by building strong institutions, effective leadership, and good relationships among government bodies, industry organisations and the community.

Building a more resilient economy will allow New Zealand to be better equipped to absorb the impacts of supply chain disruptions, while supporting firms and communities better tackle cross-cutting economic challenges, including productivity and innovation.

1 Introduction to economic resilience and supply chains

The Government directed the New Zealand Productivity Commission in October 2022 to undertake an inquiry into the **economic resilience** of Aotearoa New Zealand to persistent **supply chain disruptions**. The Commission defines these in the following ways:



Economic resilience is the capacity of industries and associated communities to anticipate, prepare for, absorb, recover from, and learn from supply chain disruptions.



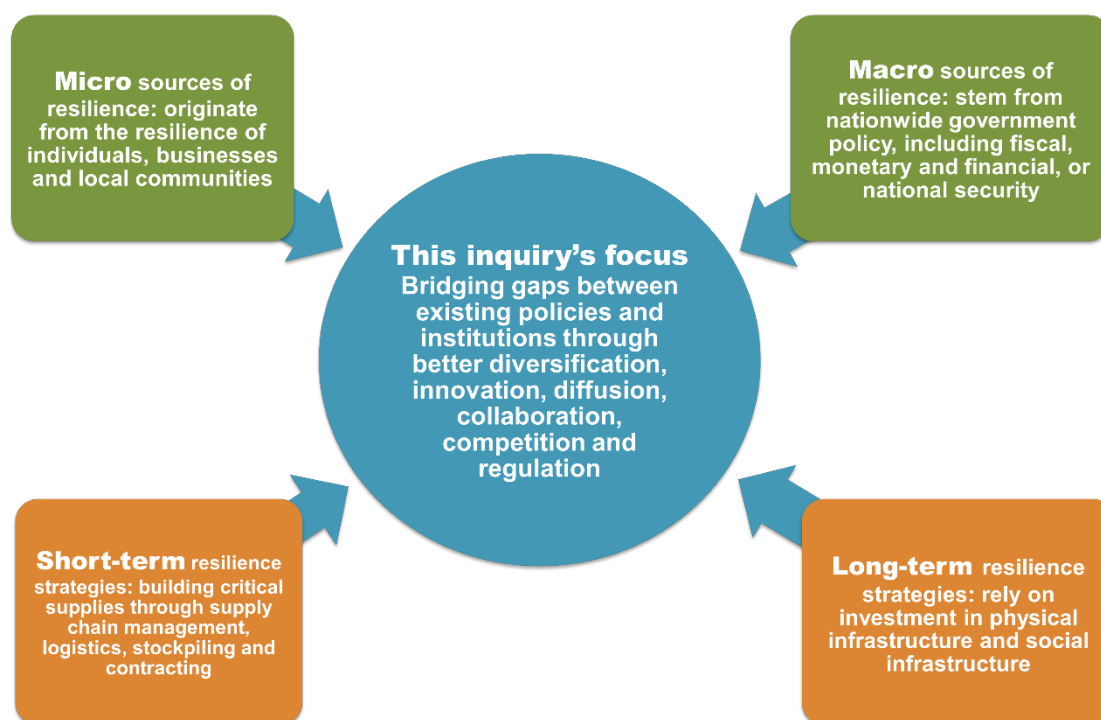
Supply chains are the tangible and intangible links between individuals, firms, community, and government that support the flow of resources, domestically and internationally, from raw materials to end user.

The Government asked the Commission to take a medium-term approach to economic resilience in this inquiry, and to identify industry-level supply chain vulnerabilities (see [Terms of Reference](#)). Its direction to complement, but not replicate, ongoing initiatives on resilience to supply chain disruptions meant that specific policies around short- and long-term resilience were out of scope, including:

- the long-term development of infrastructure underpinning supply chains, especially critical infrastructures underpinning economic security
- the identification of essential or critical goods and policy options for tackling short-term disruptions to the supply of these essential or critical goods (a task being led by the Ministry of Foreign Affairs and Trade at the time the Terms of Reference were produced).

The direction shifted our attention towards a host of possible medium-term policies and interventions aimed at enhancing the *generic* resilience capability of New Zealand firms, industries, and communities. The need to anticipate and prepare for prospective and completely unknown disruptions focused our attention on improving and sharing information well, developing strong networks, and providing the private sector with a voice in any strategic framework aimed at economic resilience in an increasingly volatile and uncertain future.

Figure 1: The scope of this inquiry



More specifically, the medium-term focus on economic resilience of industries and communities led us to focus our analysis on data, policy and governance tools that can enhance New Zealand's generic economic resilience capability over the next 10 years. Our inquiry examines:

- the definition of economic resilience and its relationship to related policy objectives, including productivity, innovation, and wellbeing ([Chapter 1](#))
- an empirical data-driven approach to assist in identifying New Zealand's trade exposures and the associated distributional effects on industries and communities through modelling representative trade, technology, and price disruptions ([Chapter 2](#))
- an analysis of international trends in economic, trade and national security policies in response to more frequent global supply chain disruptions ([Chapter 3](#))
- New Zealand's existing policy responses towards enhancing its economic resilience, including trade diversification, supply chain management, innovation policy and public-private coordination mechanisms between government and the private sector ([Chapter 4](#))
- examining the policy levers and institutional settings that would build economic resilience capability for New Zealand businesses, industries, and communities ([Chapter 5](#))
- developing a practical resilience toolkit to support businesses and industries to monitor and assess potential disruptions, identify tools that can support adaptation, and leverage their investments in resilience through existing policies and initiatives ([Chapter 6](#)).

Through our research, we found that a generic ability across industries and communities to anticipate and tackle a range of vulnerabilities will be essential for economic resilience, given the deep uncertainties about prospective sources and impacts of supply chain disruptions in

the medium term. This generic capability towards economic resilience comes from a variety of sources – both macroeconomic (through stable monetary, fiscal and regulatory policy settings) and at individual, business and community levels (through effective information sharing and supply chain management).

This inquiry also builds on our earlier *Frontier firms* inquiry (NZPC, 2021, 2023a) which recommended the development of focused innovation ecosystems in promising areas of the economy. We recommend that the government extends this approach as a way to build medium-term, industry-level economic resilience. Many small advanced economies – by using a variety of forms of modern industry policy – find synergies and manage trade-offs across many policy objectives such as trade diversification, climate adaptation, competitiveness, innovation, and better regulation (see Box 22 and [section 3.3](#)).

1.1 The risks of supply-chain disruptions are increasing

When the inquiry was commissioned in October 2022, the volatility of international supply chains was beginning to dominate the global economic outlook. The COVID-19 pandemic and its associated restrictions loomed large across the world, hindering economic activity. While COVID-19 related economic, health and border restrictions have since subsided, Aotearoa New Zealand's supply chains have remained prone to disruption through shocks from other sources, whether driven by geopolitical events, market forces and regulation, or natural disasters (see [section 1.3](#)).

Supply chains rely on physical infrastructure (such as ports, roads, or cables) to transport goods and services. Less visibly, they also rely on social infrastructure, including trade agreements, and legal and regulatory systems. More broadly, supply chains rely on human relationships that enable trade across time and space (NZPC, 2023b). For New Zealand, supply chains have become increasingly important and more complex over the past three decades, because of deepening globalisation.

The complexity of supply chains means that it is virtually impossible to predict when or how the next disruption will occur. For this reason, we have intentionally used a broad definition of supply chains in this inquiry. This reflects our view that the need to build *generic* resilience capability is greater than the need to build capabilities to tackle *specific* supply chain disruptions.

New Zealand faces an increased risk of supply chain disruptions, as economic, environmental, and sociopolitical factors create the potential for fragmentation of global trade and supply chains (see [section 1.3](#)). Frequent exposure and ongoing vulnerability to supply chain disruptions can undermine the resilience of New Zealand's economy – that is, the ongoing capability of firms, industries, and communities to anticipate, respond to, and recover from shocks.

Through consultation on the issues paper published in February 2023 (NZPC, 2023b), we heard from New Zealand businesses, industries and communities about an uncertain global economic and geopolitical outlook. In the wake of extreme weather events like Cyclone Gabrielle, submitters were highly conscious of the implications of climate change, including the need for decarbonisation, adaptation, and transition to a low-emissions economy. Submitters also expressed concerns about the resilience of their supply chains, as well as expressing a strong desire for long-term investment in the supporting infrastructure. Māori organisations shared similar concerns and brought a distinct perspective to economic resilience. These organisations had a strong focus on the long term, on relationships and

place, and on the needs of the collective – whānau, hapū, marae, iwi and the broader community.

The complexity of supply chains contributes both to their resilience and vulnerability. In economies with competitive markets, firms can switch between competing suppliers and purchasers, but vulnerabilities arise when the network of supply chains becomes concentrated. When firms depend on suppliers from countries subject to trade restrictions or from regions affected by natural disasters, the impacts can affect buyers and sellers around the world.

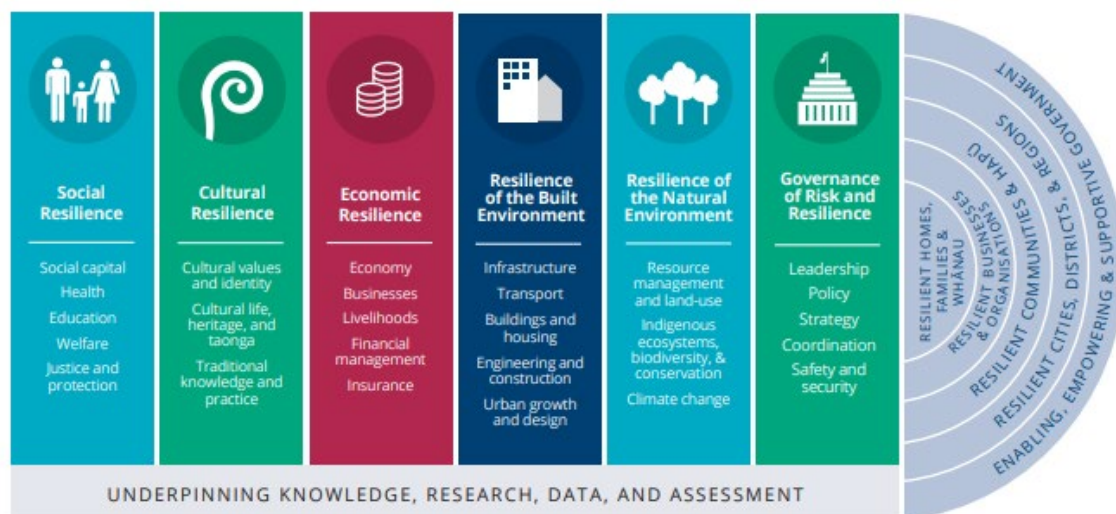
How does resilience relate to New Zealand’s productivity and economic objectives?

The concept of resilience is used in a wide variety of disciplines, including materials science, ecology, psychology, economics, and social sciences. Generally speaking, resilience focuses on the ability to adapt and transform in the face of shocks and disturbances. Rather than simply bouncing back to a previous state, resilient systems adapt their structures, functions, and behaviours – to not only survive, but also to learn, grow and improve. Over time, genuinely resilient systems evolve towards a “new normal”, better suited to changing circumstances and shocks. For this reason, the term “resilience” has increasingly become synonymous, in an economic policy context, with a range of positive attributes – many of which are similar to those needed to improve long-term productivity and economic growth (see Box 1).

While resilience is positive for a system, there are economic costs and benefits with achieving any new normal. Any adjustment costs and benefits are likely to fall disproportionately on some groups, depending on the particular shock or disturbance.

There are multiple dimensions of resilience (see Figure 2). These dimensions can encompass different concerns, functions, and sources of risk, including climate change, trade, inequality and geopolitics. An assessment of appropriate policy responses to resilience will therefore depend on careful analysis of the scope of resilience – that is, a contextual understanding of resilience objectives in that particular dimension.

Figure 2: Dimensions of resilience in Aotearoa New Zealand



Source: Ministry of Civil Defence & Emergency Management (2019, p. 20).

Box 1. Distinguishing economic resilience from economic robustness and security

There are broadly two models of resilience. The equilibrium model closely follows the materials science concept, with a focus on absorbing and bouncing back from shocks. In contrast, the evolutionary model emphasises adaptability and transformation for the long-run health and performance of the system (Pells, 2023). The inquiry uses the evolutionary model, which makes resilience conceptually distinct from other related economic objectives, including robustness and security.

Economic resilience differs from economic robustness, although the terms are sometimes used interchangeably. Robust economies, industries and communities aim for stability, and they often survive disruptions unchanged, or return to “normal” with little stress. Robustness is typically possible when the disruption is temporary and does not change underlying circumstances. Being robust to disruptions may help industries and communities avoid the strain associated with change and adaptation. Returning to “normal” can also result in a cumulative build-up of imbalances. When these imbalances result in a crisis, the impacts are often more severe than in industries and communities that embrace resilience and prioritise gradual adaptation to smaller changes (Brunnermeier, 2021). In contrast, resilient systems adapt their structures, functions, and behaviours – not only to survive, but also to learn, grow and improve. Over time, genuinely resilient systems continuously evolve towards whatever is better suited to changing circumstances.

Economic resilience also differs from national and economic security. National security aims to safeguard independence and sovereignty, while economic security is concerned with stable access to resources and income. Overseas economies have adopted economic security policies in response to persistent supply-chain disruptions and a more volatile global outlook (see Chapter 3). Governments can use international relations, and trade and industry policies, to tackle national economic security concerns. Protecting key industries may be appropriate when national security concerns are legitimate, but the risk of such protection is benefiting producers at the expense of consumers (Mankiw, 2012).

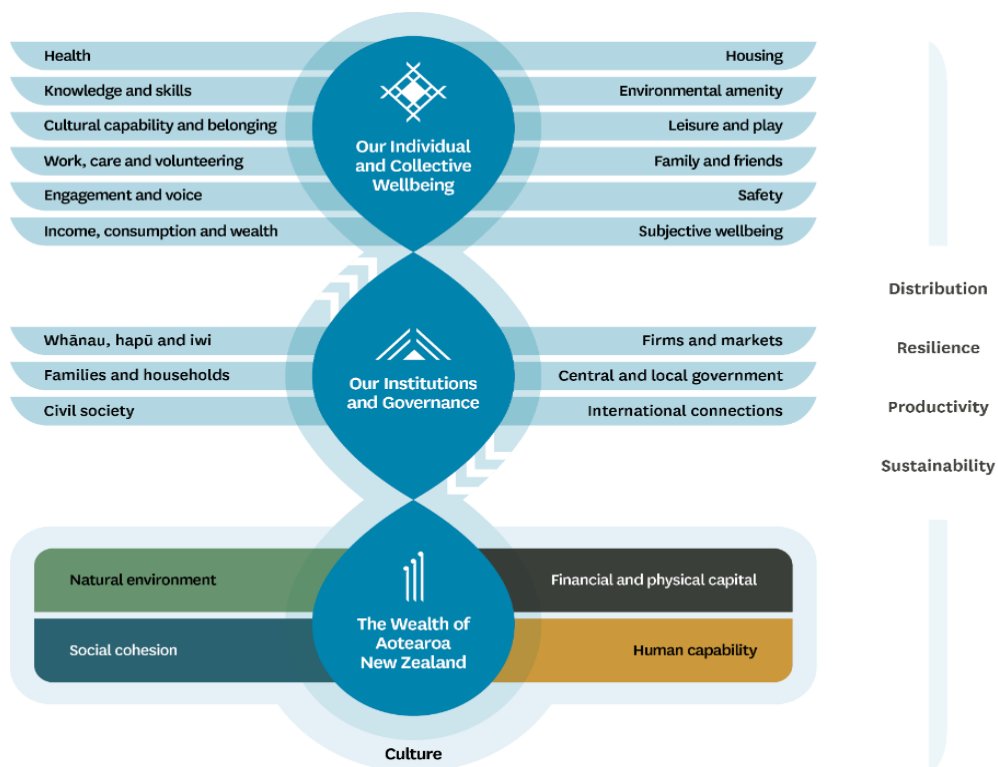
Productivity, sustainability, and resilience all matter for the long-term prosperity and wellbeing of individuals and communities (NZPC, 2023c). The capacity to be dynamic and adaptive is important to productivity and resilience. To sustain productivity, governments, firms, industries, and communities must be able to adapt to challenges, absorb impacts, and anticipate and learn from disruptions. This requires allocating resources flexibly and ongoing performance improvements.

Investments in resilience can have benefits for productivity and sustainability. For example, investments in innovative technologies that reduce greenhouse gas emissions can simultaneously improve productivity and sustainability, and so build the resilience of industries and communities. Resilience-enhancing measures (beyond short-term measures focused on immediate shortages like stockpiling of critical goods) often involve innovative approaches to tackle new challenges, and over the longer term, innovation is the primary source of productivity growth.

Enhancing the resilience of the economy overlaps with other policy objectives, including distribution and sustainability. Figure 3 outlines these relationships as set out in Treasury’s

Living Standards Framework (The Treasury, 2021b, p. 2). Resilience and productivity support wealth, institutions and governance, and individual and collective wellbeing. The quality of institutions and governance in turn impacts resilience (The Treasury, 2021b).

Figure 3: The Treasury’s Living Standards Framework



Source: (The Treasury, 2021b, p. 2)

The resilience of a society also depends on the wellbeing of individuals and communities, including their sense of empowerment, social unity, and trust in institutions (Gluckman et al., 2023). Engagements with Māori strongly emphasised the importance of these aspects (Haemata, 2023). Kaye-Blake (2023) highlighted how social resilience in rural communities relates to communal and personal features such as education levels, participation in volunteering, personal connections, and support networks. Strong social networks facilitate resource distribution between more- and less-affected parties, therefore spreading risk. Galt and Nees (2022) emphasise the role of institutions and governance in promoting the wellbeing of individuals and society. Good institutions and governance protect and enhance national wealth through sound decision making, fostering innovation and productivity, and responding effectively to risks.

Resilience is integral to the Māori economy

Te ao Māori concepts and business practices reflect similar resilience aspirations for productivity and economic growth. The Treasury complements the Living Standards Framework with He Ara Waiora¹ to integrate the different domains, mechanisms, and underlying drivers of wellbeing with a Māori understanding of institutions. This exercise highlights that preferences about risk and resilience (and perceptions of ‘optimality’ of investment) may differ across New Zealanders and different demographic communities. It may also mean that taking a wellbeing approach built on collective as well as individual outcomes.

The Māori economy is an important source of diversity and resilience for industries and communities across New Zealand. With assets worth about \$70 billion and a 60% expansion over the past decade, the Māori economy grew faster than the overall economy over the 2013 to 2018 period. A substantial proportion of this asset base is linked to natural-resource activities such as agriculture, fishing and forestry (Nana et al., 2020). The expansion of the Māori economy provides a strong foundation for resilience. Today the Māori economy is multifaceted and growing in scale and scope, with increased investment in high-value primary industries, property, tourism, construction, digital/ICT and the creative industries.

Many Māori businesses are firmly grounded in Māori values (Haemata, 2023). They adopt diverse business models, capable of supporting varied responses to disruption. Industries, people and places deeply rooted in te ao Māori tend to adopt long-term time horizons and seek to satisfy multiple bottom lines (Mill & Millin, 2021). The long-term emphasis supports and encourages patient investments in resilience, including by allowing more time and opportunities for Māori businesses and communities to prepare for and adapt to change.

Resilience is also the ability to move, change and adapt. If you have your own resources, you can change just like that.

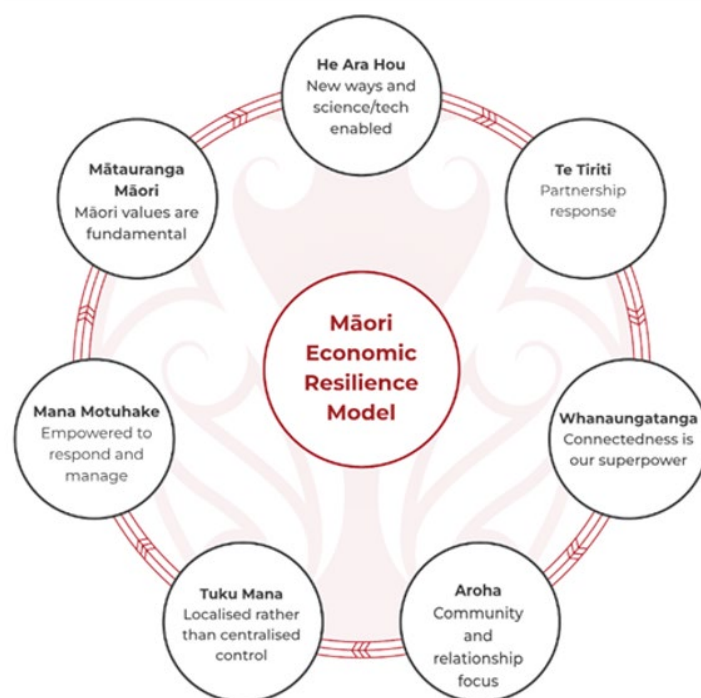
(Haemata, 2023, p. 19)

We worked with Haemata to engage with over 50 participants from across the Māori economy,² through a series of wānanga and interviews for this inquiry. The draft Māori resilience framework (Figure 4) was developed from this kaupapa, which reflects the experiences and beliefs from participants across the Māori economy (Haemata, 2023).

¹ He Ara Waiora is a tikanga-based perspective on wellbeing, co-developed by The Treasury and Māori knowledge experts (The Treasury, 2021a).

² Engagement covered iwi, post-settlement governance entities, Māori land trusts and incorporations and Māori small-to-medium enterprises across a range of industries. Additional participants included community representatives such as iwi and hapū leaders, whānau, social services/whānau ora, economic development representatives, and business networks.

Figure 4: Draft Māori resilience framework



Source: Haemata (2023, p. 56)

This framework sets out a distinct approach to economic resilience that complements other perspectives. Māori organisations take a holistic approach and prioritise relationships, seeing people, places, and time horizons as interconnected. This approach stems from te ao Māori concepts and values such as whakapapa (tribal and geographical kinships) and whanaungatanga (forming and strengthening relationships between kin and communities).

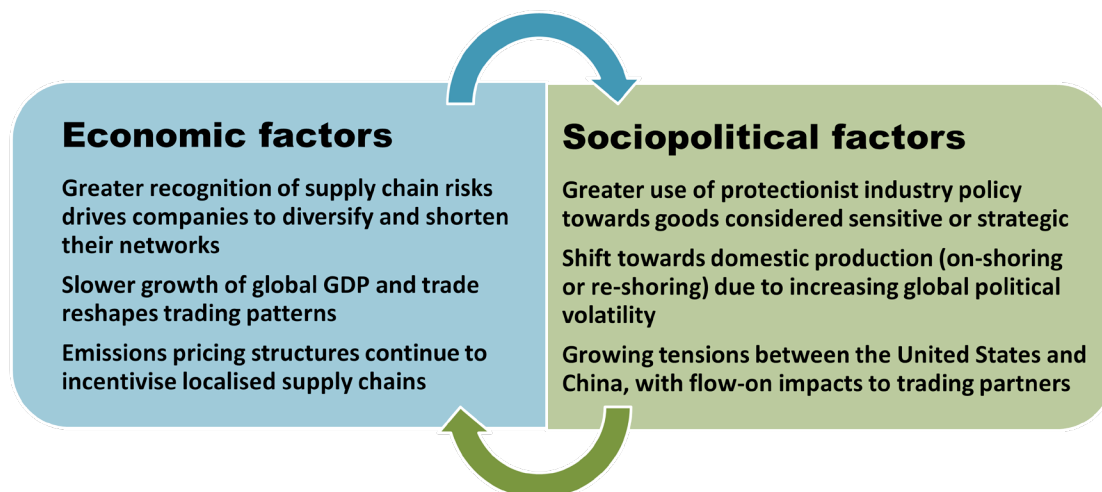
Resilience is also a relational concept, emphasising the interdependent and interconnected nature of systems and entities. This aspect is about the dynamic interactions and dependencies that shape the ability of communities to withstand and recover from disruptions. Consistent with this, our engagement with Māori highlighted a view that the resilience of communities and collectives (such as whānau, hapu and iwi) is the foundation for economic resilience (Haemata, 2023).

1.2 Global trends to date and future supply-chain disruptions

Aotearoa New Zealand has benefitted from specialisation and productivity gains through international trade over the past three decades. The era of growing globalisation saw rapid expansion in the scale and speed of global supply chains. But the global financial crises (GFC) in 2008 saw the global economic system plateau, and in 2017 the first moves in the US-China trade war took place. In the early 2020s, widespread vulnerabilities emerged in global supply chain networks through the rapid spread of COVID-19. The exponential rise in global infections and deaths within weeks caused massive disruption. While governments across the world grappled with responses to the immediate pandemic, economic and trade challenges arose from border closures, disrupted production of goods and services, international competition for the supply of essential resources, and worldwide shipping delays.

Rather than relying exclusively on market forces to correct COVID-19 disruptions, countries significantly shifted their thinking about how they do business with one another. The pandemic essentially eroded the trust that underpinned the global supply chain network. COVID-19 forced governments and businesses to examine their supply chains closely, because it showed them that the flexibility and resilience offered by international trade and global supply chains cannot be taken for granted. Indeed, climate change and geopolitical volatility, as well as COVID-19, have combined to catalyse considerably greater protectionist thinking around supply chains (see Figure 5).

Figure 5: Global drivers of supply chain ‘protectionism’



Source: Based on OECD (2023c), Skilling (2022), WTO (2023) and IMF (2023c).

In one international survey by McKinsey, almost all businesses had acted to improve their supply chain flexibility, agility and resilience (Alicke et al., 2021). Although many initially planned to increase near-shoring of suppliers, most businesses surveyed (61%) ended up increasing their inventories of critical products. “Just-in-case” strategies (rather than “just-in-time” ones), combined with transparency-improving digitisation of supply chain management, were possible ways for businesses to improve their resilience to unreliable global shipping. However, just-in-case mechanisms are not without risks, given their limited applicability to perishable goods, rising storage and warehousing costs, and the need to balance profitability and redundancy (Blackhurst & Balthrop, 2023; Masters & Edgecliffe-Johnson, 2021; PwC, 2021).

Post-COVID-19 recovery

Looking back, global supply chains have proved to be remarkably resilient. Global shipping has gradually stabilised and returned towards pre-pandemic conditions of timeliness and cost, before experiencing recent geopolitical disruptions in Red Sea. The Global Supply Chain Pressure Index fell steadily from the beginning of 2022 (Federal Reserve Bank of New York, 2023) (see Figure 6), corresponding with the easing or lifting of COVID-19 restrictions in most major economies (University of Oxford, 2023). New Zealand’s shipping and transport data show a similar trend – with a delay – compared to global indicators (Glynn, 2022).

Figure 6: Steady declines in the Global Supply Chain Pressure Index



Source: (Federal Reserve Bank of New York, 2023)

In New Zealand, temporary shortages of eggs, food-grade CO₂, and toilet paper were satisfactorily resolved within weeks, through normal market mechanisms. Initially, prices went up, then demand fell and supply increased over time. The critical shortages of personal protective equipment in 2020 lasted only several months, until supply caught up with massive global demand. Even drastic disruptions – such as disruption of oil and gas supplies to Europe after Russia invaded Ukraine – subsided as public and private measures reduced demand, sourced alternative supplies and brought down prices to pre-war levels, despite ongoing risks and uncertainties (Liboreiro & Alonso, 2023).

Finding 1.

Global supply chains appear remarkably resilient. While indicators of their health returned to pre-pandemic levels in late 2023, pressure indices are starting to rise again, reflecting recent heightened risks and uncertainties.

On many levels, markets have worked as expected. However, the impact of the COVID-19 supply chain disruption on New Zealand has been significant and the benefits for domestic supply chains of global improvements have been slow to arrive. Moreover, recent climate-related events and increased geopolitical disruptions have worsened both domestic and global conditions. This experience demonstrates that supply chain resilience and New Zealand's policy settings need to continually adapt to ongoing volatility (see [section 1.3](#) and [Chapter 5](#)).

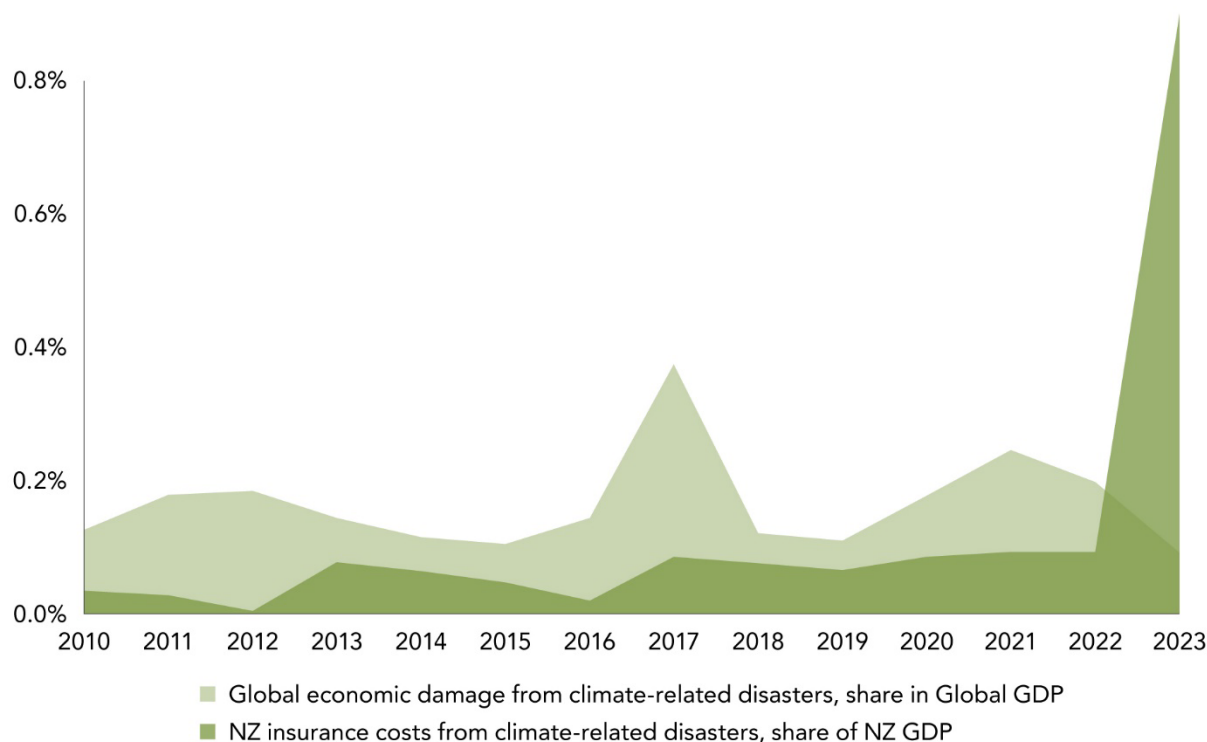
Globally, initiatives to reduce supply chain vulnerabilities are likely to continue. [Chapter 3](#) describes a range of single-country and international initiatives. Empirical studies of the impacts of resilience policies are rare (Grossman et al., 2023). Various case studies indicate that better preparedness and ability to adapt can minimise the impacts of supply chain disruptions (Alicke et al., 2022).

Future disruptions

Looking forward, interconnected challenges such as climate change, geopolitical rivalry, and pandemics pose ongoing and new risks. Although some of these risks will continue disrupting supply chains in the next decade, the timing and magnitude of disruptions are uncertain. There are many possible scenarios, with varying implications for resilience-enhancing interventions.

Climate change will contribute to more extreme and more frequent weather events like storms, heavy rainfall, floods, heatwaves, droughts, and fewer frost and snow days. Changes in the hydrology and seasonal cycle of snowmelt, as well as severe droughts, pose a threat to freshwater resources. These changes, and rises in sea level, may endanger existing communities and vital infrastructure assets (MfE, 2020). The costs of climate-related disasters oscillate from year to year, but years with high damage have become more frequent. Figure 7 shows the extreme losses caused by hurricanes in the US in 2017 and the huge increase in New Zealand insurance payouts due to Cyclone Gabrielle and Auckland floods in 2023.

Figure 7: Global and New Zealand natural disasters – economic damages and costs

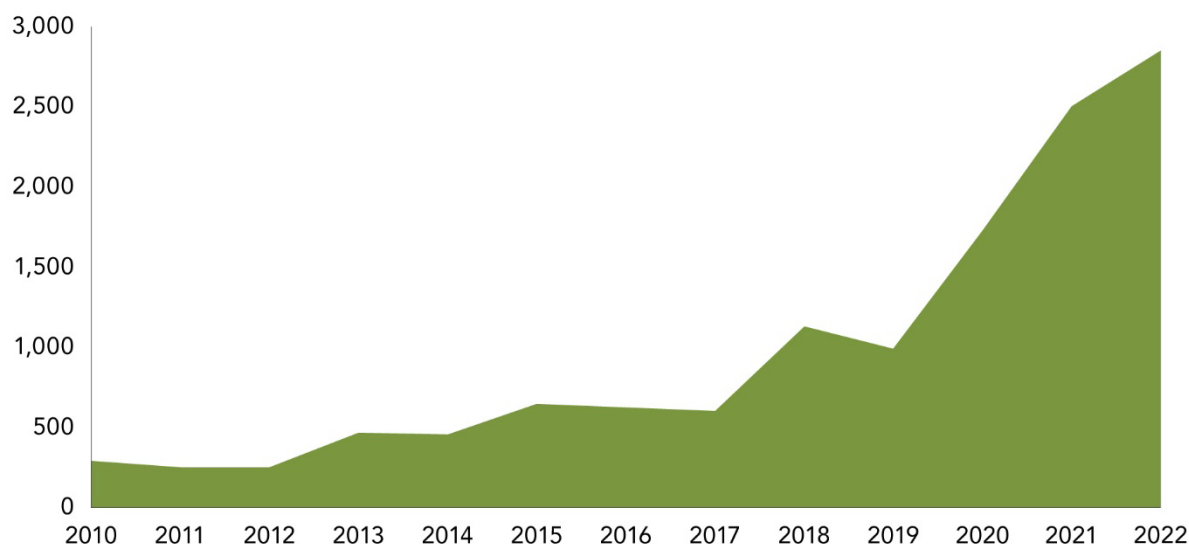


Source: (Centre for Research on the Epidemiology of Disasters, 2023; IMF, 2023b; Insurance Council of New Zealand, 2023; Stats NZ, 2023a)

Note: Meteorological and climate events include droughts, floods, storms, landslides, wildfires, and extreme temperatures. New Zealand data includes all non-earthquake events.

Geopolitical rivalries are another source of trade disruptions. New Zealand now faces a much more complex and challenging strategic environment as economic sanctions, trade restrictions, non-tariff barriers, and industrial policies increasingly disrupt global trade (see Figure 8). The search for responses often brings complex trade-offs and dilemmas.

Figure 8: New trade barriers on goods, services and investments introduced each year



Source: (IMF, 2023c)

Few observers expect a return to the supply chain stability experienced during the three decades of globalisation prior to the GFC in 2008. This stability underpinned an expansion and widening scope of global supply chains, despite occasional health scares, trade conflicts, regional financial crises, extreme weather events and other disruptions. Globalisation clearly plateaued after the GFC, as global supply chains stopped expanding in volume and reach (WTO, 2023). Trade conflicts between major trading powers increased in frequency, adding more uncertainty to the global system. The term “slowbalisation” emerged to describe this change (Kandil et al., 2020).

Inquiry participants expressed a wide range of views about the nature of future disruptions (NZPC, 2023b). Many submissions put forward specific possibilities for disruption to New Zealand’s supply chains – such as military conflicts in the Taiwan Strait and the South China Sea, an escalation of the Russian war in Ukraine, or a nuclear conflict. Others highlighted the increasing frequency of extreme weather events, such as bushfires or floods. Some raised the potential impacts of multiple catastrophes that could isolate New Zealand from the rest of the world (see Box 2).

Box 2. Global catastrophic risks

The risk of extreme catastrophic disasters – such as nuclear winter, or a complete disintegration of world trade – is beyond the scope of this inquiry. However, submissions expressed concern that New Zealand is not equipped for such global catastrophes, even if our geography could enable us to be more self-sufficient than the rest of the world.

The New Zealand Government's central agencies steer the governance and management of nationally significant risks (including a broad set of hazards and national security threats) and emergency response. The Department of the Prime Minister and Cabinet (DPMC) has system leadership and coordination roles focused on building resilience to critical national risks, and the National Emergency Management Agency (NEMA) leads overall civil defence and emergency management.

Existing powers under the Civil Defence Emergency Management Act 2002 provide NEMA with a blanket authority to manage catastrophic risks, as for any other emergency. However, the scale, scope and intensity of their impacts would far exceed those caused by natural disasters (Green et al., 2022). Although the likelihood of global catastrophic risks is low, New Zealand's current preparation for them appears weak.

While long-term disruptions are beyond the scope of this inquiry, the potential impacts of global catastrophic risks are severe and wide ranging. The DPMC should support independent research to evaluate these risks for New Zealand. This could be part of current work programmes, such as the DPMC's assessment of national security risks and NEMA's National Disaster Resilience Strategy.

The global outlook for trade growth remains weak, even as economies recover following the pandemic. The OECD notes that levels of trade relative to GDP have fallen, which is worrying, given the importance of trade for productivity and economic development (OECD, 2023c). For New Zealand, these trends indicate that, while the economy has benefitted from specialisation and international trade over the past three decades, the country remains exposed to future disruptions, due to its small size, economic structure, distance from markets, increasingly concentrated imports and exports, limited competition in some key sectors, and lagging productivity and innovation.

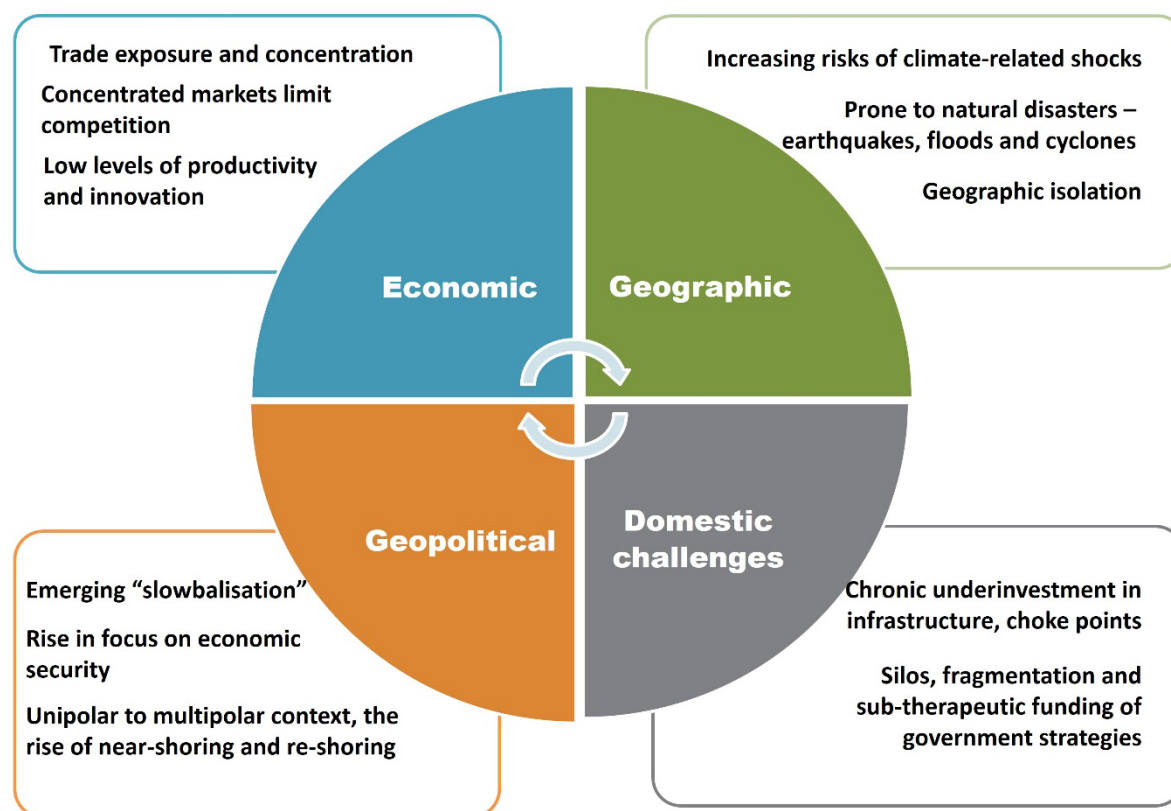
1.3 Aotearoa New Zealand's supply chain exposures

Aotearoa New Zealand has experienced many shocks over its history, caused by economic, sociopolitical, geographic and health factors (Easton, 2023). New Zealand's economic geography and institutional context means that it has one of the most exposed supply chain positions across advanced economies (Skilling, 2022). Figure 9 sets out four broad areas where New Zealand is exposed, along with the underlying factors that create increasing risks to its supply chains.

Vulnerabilities in each of the four areas compound to increase risks. For example, the unique and unusual geography of New Zealand contributes to additional challenges in the design and building of critical infrastructure. Points of pressure include ageing infrastructure, use of outdated or relatively insecure technologies, and limited capacity for growth or replacement supply in the case of infrastructure failure in some areas (DPMC, 2023a;

Skilling, 2022) . Likewise, near-shoring by other countries to countries geographically close to them is a greater threat to New Zealand than to less geographically isolated countries.

Figure 9: New Zealand’s vulnerabilities to shocks and disruptions



Source: Easton (2023), MFAT (2023a), Skilling (2022)

Skilling (2022) describes New Zealand’s vulnerability as due to being the “last bus stop on the planet”. Structural changes in global logistics, with ever-larger ships serving fewer and larger ports, could result in higher costs and reduced servicing of small, distant markets like New Zealand.

Finding 2.

Aotearoa New Zealand’s supply chains are among the most exposed of advanced economies due to geographical isolation, concentrated market structures, vulnerability to natural hazards, climate-related shocks, and ageing infrastructure, combined with chronic levels of underinvestment. These vulnerabilities create additional pressures on the resilience of the economy.

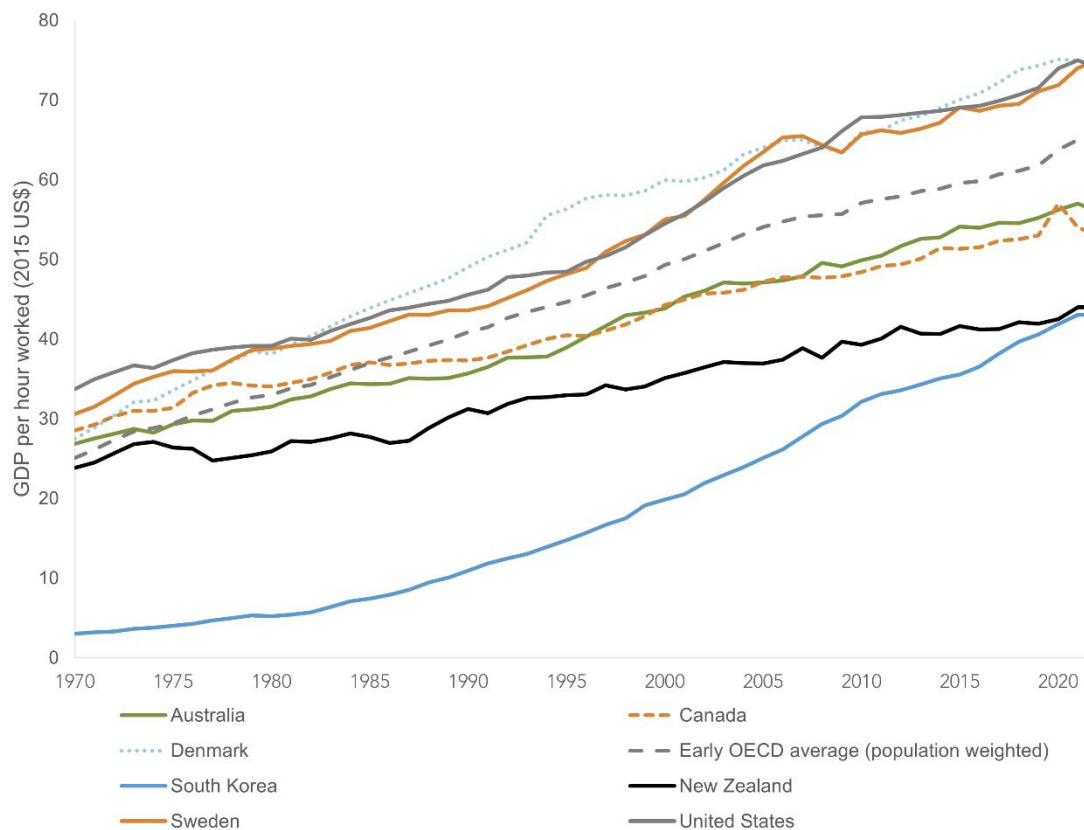
New Zealand’s existing economic challenges

New Zealand faces a range of challenges that weaken its economic resilience, and its economic performance more generally. Inquiry participants often raised topics such as infrastructure, skills and migration, or regulation. While some of these are out of scope for this inquiry, we have addressed them in past research and inquiries (NZPC, 2012, 2014b, 2017, 2020, 2022).

Our consultation for this inquiry also highlighted the close overlap of economic resilience with the challenges and policy responses related to climate change and innovation. First, the

impacts of climate change are an increasing source of supply chain disruptions (see Figure 7) and a major driver of the need for resilience. Second, emissions reduction and climate adaptation (like building resilience, more generally) require development or adoption of innovative technologies and responses. It follows that a country that lags in innovation (and productivity more generally) will be limited in its ability to adapt to supply chain disruptions. However, New Zealand is well known to trail its peers in both innovation and productivity. Figure 10 illustrates the long period of relative decline in New Zealand's productivity levels (NZPC, 2023c, p. 33).

Figure 10: New Zealand's productivity levels and growth lags behind those of other developed countries



Source: New Zealand Productivity Commission calculations based on OECD Productivity Database, release of December 2022.

Notes: Early OECD countries are defined as those who joined the OECD prior to 1975. This includes Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Türkiye, the UK, and the US.

As industries and communities adapt to climate change, they can often create co-benefits for economic resilience. For instance, adapting or rebuilding infrastructure to withstand more extreme weather obviously improves economic resilience. Resilience co-benefits will also flow as policies for emissions reduction and climate adaptation reshape industry business models and technologies. The Terms of Reference for this inquiry direct us to complement and not duplicate existing policy strategies and initiatives, such as those relating to climate change. Accordingly, we do not cover these policies directly, but we do advocate for an integrated response to New Zealand's resilience, innovation, productivity, and climate challenges.

Finding 3.

Aotearoa New Zealand's existing policy challenges around productivity, innovation, emissions reduction and climate adaptation compound the risks associated with an increasingly volatile future. The interconnected nature of these challenges means that an integrated policy approach is called for, and that opportunities exist for initiatives that meet multiple objectives.

1.4 The role of government in resilience investments

Government and the private sector (individuals, firms, industries, and associated communities) each have a role to play in the anticipation of, and recovery from, supply chain disruptions. [Section 1.2](#) noted this delineation of responsibilities in the response to the COVID-19 pandemic. Private sector firms adopted firm- or industry-specific supply chain management strategies to seek alternative suppliers, build stock inventories, or adjust business strategies, while governments were responsible for setting policy objectives at the macroeconomic level through monetary, fiscal or regulatory policy levers.

The rationale behind government intervention in economic resilience is twofold – first, to identify and resolve market failures stemming from the difference between private and social benefits and costs around proactive investments in resilience and, second, to provide macroeconomic settings that signal the direction of economic policy in the medium-to-long term. Public interventions can close the gap between the private and social benefits and costs through:

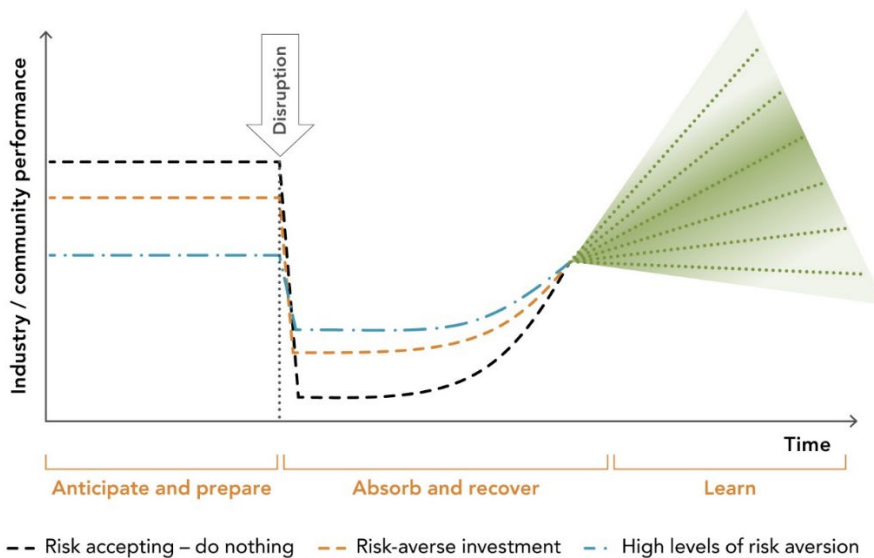
- reducing uncertainty, by pooling best available information to analyse vulnerabilities and emerging disruptions
- strengthening incentives for proactive investments in resilience by offering some co-funding
- investing in generic resilience capabilities to absorb and adapt to any kind of shocks.

We argue in this inquiry that public interventions are needed to develop generic capabilities that enhance resilience – better information, pooling and sharing information, co-funding, facilitating relationships and networks, and taking a strategic longer-term view.

Proactive investment in economic resilience

The issues paper for this inquiry introduced a stylised model for proactive investments in economic resilience (NZPC, 2023b, p. 10). Figure 11 extends this model by introducing parties with different risk preferences, including those who simply accept risk (black dashed line) those who are more risk averse (orange dashed line), and those with high levels of risk aversion (blue dashed and dotted line). The extension also recognises that risk preferences can change over time, depending on the expected frequency and impact of shocks, on new information and on changes in the capacity to use that information. Similarly, individual firms or people can face different incentives and have different risk preferences depending on their circumstances, including how constrained they are financially.

Figure 11: Stylised model of proactive investments in economic resilience



Investing in resilience is akin to buying insurance or investing in defence. Society or a firm pays a cost upfront by investing in ways to help offset the negative impact of a shock if it occurs.

Figure 11 shows how the costs of investing in economic resilience can involve an initial drop in performance (the drop from the black dashed line in the anticipate-and-prepare phase to the orange or blue dashed lines). For example, spending money on paying insurance or diversifying supplier and customer bases means this money cannot be spent on something more productive. During periods of stability, these investments may appear wasteful.

However, benefits arise when the investment leads to a better response to disruption in the medium term (in Figure 11, the blue and orange dashed lines show a smaller negative shock and a faster recovery than the black dashed line). For example, a diversified supplier or customer base reduces losses from supply chain disruptions. In Figure 11, the lower losses made in the absorb and recover phase (shown by the orange dashed line compared to the black dashed line) can outweigh the costs of resilience in the anticipate-and-prepare phase.

Figure 11 also illustrates that a society can underinvest or overinvest in resilience. Underinvestment can cause adverse and avoidable impacts of disruption, as illustrated by the depth and slower recovery of the dashed black line compared to the orange. Excessive risk aversion, however, can lead to an overinvestment in resilience and undermine efficiency, by wasting valuable resources. This is illustrated by the blue dashed and dotted line bringing only small additional benefits in absorption and recovery compared to the orange dashed line.

Figure 11 shows that outcomes are uncertain (green-shaded triangle), because of uncertainty about the nature and size of shocks and the effectiveness of investments. As time horizons lengthen, uncertainty will grow around the nature and size of potential shocks and the effects of alternative resilience investments.

Overall, Figure 11 presents a highly simplified picture of investments to build economic resilience. [Section 1.1](#) discussed how initiatives to build economic resilience can simultaneously achieve other objectives – such as raising productivity, improving the distribution of economic resources, and sustaining economic growth. Governments, communities, and industries can have greater confidence in the value of investments to build resilience if, at the same time, those investments have other economic and social benefits.

Complications created by uncertainty

Disruptions to supply chains can come in the form of “known” and “unknown” risks (see Box 3).

Shocks can vary by onset (fast or slow moving), duration (immediate or persistent), depth and breadth (the extent to which there are heavy distributional impacts on specific regions, industries or communities). Viable preparation for and responses to disruptions will vary by these characteristics, which makes the analysis of trade-offs challenging. Some shocks can be anticipated and prepared for. Others are so unpredictable that specific preparation and response may need to focus on post-shock absorption and recovery.

Uncertainty creates these difficulties in judging the nature of future disruptions, which can give rise to a tendency for the private sector to maintain the status quo and underinvest in economic resilience. Moreover, this tendency can be reinforced by:

- use of high discount rates (that emphasise short-term, certain profits) in a firm’s cost-benefit analysis
- use of private costs and benefits which do not align with social costs and benefits
- competitive pressures on firms’ short-term profits.

In the case of the last point, the costs of investments in resilience are immediate and certain, while the benefits accrue only if the disruption occurs and proactive resilience investments can materially reduce its harm. While the long-run survival of a firm will likely depend on its investments in resilience, in the short term, a trade-off exists between costs and resilience. If firms proactively invest for long-term resilience, their short-term profits will be lower, and firms focused on immediate profitability may outcompete them.

Box 3. Categorising known and unknown risks

Risks vary in predictability and impact. Predictability depends on the degree of certainty around the occurrence, speed and timing of shocks. Impact depends on the type of shock; its severity and how exposed people and valued assets are to it.



Known knowns are potential events where the timing and impact can be relatively well understood and predicted. This predictability allows for the development of measures that individuals, businesses and nations can undertake to mitigate the effects of these events. For example, the cost of car crashes can be mitigated by median barriers and stop banks can protect against flooding.

Known unknowns (such as major earthquakes in Aotearoa New Zealand) are events that people know are coming, but for which it is challenging to predict when they will happen, or the extent of their impact. To prepare for such events, a broad approach that encompasses many possible scenarios is more effective than relying on a specific plan. However, individuals and firms often underestimate the likelihood of known unknowns and fail to invest enough in preparation for them until it is too late. Society also tends to overreact to such events; people and firms become more risk averse immediately after a negative event, but gradually become less cautious over time.

Unknown unknowns or “black swans” are unforeseen, or highly unlikely, but significant events. It is impossible to be fully prepared for unknown unknowns. Resilience against unknown unknown events depends on having a robust decision-making framework that can adapt to unexpected situations, and a resource buffer (savings or the ability to borrow) that can be repurposed as necessary.

Shocks can be better understood over time through better access to data and information. For example, meteorological research and modelling of extreme weather patterns have enhanced understanding of the impacts of climate change. NIWA’s climate model predicts rising mean temperatures, and an increase in the incidence of extreme daily rainfalls and extreme wind speeds over the next few decades (MfE, 2018), and recent climate-related disruptions (such as Cyclone Gabrielle) tested New Zealand’s preparedness for extreme weather events. Although the exact timing and extent of the next climate-related shock remains “unknown”, New Zealand would be better equipped by learning from its recent experiences on how to prepare better for future shocks.

On the other hand, firms collectively (or governments) could overinvest in economic resilience if the public-good aspects of information and resilience-enhancing investments are not recognised. Although this is less likely than underinvestment, plausible overinvestment scenarios exist.

- Each firm could invest separately in acquiring information about existing vulnerabilities and emerging disruptions (especially those observable industry or national level, rather than those pertaining only to a firm's direct suppliers). Collecting the same information many times over is wasteful.
- Each firm could proactively invest in resilience-enhancing measures that it can use only partially and inefficiently (for example, firms each acquiring in-house specialised skills that would be better procured and used if multiple firms or the whole industry pooled resources).
- Each firm invests in resilience to defend its market share from attempts of competing firms to “steal” it after a disruption, or conversely invests to steal the market shares of others. If multiple firms do this it becomes a socially wasteful zero-sum “game” (Grossman et al., 2023).
- A government could overinvest in resilience because it is politically motivated to act on voter concerns about specific disruptions and vulnerabilities. Essentially, some voters gain benefits without incurring costs, which fall on others via taxes or excessive regulation.

Because it is possible to underinvest or overinvest in resilience and difficult to get it right, we argue the best way of finding the right balance is for decisions to be informed by firms “who have direct incentives and the capacity to mitigate against them” (Australian Productivity Commission, 2021, p. 132), and by public agencies that follow global trends and risks.

Finding 4.

A society or a firm invests in resilience by paying upfront to help offset the negative impact of a shock if it occurs. However, a society and/or firms can under or overinvest in resilience. They may underinvest because of competitive or social pressures to save short-term costs, and the deep uncertainties about future disruptions. Overinvestment is less likely but could arise from excessive risk aversion.

Generic sources of economic resilience

The Commission's focus on medium-term economic resilience (see centre of Figure 1) stems from the inquiry's Terms of Reference, and from what we see as an unmet need to build generic resilience capabilities in industries and communities vulnerable to disruptions.

The generic capability for economic resilience can stem from different sources at both micro and macroeconomic levels. It can be driven by either government or private-sector actors. Governments can adopt fiscal, monetary or regulatory policy settings that contribute to economic resilience (see Box 4 for an explanation on fiscal buffers and their contribution towards the generic resilience of an economy). On the other hand, individual firms can enhance their resilience by making proactive investments in their supply chain management.

Box 4. Fiscal buffers contribute to generic resilience

Fiscal buffers (in the form of either savings or the ability to borrow) provide a government with the capacity to spend on recovery efforts after a significant negative shock hits. Recent examples include expenditure following the 2011 Christchurch and 2016 Kaikōura earthquakes, and the COVID-19 pandemic (Galt & Nees, 2022). Building fiscal buffers relies on a government's power to tax, its long-term credibility, social cohesion, and expectations of its ability to service debt when a negative shock occurs (Brunnermeier, 2021).

Overall, resilience-enhancing fiscal policy is a balance between spending and saving. While a strong government balance sheet is an important and (in monetary terms) liquid store of resilience, it is also important to acknowledge that building these stores is not without cost. Trade-offs are needed between building fiscal buffers over time, and expenditure now in key areas (such as physical infrastructure, education, health, or social infrastructure and institutions). To build resilience, governments therefore need to assess the risks they face, anticipate the assets that will most cost effectively provide the desired level of resilience (across the natural environment, social cohesion, human capability, physical and financial capital), and invest in these assets and institutions accordingly (Hughes, 2021).

Over time, if shocks compound or increase in frequency, the government's fiscal buffers and stores of wealth will erode and constrain its ability to fund recovery efforts through debt. Ongoing stresses will eventually require some form of structural change, which can be in competition with the desire to support current living standards. Unfortunately, it is not always possible to meet the needs of current generations without significantly compromising the living standards of future generations.

The recommendations of this inquiry are grouped around five sources of generic resilience (analysed in [Chapter 5](#)).

- Enable the use of data and information-sharing tools and work with private-sector experts to analyse trade patterns and industry exposures. Combining empirical data with expert knowledge of exposures and vulnerabilities will enable robust decision-making and policy setting in preparation for, and in the event of, an unexpected disruption.
- Strengthen institutions through better coordination within government, and between government and private-sector actors.
- Implement policies and initiatives with strong links to economic resilience. These can include promoting the diffusion of innovation, stewarding regulatory systems to ensure regulations remain fit for purpose in response to disruptions, managing climate adaptation, transitioning towards a low-emissions economy, equipping workers and businesses with skills, and workforce development policies.
- Co-fund New Zealand businesses and industries to develop innovative solutions that enhance economic resilience and related objectives.
- Build a governance system that gives strategic direction at a high level, while enabling devolved decision making that encourages “bottom-up” innovation initiatives.

Common to facilitating the above sources of generic resilience is the need to strengthen the networks and institutions that can support more effective supply chain management, policy, and decision making. This means promoting stronger networks of relationships among firms, industry and community groups and public agencies that enable information sharing, help to identify opportunities for proactive investments, and maintain commitment over time.

2 Economic impacts of supply-chain disruptions

This chapter sets out the Commission's empirical analysis of Aotearoa New Zealand's exposure to supply chain disruptions.

[Section 2.1](#) investigates the country's exposure to concentrated markets and products at an aggregate level, and its vulnerability to disruption in the import and export of specific products.

[Section 2.2](#) explores the economic and labour market effects of supply chain shocks.

We model how three representative supply chain shocks could impact Aotearoa New Zealand's labour market, incomes, and GDP, and how these impacts are distributed across industries, regions, and demographic groups. The three shocks arise from:

- a disruption in the supply of oil
- a technology change impacting demand for New Zealand's dairy products
- a geopolitical change making it more costly to export to our major markets.

We then model the costs of the output subsidies and wage subsidies needed to maintain employment in sectors impacted by the shocks, and the flow-on impacts on GDP.

Finally, we estimate the labour market and GDP outcomes of output subsidies and wage subsidies under alternative assumptions of full reemployment and 50% reemployment of laid-off workers.

[Section 2.3](#) draws out the main implications for policy and practice from our empirical analysis. The impacts of supply chain shocks on New Zealand's economy are potentially large (up to 7.5% of GDP). Policies that support workers to move to new jobs, and the movement of the economy's resources to new opportunities, are key to reducing the negative impact of shocks. The government can work with industry experts, using trade and other data, to identify risks and anticipate and build resilience to future economic shocks.

Some readers may prefer to skip the details of models estimating the impacts of supply chain shocks on the economy. If so, they can move directly to [section 2.3](#) (which sets out the policy implications) and the later chapters on policies to strengthen economic resilience.

2.1 Supply chain connections and concentrations

This section uses trade data to depict Aotearoa New Zealand's trade concentration and potential exposures to supply chain disruptions. It first shows, at a broad level of analysis, how trade has re-concentrated over the last 15 years. It then makes novel use of international input-output tables to show that this re-concentration may be significantly underestimated if the analysis does not include New Zealand's indirect trade exposure through major trading partners. This section investigates New Zealand's vulnerability to trade disruption, using data on goods traded at a specific product level (noting that high-level statistical analysis can hide underlying product diversity). This section concludes by assessing New Zealand's regional exposure to trade disruptions.

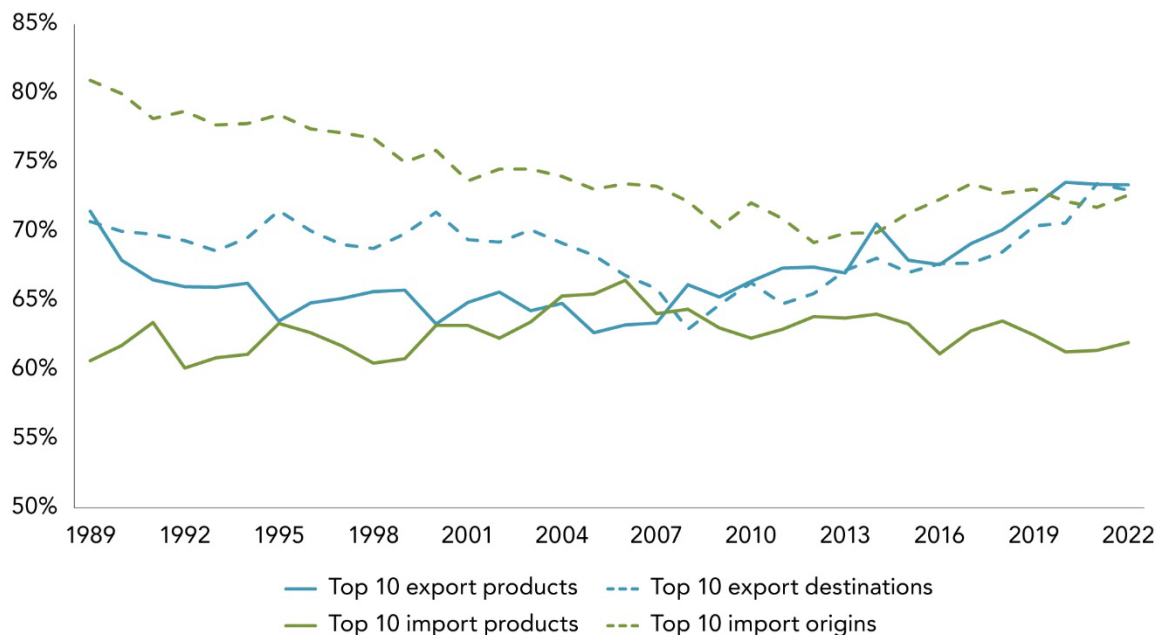
Trade has become more concentrated

Trade concentrations create vulnerabilities in supply chains because they make it more difficult to access alternative import or export markets in the event of a disruption. We drew on methodologies used in Australia, Canada and the European Union to analyse concentrations (see Australian Productivity Commission, 2021; European Commission, 2021; German Council of Economic Experts, 2022; Jiang, 2021) and to produce the accompanying paper (Legge & Temple, forthcoming). These methodologies combine the analysis of domestic trade concentrations with global market concentrations to assess vulnerabilities.

Aotearoa New Zealand trades with many countries across a wide range of goods. However, most of its exports comprise a few types of goods sold to a few markets. The top 10 exported goods in 2022 accounted for 73% of all exports (in terms of value), with over half of exports (56%) coming from four product groups (dairy, meat, wood and fruit). The same is true for export markets – the top 10 destination countries buy 73% of New Zealand’s exports, and over half of exports (58%) go to just four countries: China (29%), Australia (12%), the US (11%) and Japan (6%).

New Zealand’s imports are also concentrated. Just under half of imports (49%) are accounted for by four product groups (machinery, vehicles, fuels, plastics), and 59% come from just four countries: China (24%), Australia (11%), the US (8%) and Japan (6%). Figure 12 shows that New Zealand’s imports and exports have become more concentrated since 2008, when New Zealand entered a free trade agreement with China.

Figure 12: Aotearoa New Zealand’s top 10 exports and imports (% of total by value)



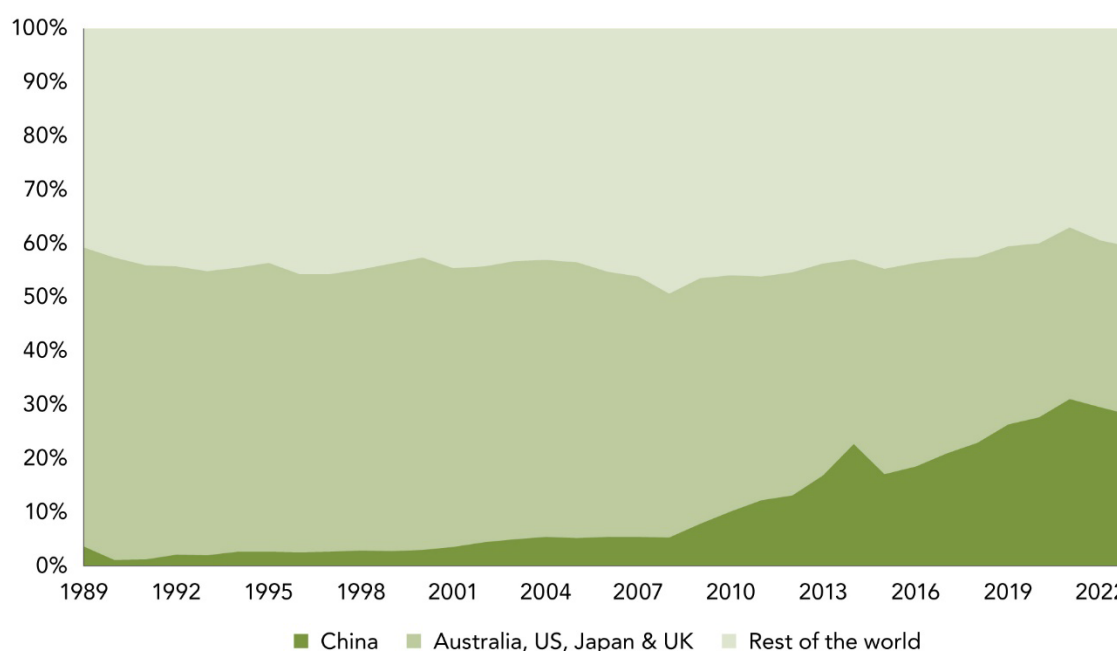
Source: (Stats NZ, n.d.)

In 1989, 71% of exports from New Zealand were concentrated in just 10 goods (in terms of value), and 71% of exports were sent to just 10 countries. By 2008, the corresponding figures were 63% and 66%, showing a gradual decrease in concentration. However, this trend then reversed and, since 2008, the concentration of the top 10 exports and destinations both increased to 73%.

The pattern for imports is slightly different. There has been little change in the concentration of goods, but they are now imported from more countries. While the top 10 products accounted for 61% of New Zealand’s imports in 1989 and 62% in 2022, the top 10 countries accounted for 81% of imports in 1989, 69% in 2012, and 73% in 2022.

Since 2008, China has become New Zealand’s largest destination for exports (see Figure 13). China’s share of New Zealand’s exports (in terms of value) rose from 5.2% in 1989 to 30% in 2022 – similar to the share of exports going to New Zealand’s historical trading partners, Australia, the US, Japan, and the UK, combined. During this period, New Zealand took advantage of the new opportunities to export agricultural products (often highly restricted in other markets) into the buoyant Chinese market. Australia, the US, Japan, and the UK accounted for 56% of New Zealand’s exports in 1989, but only 31% in 2022.

Figure 13: Aotearoa New Zealand’s export markets (% of total by value)

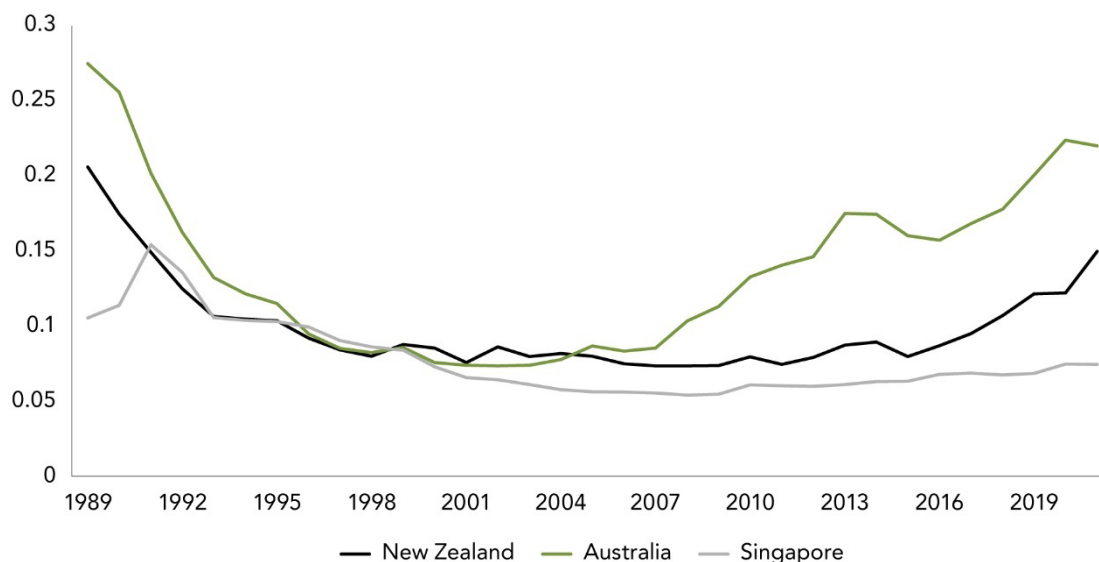


Source: (Stats NZ, n.d.)

The types of goods exported by New Zealand have also become more concentrated since the 2000s. In 1989, the leading product group, including dairy, accounted for 16% of all exports and about half of all primary goods exported. By 2022, dairy goods had increased their share of the value of New Zealand exports to 28% and made up three-quarters (74%) of all primary exports. China’s dairy-import concentration has also increased – New Zealand currently supplies about 40% of China’s dairy imports by value (Ma, 2023).

Figure 14 shows how New Zealand’s export concentration fell through the late 1980s and early 1990s (as it did for several other countries). This trend reversed after 2008 for New Zealand and Australia, in contrast to other smaller open economies (World Bank, 2024a).

Figure 14: Export concentrations in selected economies



Source: NZPC calculations based on World Integrated Trade Solutions’ HH Market concentration index (World Bank, 2024a).

Note: The “Hirschman Herfindahl index is a measure of the dispersion of trade value across an exporter’s partners. A country with trade (export or import) that is concentrated in a very few markets will have an index value close to 1. Similarly, a country with a perfectly diversified trade portfolio will have an index close to zero” (World Bank, 2024b).

Finding 5.

New Zealand’s trade is concentrated. Since 2008:

- export products and destinations have both become more concentrated
- import product concentrations have remained at a high level
- import origin concentration has increased.

These trends have increased the vulnerability of industries and communities to future supply chain disruptions.

Aotearoa New Zealand’s indirect trade exposure

Figure 12 through 14 only show New Zealand’s direct exposures to trading partners. Indirect exposures arise when a trading partner sells a New Zealand product on to a third destination. A fictitious example would be where China and Australia each buy half of New Zealand’s production of wine bottle caps, and Australia uses all these New Zealand-made bottle caps as an input in its wine exports to China. The overall exposure of New Zealand bottle caps to China is not just the half it exports directly to China, but also those being used in Australia’s wine industry and exported indirectly. Likewise, when examining import concentrations, cars imported from Japan with a large share of components made in China increase indirect import exposure beyond the level indicated by direct imports from China.

Interest in indirect trade exposures accelerated after the global pandemic and related trade disruptions. Baldwin et al. (2022, 2023) constructed a set of “look-through” indicators

combining direct and indirect industry exposures, using Inter-Country Input-Output data (OECD, 2021c). Baldwin et al. (2023) examined trade exposures only for manufacturing goods used as intermediate inputs. Even so, this allows a comparison between direct (face-value) exposures and combined direct and indirect (look-through) exposures for US supply chains.

The Commission and Motu researchers have replicated this methodology for the 2018 year for 17 manufacturing sectors in Aotearoa New Zealand, extending it to look at exports and the agricultural sectors (see Table 1). We found that, on average, approximately 20% of intermediate inputs that New Zealand firms use in production come from overseas. Food-sector exposure is relatively low (10%), as most manufactured goods used as intermediate inputs in food production are sourced domestically. Agricultural sectors are more exposed, with direct and indirect exposure to imports of 49%, indicating high dependence on imported fertiliser and machinery. Table 1 shows that China is the top source of imports for 18 of the 19 industries, though specialised transport equipment relies more on US inputs (5.9%).

Table 1: Combined direct and indirect exposures to intermediate goods (%)

	Intermediate inputs (imports)				Intermediate outputs (exports)			
	Foreign	China	USA	Australia	Foreign	China	USA	Australia
Food	10.2	2.6	0.8	1.0	23.8	9.4	2.2	1.9
Clothes	19.5	9.1	1.0	0.9	16.0	5.0	2.1	0.9
Wood	11.6	3.2	0.9	0.8	39.0	7.2	7.0	6.0
Paper	13.2	3.7	1.1	1.1	27.0	8.7	3.9	1.8
Petrol	7.8	1.7	0.4	0.4	13.9	2.8	2.6	1.0
Chemicals	18.7	5.0	1.8	1.4	24.3	9.1	2.6	2.1
Pharma	19.9	5.3	1.9	1.8	15.6	5.0	1.6	1.6
Plastics	19.9	5.8	1.8	1.6	23.4	5.3	5.5	2.2
Non-metals	11.3	3.3	0.7	1.1	12.5	2.5	1.9	1.3
Basic metals	12.3	4.1	0.8	0.9	32.6	3.9	5.8	3.7
Fabricated metals	17.1	5.2	1.0	2.2	16.8	2.8	3.9	2.2
Electronics	21.6	8.7	1.5	1.4	10.7	1.4	2.0	1.9
Electrical equipment	20.0	7.9	1.2	1.4	17.8	2.5	4.3	2.8
Machinery	19.0	5.7	1.3	1.9	16.2	2.2	2.7	3.3
Vehicles	25.5	6.6	2.6	1.0	26.5	5.7	5.0	2.4
Transport	23.5	4.3	5.9	0.7	26.3	5.4	5.2	2.4
Manufacturing, other	15.5	5.2	1.0	1.1	26.4	5.3	5.4	2.2
Agriculture	49.3	12.4	4.2	4.0	29.6	11.7	2.0	2.1
Fishing	41.4	7.7	2.5	3.3	24.9	7.7	2.0	6.2
Average	19.9	5.7	1.7	1.5	22.3	5.5	3.6	2.5

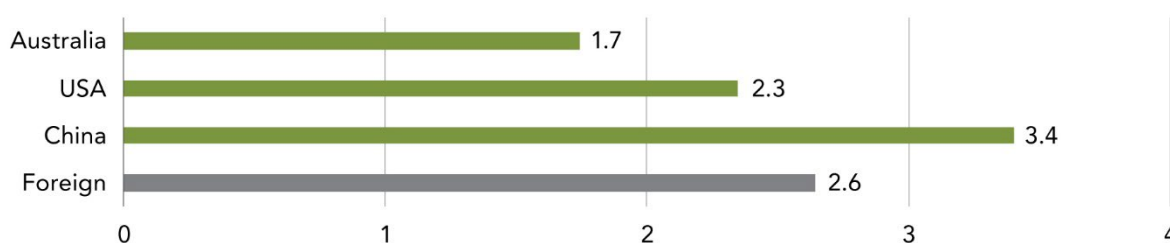
Source: NZPC and Motu calculations using Inter-Country Input-Output data for the 2018 year (OECD, 2021c).

Note: Import estimates include intermediate manufacturing goods, replicating the calculation by Baldwin et al. (2023) for Aotearoa New Zealand. Export estimates include exports of New Zealand manufacturing and agricultural industries to all industries, following the FPEX indicator from Baldwin et al. (2022). Data are from OECD (2021c).

The picture is less uniform for intermediate goods exports (the share of New Zealand’s production sold as intermediate inputs to exporters). These are goods produced in New Zealand for overseas processing, such as unfinished raw logs for manufacturing into furniture, or milk powder used for ingredients. While most products produced in New Zealand for use as intermediate inputs (77.7% on average) are sold domestically, China is the top overseas buyer in 12 out of the 19 industries.

We next estimated the ratios of look-through to face-value import exposure by source country, for manufacturing goods used as intermediate inputs (see Figure 15). We found that look-through exposure to major trading partners is about two or three times higher than face-value exposure (in absolute terms – however, any exposure is still relatively low, because about 80% of intermediate inputs used in Aotearoa New Zealand are supplied from New Zealand).

Figure 15: Average ratio of look-through (direct and indirect) to face-value (direct) import exposures for manufacturing goods used as intermediate inputs in 19 sectors



The difference is greater in specific industries such as agriculture (direct 15.3%, combined 49.3%, ratio of 3.2) and in trade with China (direct 1.7%, combined 5.7%, ratio of 3.4). Many of the countries that New Zealand imports manufactured goods from source a large share of intermediate inputs from China.

High indirect exposure to key trading partners implies that reducing supply chain exposure to a specific trading partner might be harder than it appears from looking at direct exposure alone (see also [section 3.1](#)). Diversifying to new import or export markets may not reduce New Zealand’s trade exposures to a specific trading partner if, in turn, these new markets also indirectly depend on supplies or demand from the same country.

Interpreting these results requires caution, as input-output analysis of trade exposure is novel. For example, the literature is not yet clear about what a resilient level of foreign exposure might be, since greater exposure also implies stronger connection to global value chains. The mechanism driving trade exposure and disruption is essentially the same as the mechanism driving specialisation and growth. As part of this, our trading partners might be adding value to our products in a manner that New Zealand cannot replicate (at least with any comparative advantage). The fact that they resupply one of our concentrated markets does not necessarily mean that their trade is equally concentrated – they may have many other markets for their products that New Zealand indirectly benefits from.

Throughout this inquiry, findings based on harmonised international datasets were not always identical to results based on national datasets. The OECD Inter-Country Input-Output tables are extensively harmonised to cover 76 countries and 45 industries, but understanding potential distortions requires further research. In addition, as discussed below, complementary data and expert judgement should inform conclusions. Nevertheless, novel analysis of indirect trade exposures is an important contribution to a better understanding of New Zealand’s overall exposure to supply chain disruption.

Finding 6.

Aotearoa New Zealand's trade may be even more concentrated than direct trade statistics suggest, due to indirect exposures through the country's trading partners.

Product level concentration

Customs data on trade in goods allow for more detailed analysis of concentrations and vulnerabilities at a specific product level. At this level, we can potentially say much more about the importance of a product in the production process and its substitutability. Identifying exposed products requires filtering data to exclude products which are not concentrated for Aotearoa New Zealand's trade, or from a global perspective. Data on trade in services is not collected at this level of detail and so is not included in this analysis (see Box 5.)

The Commission set filtering parameters, following the approach of the Australian Productivity Commission (2021) and similar exercises in other advanced economies. A product is flagged as vulnerable to disruption when New Zealand imports more than 80% of a product from a single country of origin, or exports more than 80% of a product to a single destination country (filter 1), the global market is dominated by a single exporting or importing country with 50% or higher global share of a product (filter 2), and New Zealand trades with this dominant country (filter 3). Finally, the filter distinguished between persistently vulnerable products flagged by the above filter for each of the three years, and intermittently vulnerable products flagged only in a single year (filter 4). Vulnerable products are those that meet all requirements and are not filtered out from the dataset.

The filtered data help to identify vulnerabilities, where global market concentrations make adaptation to supply chain disruptions more difficult, due to a limited availability of alternative import and export markets. At the same time, the specification of filters includes arbitrary elements. Applying the filters with different thresholds, in different sequence, and for different years can affect the results. Moreover, this type of analysis lacks insights about criticality and substitutability of specific products for overall production. To overcome these limitations, trade data analysis needs to be supplemented (in an iterative process) with insights from industry experts (see next subsection). However, firms could use the set of trade data and the filters developed by the Commission to examine their own supply chain risks. Similarly, government agencies could use them to investigate concerns about potential or claimed criticality for thousands of specific goods.

Despite the large number of products traded, we identified only a very small number as vulnerable after applying the filters specified above. In 2019, around a third of imports and a quarter of exports relied on a single country that either supplied 80% or more of the imported goods, or was the destination for 80% or more of the exported goods. We found a far smaller number of products were vulnerable because alternative suppliers or buyers were limited – only 429 imported products worth \$3 billion (3.8% of 11,041 total imported products, worth 4.9% of total value of imports in 2019), and 234 exported products worth \$0.7 billion (2.7% of 8,525 total exported products, worth 1.2% of total value of exports in 2019). Similarly, we identified only 407 imported goods in 2017 and 426 in 2018 as vulnerable. New Zealand experiences some of the same vulnerabilities that have prompted industrial and strategic trade policy in the US and other advanced economies. These include import of phones and electronic equipment from China (such as “automatic data-processing machines”), which make up a significant proportion of vulnerable imported products.

Box 5. Trade in services lacks granular data but is also vulnerable to disruption

Services typically do not attract country-specific tariffs and, consequently, trade data are not collected at the same level of detail as data for goods (Legge & Temple, forthcoming). Services are also more difficult to track and quantify, because they are not administered with the same regulatory processes as goods.

Moreover, services are increasingly inseparable from traded goods as, for example, up to 50% of the export price of a raw log consists of services (NZPC, 2014a, p. 69). This is reflected in trade statistics, where services comprise 30% of total exports, but account for 57% of the value added (OECD, 2022b).

Service supply chains share risk factors with supply chains for goods. Tourism and transportation account for about two-thirds of New Zealand's service exports. They are as dependent on physical infrastructure as goods exports, but more vulnerable to any restrictions on the movement of people. Commercial services, such as finance or software, make up a small but growing area of exports. They are vulnerable to disruptions to internet infrastructure, but they also face challenges relating to intellectual property. While New Zealand's goods trade is increasingly focused on Asia, services are traded predominantly with traditional partners such as Australia and the EU.

Over the three years between 2017 and 2019, 119 imported products (\$1.4 billion in value) and only 23 exported products (\$0.1 billion in value) were found to be persistently vulnerable (see Table 2). Imports from China comprised 71.4% of vulnerable imported products by value (\$1.0 billion) and the majority by number (73 of 119). The US and Canada were the next biggest origins, with 11 and 18 products, respectively. For export destinations, New Zealand is most dependent on Australia, closely followed by Japan, China, and the US.

Table 2: Top five imported and exported products persistently vulnerable in 2017-2019

Imports	Origin, 2019 total imports (\$m)	Exports	Destination, 2019 total exports (\$m)
Data-processing machines	China, \$741	Wood for fuel	Japan, \$37
Agricultural feed (oilcake and residues)	Argentina, \$172	Unprocessed wool	China, \$19
Monitors for data-processing machines	China, \$68	Printed plastic packaging	Australia, \$12
Paper and paperboard	Australia, \$61	Precious metal waste	US, \$12
Electrical machinery	China, \$33	Fire alarm systems	Australia, \$11

Source: Trade data analysis 2.0 (Legge & Temple, forthcoming)

The top five persistently vulnerable exports in Table 2 are relatively small in value. However, global trade is dynamic; products that are in high demand in one year may be a lot less popular in the next, or they can be popular in some markets first and others only later. The shifts in global demand and supply can alter the vulnerability of specific products every quarter when new trade data are released. Table 3 lists the top three vulnerable imports and exports in three successive years, showing how their composition changed. Overall, 811 imported and 593 exported items were vulnerable in at least one year between 2017 and 2019.

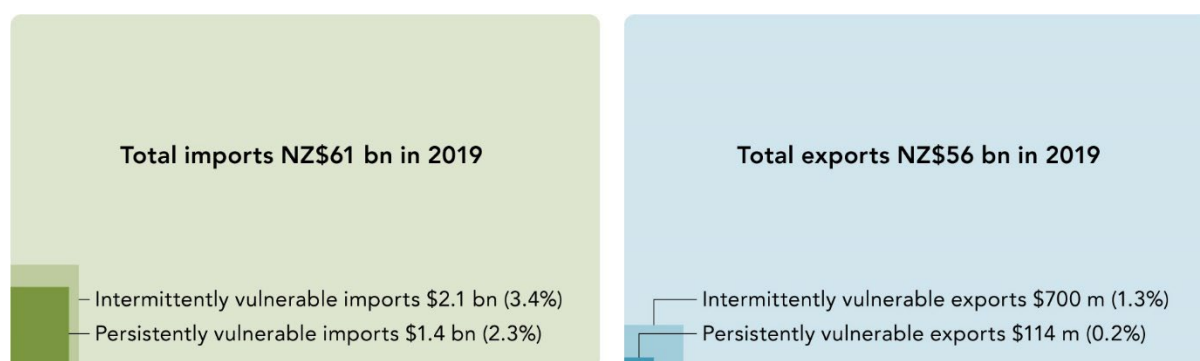
Table 3: Top three imported and exported intermittently vulnerable products

Imports		Value (\$m)	Exports		Value (\$m)
2017	Data-processing machines	\$660	Methyl alcohol		\$665
	Aeroplanes and other aircraft	\$520	Unwrought silver		\$112
	Fertilisers (phosphate)	\$131	Lambskins		\$52
2018	Data-processing machines	\$716	Live lobsters		\$293
	Fertilisers (phosphate)	\$187	Wood rough (coniferous)		\$44
	Oil-cake and soya-bean residues	\$137	Wood for fuel (non-coniferous)		\$31
2019	Data-processing machines	\$741	Frozen meat cuts (excl. lamb)		\$259
	Aeroplanes and other aircraft	\$608	Wood rough (coniferous)		\$50
	Aluminium oxide	\$383	Wood for fuel (non-coniferous)		\$37

Note: We refined trade data filters in response to stakeholder feedback, and the ranking of items for 2019 is not the same as reported in the issues paper (NZPC, 2023b, p. 19). Changes are documented in the *Trade data analysis 2.0* (Legge & Temple, forthcoming).

Overall, New Zealand’s exposure to concentrated imports and exports appears relatively small (see Figure 16). No more than 3.4% of total import value and 1.3% of exports were identified as vulnerable through the data-filtering procedure. At the same time, as indicated by Table 2 and Table 3, some of the vulnerable goods are important for the economy and their persistently disrupted supply could have major impacts on the economy, well beyond their modest share of total trade value. While it is not possible to estimate these impacts, [section 2.2](#) attempts to estimate the wider economic impacts of some generic trade shocks that would affect a range of products produced by different sectors.

Figure 16: Vulnerable trade as a proportion of total trade value



Finding 7.

Vulnerable products are those where Aotearoa New Zealand has limited alternative import or export markets. Trade data analysis indicates that only a few products were persistently vulnerable over several years, but many products were intermittently vulnerable in individual years. Routine trade data analysis would provide early warnings on emerging vulnerabilities and disruptions, if combined with insights of industry experts on criticality and substitutability.

Finding 8.

China is a major source and destination of Aotearoa New Zealand's vulnerable products. Nearly three-quarters of New Zealand's vulnerable imported goods came from China, while two-thirds of New Zealand's vulnerable exports go to Australia and Japan. For most New Zealand industries, China is the most important source and destination of intermediate manufactured goods.

Complementing trade data with expert judgment to assess vulnerabilities

As other studies have found, data alone are insufficient for studying the underlying causes of trade shifts (Australian Productivity Commission, 2021). Some year-on-year declines reflect changes in consumer preferences and in producer technologies when a good traded last year is no longer needed. Other fluctuations may reflect temporary supply chain disruptions that cause delays but do not require any lasting adaptations by consumers or producers.

For example, in an analysis of trade data for our issues paper, we found that frozen sheep meat cuts were Aotearoa New Zealand's second most highly concentrated exported good in 2019 (NZPC, 2023b). The Meat Industry Association of New Zealand subsequently advised us that this concentration was temporary and due to a major outbreak of African Swine Fever in China in 2018 that raised demand for imported meat to China to exceptionally high levels in 2019. The Association told us that the industry had both good access to export markets and the flexibility to navigate disruptions in particular markets (Meat Industry Association of New Zealand, sub. 15, p. 4).

A “data with experts” approach helps ascertain how essential a vulnerable product or market is to the production process (Australian Productivity Commission, 2021). Often, a domestically produced or alternative product can substitute for a disrupted import, but only industry experts have the knowledge of technologies to make that assessment. On the other hand, substitutes for some imports may not exist, and their disruption can close a large industry (Acemoglu et al., 2012; Carvalho & Tahbaz-Salehi, 2019; Elliott et al., 2022). Similarly, there may be alternative markets for disrupted products, but, if no firm in New Zealand exported to those markets in the last few years, they cannot be identified by an analysis of trade data alone.

Chapter 5 recommends that the government work with industry networks to develop a “data with experts” approach to identify supply chain vulnerabilities.

Finding 9.

Reliable conclusions about supply chain vulnerabilities require expert industry judgement, combined with the analysis of trade data. Conclusions need to consider developments in domestic and international markets, the availability of alternative markets, and the availability of substitutes for technology.

Exposure of regional communities to trade

We extended our analysis of trade data to identify the industries using vulnerable products, and the regions in which these industries operate. Specifically, textile manufacturing and machinery manufacturing were most exposed to both vulnerable imports and exports, followed by food manufacturing³ and polymer and rubber product manufacturing. The transport equipment, chemical products and primary metal manufacturing industries were particularly exposed to vulnerable imports, while the furniture, forestry and logging, and agriculture industries were particularly exposed to vulnerable exports.

We mapped observations on exposed industries to communities where a high proportion of employment stems from these industries exposed to vulnerable imports and exports. We found that the industries most exposed to vulnerable imported and exported goods are also the industries that are most reliant on imports and exports, generally (as identified in Stats NZ's Input-Output tables) (Legge & Temple, forthcoming). As a result, in the following analysis we consider industries (and communities) that are exposed to imports and exports generally.

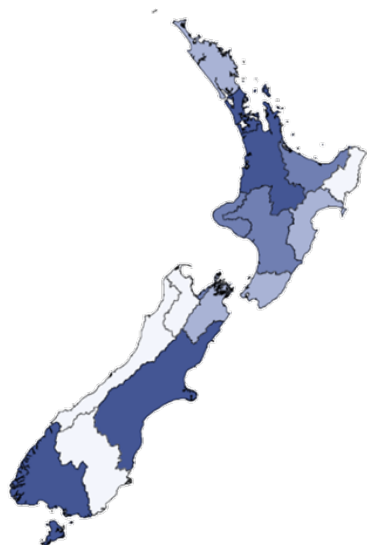
Specifically, we define import-exposed industries as those with more than 30% of their total input cost coming from imports, and we define export-exposed industries as those industries with more than 70% of the total production value being exported. Based on these definitions, our analysis shows that employment in industries exposed to disruption of imports is more concentrated in the more urban regions with larger populations and more diversified economies: Auckland, Waikato, and Canterbury (see Figure 17a). Employment in industries exposed to disruption of exports is more concentrated in the more rural regions with smaller populations and more economic activity based on natural resources: Gisborne, Tasman, the West Coast and Southland (see Figure 17b).

Many regions exposed to vulnerable exports had high deprivation index scores in 2018. People who live in such regions may have limited capacity to cope with and adapt to environmental hazards. This was highlighted by Cyclone Gabrielle, which severely disrupted and inflicted damage on these regions and communities. In response, government agencies are adding deprivation indicators into existing tools such as the Living Standards Framework Dashboard (The Treasury, 2023) and the Ministry of Business, Innovation and Employment's interactive Regional Economic Activity Web Tool (MBIE, n.d.). Trade vulnerabilities could also inform government policies focused on exposed regional communities.

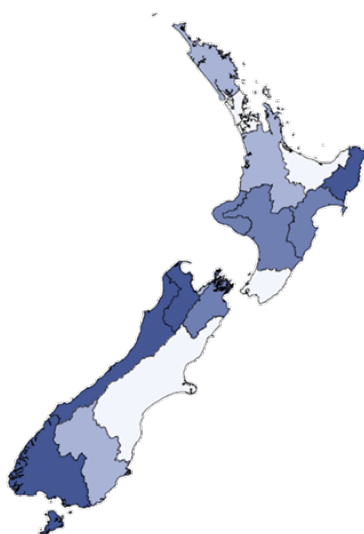
³ Food manufacturing faces risks because it depends on vulnerable products – either its sales or its inputs or both. This vulnerability exists despite food manufacturing sourcing most of its manufactured inputs domestically (see Table 1).

Figure 17: Regional exposure to trade disruptions

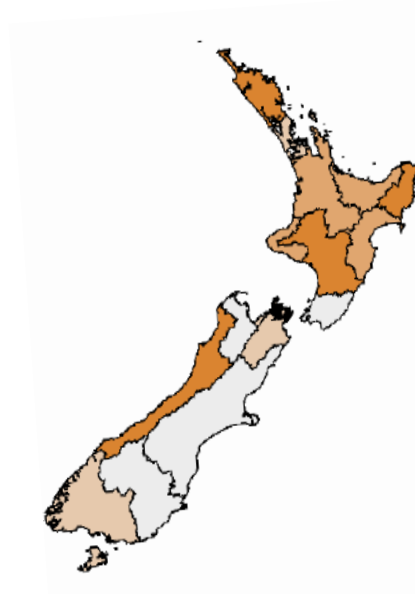
a. Import exposures



b. Export exposures



c. Socioeconomic deprivation



Source: Legge & Temple (forthcoming) and NZ Deprivation Index (17c) (University of Otago, 2021)

Note: Darker colours indicate greater exposure to disruption of imports (17a), of exports (17b), and higher socioeconomic deprivation (17c). The defence sector has been excluded because of the unique nature of its supply chains. The NZ Index of Deprivation is an area-based measure of socioeconomic deprivation produced by the University of Otago. It measures the level of deprivation for people in each small area based on nine census variables. The dataset is based on 2018 Stats NZ Census data, and the map in 17c provides a deprivation score at Statistical Area 1 level.

Finding 10.

Less-populated regions with economic activity based on natural resources have relatively more employment exposed to export disruption, while regions with larger populations, urban centres, and diversified economies have relatively more employment exposed to import disruption. Southland has the highest employment exposure to both vulnerable import and export industries.

Finding 11.

Regions with higher scores on the socioeconomic deprivation index appear to be more exposed to import and export disruptions.

2.2 Supply chain shock scenarios

This section uses economic modelling to explore the potential impacts of supply chain shocks on the labour market and the economy. Such modelling can help guide decisions about investments in resilience or support for affected sectors. Modelling can provide a sense of the scale of potential impacts and where they fall. It also provides estimates of outcomes under different policy interventions intended to ameliorate the effects of shocks on individuals and communities.

Computable general equilibrium (CGE) modelling (see Box 6) can inform decision making on economic resilience by looking at the effects of price changes in traded goods and services for the countries affected by the shock, as well as the impacts on output, employment, and trade balances across different sectors. CGE modelling captures many interdependencies between sectors and feedback effects between supply and demand. This makes CGE models suitable for estimating the balance between the costs and benefits of different interventions, including costs avoided in comparison to a baseline scenario without interventions.

We commissioned Motu Economic Research to develop a CGE model to understand the potential impacts of different types of representative supply chain disruptions on economic outcomes. While numerical outputs of these models are reported precisely, they are subject to uncertainty and indicate the order of magnitude of potential effects, rather than providing exact predictions.

Box 6. CGE and distributional modelling

CGE models are a standard policy tool for trade analysis. They are used by international organisations (OECD, 2020) and domestic agencies such as the Ministry for Primary Industries (MPI) (TERM model), the Ministry of Foreign Affairs and Trade (MFAT) (METRO), and the Ministry for the Environment / Climate Change Commission (C-PLAN). The models can show how changes in one sector will impact other sectors, using real-world data to simulate how an economy might react to changes in policy or technology, or to other factors.

Trade-based CGE models are built on commodity-level trade flows. They use changes in the prices of goods and services to show how events (or “shocks”) propagate through the economy. The models simulate how firms in different sectors substitute between different inputs and markets, as well as the resulting changes in output, industrial structure, and employment.

Our CGE model derives from the Global Trade Analysis Project (GTAP), which a global network of researchers has developed and maintained since 1992 (Aguiar et al., 2022). The model is static, with a 2025 baseline. GTAP data from 2014 is projected to 2025 by simulating the key changes that have occurred or are likely to occur in the New Zealand economy: GDP and capital growth, changes in trade patterns and relations, and key policy changes. The impacts of our modelled supply chain disruptions are all compared to this 2025 baseline. While the model concentrates all impacts into a single period, in practice, the impacts of shocks are likely to spread over several years.

Choosing shock scenarios

We looked for representative scenarios to model the effect of supply chain shocks with attention to supply and demand shocks, and to a more general trade shock. We looked at examples of past and recent shocks and took account of supply chain concerns raised by submitters to our inquiry. We also consulted with public and government agency stakeholders on what scenarios would be useful to inform policy.

The COVID-19 pandemic caused shipping disruptions that translated into price shocks along import and export supply chains, pushing up delivery timeframes and shipping costs (Benigno et al., 2022). These impacts were strongest in island countries, which are both reliant on imported goods and distant from the trade partners that provide them (Carrière-Swallow et al., 2023).⁴ While the impact of the pandemic on shipping was large and long lasting, subsequent geopolitical events have exacerbated this impact and continue to create risks from overseas for New Zealand.

Other examples of shocks include the blockage of the Suez Canal in 2021 or the Tōhoku earthquake and tsunami in 2011, which temporarily disrupted supply chains but did not require public interventions in New Zealand (Skilling, 2022). Insurance company data provide many examples of seemingly small, localised, temporary, one-off disruptions in faraway places that impact major industries' performance in the largest economies (Benigno et al., 2022; Fujimoto, 2011). For example, a fire in 2012 at a resin plant in Germany resulted in a six-month disruption of the automotive industry on all continents (Dong et al., 2018; Simchi-Levi et al., 2014).

Shipping and transport disruptions were top of mind for inquiry participants, while disruptions arising from geopolitics and climate change were also prominent concerns (see Table 4). The recent hostile targeting of shipping in the Black Sea and Red Sea is also adding to supply chain concerns.

Table 4: Top five supply chain concerns identified by submitters (n = 59)

Issue	% of respondents
Shipping and transport infrastructure bottlenecks	72.9%
Geopolitics events resulting in loss of access to some markets	47.5%
Total loss of access to crucial inputs or markets	45.8%
Climate-change-induced weather events, such as floods, bushfires, and major storms	44.1%
Access to labour (including labour shortages and training)	42.4%

Source: Submissions to the Resilience Inquiry.

⁴ Public policy responses in Aotearoa New Zealand included subsidising the operation of major firms, including transport operators; guaranteeing future revenue to maintain certain services; and subsidising the wages for employees of firms that were not able to operate.

We chose three representative disruption shocks to evaluate with CGE modelling.

1. **Oil shock** – a broad-based cost increase affecting the supply of energy to New Zealand. This could be caused by an oil price increase, collapse of major infrastructure, or a disruption that affects a key global supply route.
2. **Technology shock** – a large technological change affecting demand for New Zealand exports, such as the rapid uptake of new technology to produce synthetic milk under licence at half the cost of producing dairy-based milk.
3. **Trade shock** – a broad geopolitical trade disruption specified as Asian countries (not including Japan and South Korea) imposing trade restrictions affecting both supply and demand that are equivalent to a direct 25% tariff on imports of goods and services from New Zealand, Australia, Japan, South Korea and North America.

The shocks are not realistic predictions of future events, but they enable us to compare how a disruption could play out under alternative scenarios, and they help identify the different objectives or outcomes that policymakers may want to pursue in response. We chose them to demonstrate how a simple static CGE model can readily show how different shocks and potential responses might flow through the economy to economic and labour market outcomes.

The three shocks cannot cover every possible disruption. For example, the trade shock uses a tariff affecting the price level of targeted goods to proxy a range of alternative coercive or retaliatory measures that could be taken by other parties. These could include, for example, export restrictions, preferred supplier rules, subsidies for competing firms, regulatory compliance measures and various technical barriers.

We constructed each shock by altering the prices of some core set of inputs – to simulate a disruption changing underlying supply or demand. Table 5 shows the variations in three sets of parameters we used to model the effects of shocks under alternative assumptions. For the specification of trade and technology shocks, we compared full reemployment for affected workers (a common assumption in CGE models) with different levels of reemployment (mobility frictions). Similarly, we estimated scenarios with and without government interventions, to gauge the impacts of subsidies on outcomes for firms and workers. Finally, in the technology shock, we have compared a scenario where land-use change is restricted to a scenario where policy change speeds up the process of land reallocation for purposes other than dairy. We modelled all scenarios and variations as one-off shocks to the projected baseline occurring in 2025. Data from 2014 and 2018 were used to develop the projections for 2025.

Table 5: Specification of modelling scenarios

Specification	Oil shock	Tech shock	Trade shock
Type	Supply	Demand	Trade
Shock event	Oil price increase to US\$250 per barrel	Synthetic dairy produced at 50% costs	Asia imposes barriers (25% tariff equivalent)
Employment friction	Full reemployment -	Full reemployment 50% reemployment	Full reemployment 50% reemployment
Government response scenarios	- - -	No response Labour subsidy -	No response Labour subsidy Output subsidy
Land-use scenarios	- -	Land held in dairy Alternative uses of land	- -

Motu estimated over 25 different scenarios based on Table 5 specifications. The full results are available in unpublished datafiles, as supplementary information to this report (White & Winchester, 2023). The following sections summarise and draw out key insights of the modelling results. The immediately following sections assume full reemployment following each shock, while later sections also examine implications and policy options when only 50% of those who lose jobs get reemployed.

Scenarios result in large macroeconomic and employment losses

The broad-based supply disruption, represented by the oil shock, has the largest modelled impact on Aotearoa New Zealand's production and consumer income (see Table 6). It reduces GDP by 7.5%, whereas the impact of each of the trade and tech shocks is approximately 1.5%. The trade and technology shocks each produce similar losses of consumer welfare (3.1%), but the oil shock triples that loss to 9.3%.⁵

These results assume that all jobs lost will be replaced by new jobs (that is, the full reemployment specification in Table 5). Each shock changes the usual pathways that people typically follow to find a job. While some losses will happen through attrition, the shocks entail a level of disruption, affecting multiple industries and affecting thousands of jobs. While the oil shock has the larger impact on output and consumer welfare, the technology shock affects the most jobs. Assuming it is irreversible (unlike the trade or oil shocks) the technology shock is likely to entail an enduring change in the global demand for New Zealand exports. The model therefore generates a larger change in the output structure of the economy.

⁵ Consumer welfare is estimated using the Hicksian equivalent variation in income – the change in consumer income that would have the same effect on consumer welfare as the shock (taking account of changes in prices caused by the shock).

Table 6: Impacts of disruption scenarios with full reemployment assumption

Impact on:	Oil shock	Tech shock	Trade shock
GDP	-7.5%	-1.4%	-1.7%
Consumer welfare	-9.3%	-3.1%	-3.1%
Jobs affected ⁶	33,078	111,700	24,345

Note: GDP and consumer income estimates are from White and Winchester (2023). The estimates of affected jobs are from (Riggs, 2024), and they express a difference between the baseline projections of jobs in 2025 without any shock, and a prediction after each shock. These estimates include both actual job losses and jobs that would have been created without the shock.

The economy takes time to adapt to the persistent supply chain disruptions modelled in the three scenarios. Each is a permanent shock, in the sense that the model shows their impacts once the economy (businesses, sectors and industries) has adjusted its use of resources to the new set of prices it faces.

In reality, the trade and oil shocks could reverse quickly, but it could still take time to return to the original growth path (see the stylised model in [section 1.4](#)). In contrast, the technology shock is unlikely to be reversible (short of banning or regulating the new source of protein competing with dairy-based milk). In response the economy could, and likely would, adapt by finding new products or markets for exports. This would reduce the impacts of the shock. However, if the economy did not change and output continued, the impact of the technology shock would be repeated in future years.

Our estimates are conservative, since they are based on labour being mobile. In practice, people would incur costs of retraining and moving regions. Many firms would need to match skills and reconfigure their operations. Growing firms would need to invest, to scale up. Left out of the modelling are also the complications of uncertainties about the nature and timing of disruptions, the impacts of these uncertainties, and the success of any attempts to reduce the social harms that might result from these impacts.

The costs are not small. Even a little preparation – such as having institutions ready to assist the transition through supporting labour mobility – would reduce potential costs. Faced with GDP reductions of up to 7.5%, both private and public sectors seem likely to support some proactive investment to ameliorate impacts, as well as some initiatives to identify and support those most exposed.

Finding 12.

Supply chain disruptions are likely to cause significant losses in macroeconomic performance and employment. Computable general equilibrium modelling of three representative shocks to Aotearoa New Zealand's economy estimates reductions between 1.4% and 7.5% in GDP. Distributional modelling estimates between 24,000 and 112,000 jobs affected.

⁶ Note that a job is defined as a unique employment relationship between an individual and a single enterprise. This means the same individual could be represented multiple times if they have more than one source of employment with different enterprises. However, as each worker-job captures multiple spells of employment over a year, an individual relationship with an enterprise is only captured once over that period. This worker-job measure also captures a range of working hours, so a part-time job is given equal weight to a full-time job.

Distributional impacts on industries, communities, and demographic groups

This subsection links the macroeconomic impacts of the specified shocks on specific industries (estimated in the CGE model) to employment outcomes in regional communities and different demographic groups. To do this, we applied the employment indices generated by the CGE model to actual employment data held in Stats NZ's Longitudinal Business Database and Integrated Data Infrastructure (IDI) (see Box 7). We first estimated industry-level employment effects, and then simulated the impacts by characteristics of impacted workers and jobs (such as age, education, ethnicity, and region).

Box 7. The analysis of distributional impacts⁷

Our distributional analysis (Riggs, 2024) is similar to the Distributional Impacts Microsimulation for Employment (DIM-E), which was developed by the New Zealand Climate Change Commission to analyse policies to reduce greenhouse gas emissions (Riggs & Mitchell, 2021). Our distributional analysis is used to examine how shocks result in the reallocation of employment across industries and the employment outcomes for different types of workers.

The analysis uses data from Stats NZ's Longitudinal Business Database and Integrated Data Infrastructure (IDI), which link government administrative data with census and survey data. Employment in the shock year (2025) is estimated by multiplying employment indices (generated from the CGE model) by the number of worker-jobs in each ANZSIC06 industry in the base year (2014). The model next estimates the changes in worker-job equivalents between 2014 and 2025 for each of the baseline and shock scenarios. This allows comparisons of reallocation or "job-churn" occurring under different scenarios. Finally, the analysis simulates the characteristics of the worker and the job for each worker-job profile (such as age, qualification, ethnicity, and region) using 2018 worker-jobs data in the IDI.

⁷ The results of the distributional simulations are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI, see the Stats NZ webpage Integrated data. The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes and is not related to the data's ability to support Inland Revenue's core operational requirements.

Interpreting the results from the analysis of distributional impacts

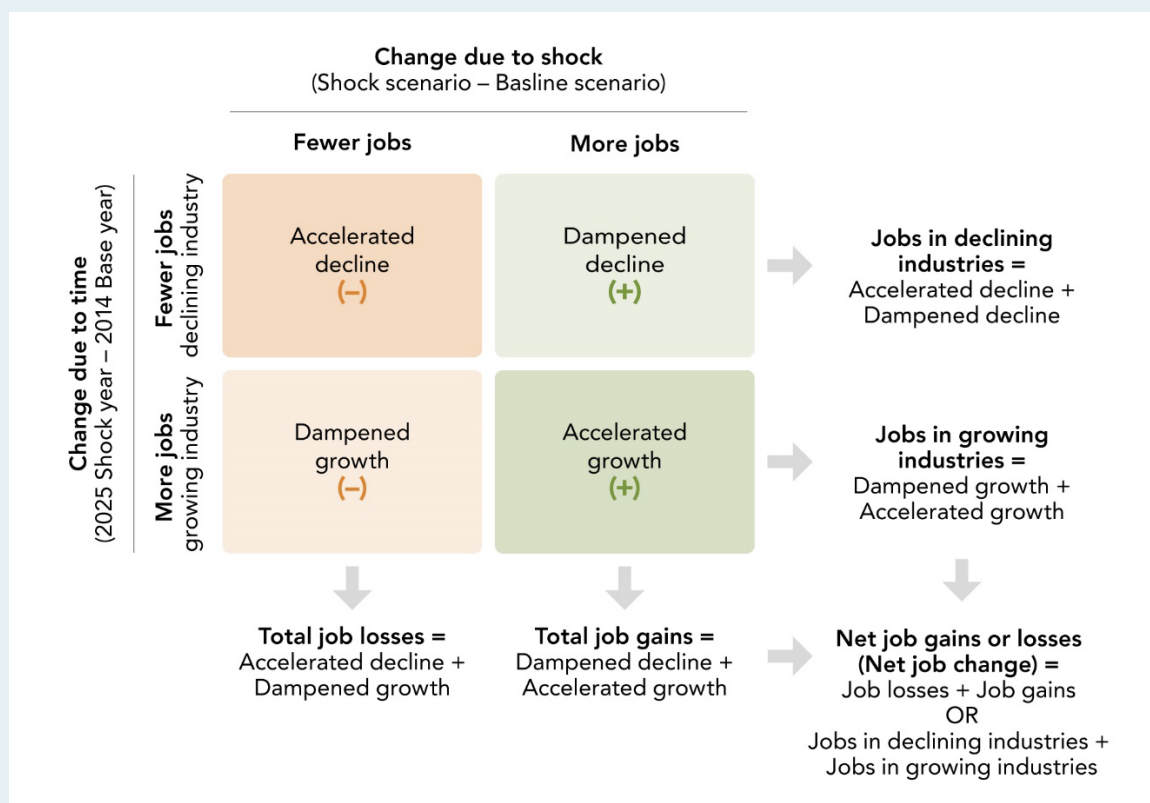
Our model of distributional impacts is based on a detailed analysis of the impact of shocks on employment in declining and growing industries. The results need careful interpretation (Box 8).

Box 8. Interpreting the results from the analysis of distributional impacts

The modelling provides output that shows the impact of shocks on employment in declining and growing industries. The impact of shocks is assessed against a baseline scenario of employment decline and growth in industries over the period to 2025. The baseline projection expects employment in growing industries to increase, and in declining industries to decrease. A shock can either accelerate or dampen the speed of change in both declining and growing industries (Figure 18).

Readers need to take care in understanding the definition of “job losses” and “job gains” and other output measures used in the analysis. Figure 18 shows how the model measures the impact of shocks on employment.

Figure 18 Types of impact on employment



The four quadrants represent four outcomes arising from the interaction between the evolution of industry employment over time and after the shock. The baseline projection expects employment in growing industries to increase and in declining industries to decrease. The shock can either accelerate or dampen the speed of change in both declining and growing industries.

The impacts on employment can be measured in six different ways.

- **Total job losses** – all jobs lost due to shock, including faster decline of declining industries and slower growth in growing industries.
- **Total job gains** – all jobs gained due to shock, including slower decline of declining industries and faster growth of growing industries.
- **Jobs in declining industries** – the impact of a shock on jobs in industries that were projected to decline in the baseline, where the shock accelerates jobs losses in some declining industries and dampens them in other declining industries.
- **Jobs in growing industries** – the impact of a shock on jobs in industries that were projected to grow in the baseline, where the shock accelerates jobs gains in some growing industries and dampens them in other growing industries.
- **Net job losses and gains (net job change)** – the overall impact of shocks on employment compared to the baseline scenario, which can be calculated either by summing Total job losses and Total job gains or Jobs in declining industries and Jobs in growing industries.
- **Total affected jobs** – represents the sum of absolute values of *all four* quadrants (Accelerated decline, Dampened decline, Dampened growth, Accelerated growth), irrespective of whether they represent net gains or losses, capturing the full extent of the job-churn.

Industry impacts

Box 7 lists the 3 most impacted industries out of the 212 specified in our distribution analysis (see Table 7). For each shock, under the full reemployment assumption, all displaced workers will eventually find new jobs. The results show the industries that jobs reallocate from (that is, which have net job losses) and the industries that jobs reallocate to (that is, which have net job gains). While Table 7 provides only a small sample of our distribution analysis, it highlights a general trend that, following a disruption, jobs tend to be destroyed in services and primary industries, and are most likely to be created in manufacturing.

Losses include not only existing jobs that would be destroyed by the shock, but also jobs that were not created due to the shock (but would have been created in its absence, according to the model projections) (as explained in Box 8). Conversely, the estimates of job gains include not only jobs created by the shock but also jobs not destroyed due to the shock. This recognises that the shock can slow job destruction in declining industries, representing a job gain relative to the baseline scenario.

Table 7: Top 3 industries jobs re-allocated from and to after the shock

Shock	Jobs reallocate from	Net jobs	%	Jobs reallocate to	Net jobs	%
Oil shock	Air and space transport	-2,982	24%	Other machinery and equipment manufacturing	1,421	11%
	Cafes, restaurants and takeaway food services	-1,494	1%	Other transport equipment manufacturing	1,217	11%
	School education	-874	1%	Meat and meat product manufacturing	739	2%
Tech shock	Dairy cattle farming	-15,041	63%	Meat and meat product manufacturing	21,766	62%
	Dairy product manufacturing	-7,725	76%	Sheep, beef cattle and grain farming	16,957	68%
	Agriculture and fishing support services	-2,878	13%	Seafood processing	3,325	62%
Trade shock	Cafes, restaurants and takeaway food services	-1,483	1%	Other machinery and equipment manufacturing	1,650	11%
	School education	-742	1%	Other transport equipment manufacturing	1,412	11%
	Hospitals	-523	1%	Meat and meat product manufacturing	971	3%

Source: (Riggs, 2024)

Note: The percentage change represents the change in jobs due to the shock relative to the number of jobs the industry is expected to have without the shock (i.e., the baseline for 2025). The net number of job gains and losses is in comparison to the same baseline. The three scenarios presented in Table 7 assume full reemployment. All results are from simulations.

Since employment changes are distributed across 212 industries, the net number of job changes seem relatively modest, even in the most-impacted sectors. However, total affected jobs – including those not created and not destroyed due to each shock – add up to between 20,000 and 112,000 (see Table 6). The job churn triggered by any of the three shocks could require thousands of people to change jobs or careers. Aside from the normal stresses of changing jobs, this would have significant flow-on financial and non-financial impacts for workers who need to relocate where they live, undermining their support networks of family, friends, and communities. Such disruption can also make finding a job harder, because new opportunities could be outside their normal networks. So even with job gains, as previously noted, people will bear transition costs that are not fully captured in the consumer welfare measure in Table 6.

The full results of our distributional analysis (Riggs, 2024) highlight variation among the most impacted industries under different specifications of shocks. Unsurprisingly, each shock impacts industries most exposed to the disrupted supply chain. If barriers were imposed on New Zealand exports, industries that export services such as tourism or education could be significantly impacted (for example, by travel restrictions). Similarly, technological change disrupting the dairy industry would generate job losses and shift employment to neighbouring primary industries. An oil shock would impact most transport and service export industries. However, some results are consistent across scenarios and their specifications. Most notably, manufacturing industries are most likely to create jobs under any type of shock scenario. This is observable even from Table 7, which is limited to a small snapshot of the overall results.

Regional impacts

The trade data analysis (see [section 2.1](#)) indicated a broad pattern of regional exposures, where rural areas were more exposed to export concentrations and urban regions to import ones. Distributional analysis, building on the CGE models, allows us to explore the regional impact of economy-wide shocks on employment outcomes. The number and share of affected jobs vary greatly over regions (Table 8).

Table 8: Regional job reallocation after a shock and extent of impact

Region	Oil shock	Ratio	Tech shock	Ratio	Trade shock	Ratio
Auckland	-1360	0.8	-5713	0.6	611	0.6
Waikato	528	1.3	-3049	1.4	-105	0.4
Wellington	-888	1.7	-1779	0.6	-649	1.9
Bay of Plenty	200	0.6	-1492	0.8	-191	0.9
West Coast	25	0.9	-396	2.4	-103	5.2
Taranaki	208	2.1	-351	0.6	85	1.3
Canterbury	316	0.5	-250	0.1	642	1.6
Northland	25	0.2	-145	0.2	-113	1.3
Marlborough	77	1.3	181	0.5	-21	0.5
Nelson	40	0.7	221	0.7	33	0.9
Tasman	94	1.7	930	3.0	-50	1.4
Otago	-110	0.4	1810	1.2	-269	1.5
Southland	234	2.3	1913	3.3	42	0.6
Gisborne	94	1.8	2041	7.1	-73	2.1
Manawatū-Whanganui	183	0.9	2665	2.3	26	0.2
Hawke's Bay	336	1.9	3346	3.4	129	1.1

Source: (Riggs, 2024).

Note: Pale green bars indicate a net job loss (or fewer jobs) in the region due to the shock, dark green bars a net job gain (or more jobs) in the region due to the shock. Ratio is the region's share of net jobs to the region's share of total jobs. Table does not include jobs in 'Area Outside Region' (Stats NZ, 2017). All results are from simulations.

Only Wellington faces fewer jobs due to the shock (net job losses) across all three scenarios, while Hawke's Bay, Manawatū-Whanganui, Southland, and Nelson are likely to experience net job gains due to all three shocks.

However, focusing only on the net effect of shocks oversimplifies the regional picture as main centres have more jobs to begin with, and so provide more choices to job seekers.

Table 8, therefore, also shows the ratio of the region's share of net job changes to its share of total jobs. If the ratio exceeds one, then the region has a disproportionately larger share of the net effect, relative to its share of the country's jobs, which could indicate some difficulties in adjusting. Conversely, if this ratio is less than one, then the region will have a disproportionately smaller share of the net effect of the shock. These ratios create a very different picture of regional impact.

Tasman, Gisborne and the Hawke's Bay are the most disproportionately affected regions across all the shocks, in terms of the net effects, particularly for the technology shock. The West Coast is the most adversely affected region for the trade shock, while Southland is the most advantageously affected region for the oil shock.

Under the technology shock (which generates the largest employment impact overall), the upper central North Island (including Auckland, the Waikato and the Bay of Plenty) bears the brunt of regional job loss, while most of the regions that gain jobs appear to be in the middle North Island (Gisborne, Manawatū-Whanganui, and the Hawke's Bay) or the deep south

(Otago and Southland). In proportion to their share of the country’s total jobs, however, Gisborne, the Hawke’s Bay, Tasman, Southland, and the West Coast have relatively more impacted jobs.

Overall, the technology shock requires a significant adjustment, not only within industries (see Table 7), but also across regions (see Table 8), age groups, qualifications, and ethnic groups (see Table 9). A shock like this would be highly disruptive.

Socioeconomic group impacts

Table 9 shows the distribution of shock-induced changes in employment across age, qualification, and ethnicity groups. With the assumption of full reemployment, overall employment is the same as in the baseline scenario. However, the distribution of job changes differs across groups as some face net job losses and others net job gains. For age groups, the distribution of these net gains and losses is remarkably consistent across the three shocks. Jobs for young people (age 15–29) are most likely to be reduced, while jobs for older cohorts (age 50–59) are likely to increase. The largest net losses are for the 15–19 age group, while the largest net gains are for the 50–54 age group.

Table 9: Top three impacted demographic groups from shocks with full reemployment

Shock	Oil shock		Tech shock		Trade shock		
	Job losses	Job gains	Job losses	Job gains	Job losses	Job gains	
Age cohorts	1	20–24	50–54	30–34	15–19	15–19	50–54
	2	25–29	45–49	25–29	55–59	20–24	45–49
	3	15–19	55–59	35–39	60–64	25–29	55–59
Qualification	1	Bachelors	None	Bachelors	None	Bachelors	Post-secondary
	2	Post-graduate	Secondary	Post-graduate	Secondary	Post-graduate	None
	3	-	Post-secondary	Post-secondary	-	-	Secondary
Ethnicity	1	Asian	Māori	Asian	Māori	Asian	Pasifika
	2	MELAA	Other	European	Pacific	Māori	Other
	3	-	European	MELAA	-	MELAA	-

Source: Quantitative estimates available from Riggs (2024).

Note: Age cohorts are defined by five-year groups, between 15 and 64, with a single group for 65+. Qualifications are categorised according to the highest achieved educational qualification: None, Secondary, Post-secondary, Bachelors, and Post-graduate. Ethnic groups are Asian, European, Māori, MELAA, Other, and Pacific. The estimates presented assume full reemployment.

There are other similarities across the shocks. Net job losses occur in industries that currently employ workers with bachelor’s degrees and post-graduate qualifications, while net job gains occur in roles where secondary and post-secondary qualifications (but not degree qualifications) are common. Losses occur in jobs that currently employ many Asian and Middle Eastern / Latin American / African (MELAA) workers, while gains occur in jobs that currently employ a high proportion of Pasifika workers.

Note that jobs affected are much greater than net job changes, since transitions involve a high degree of job churn and reallocation, both within and across regions. Net gain figures, for instance, hide job losses for individuals in these groups.

Our CGE modelling and distributional analysis provide a wealth of results to compare how different shocks impact as they propagate through supply chains. While common features

exist across the shocks at a high level, significant differences in the impact of shocks highlight the importance of this type of analysis in developing proactive policies to support resilience.

While supply chain disruptions result in overall losses in GDP (see Table 6), they also create opportunities for some industries, both in domestic and international markets. These opportunities can translate into new jobs that compensate for disruption-induced losses. Consequently, building resilience in industries and communities should not solely focus on anticipating and preparing for emerging disruptions. Resilience, importantly, also includes the ability to adapt quickly and seize new opportunities created by a disruption.

Finding 13.

The Commission modelled the distribution of the impacts of three representative disruption scenarios on different industries, regions, and socio-economic groups. Several high-level patterns stood out.

- The greatest impacts of each shock are felt in the industries most exposed to the disrupted supply chain.
- Most net employment gains are in manufacturing (aside from dairy processing), while net losses tend to concentrate in the services and primary sectors.
- Younger workers as a group experience net job losses and older workers experience net job gains.
- Highly educated workers as a group experience net job losses and workers with secondary and post-secondary (but not degree) qualifications experience net job gains.
- Experiences of ethnic groups are mixed with net losses in jobs employing many Asian, Middle Eastern, Latin American, and African workers, and net gains in jobs currently employing many Pasifika workers.
- Less-urbanised regions are disproportionately more affected than the more-urbanised regions, particularly Gisborne, Tasman, the Hawke's Bay, the West Coast and Southland.

Modelling different policy choices

As well as estimating the macroeconomic and distributional impacts of shocks, the scenarios we developed also provide a method to examine potential policy responses. Another way to interpret estimated losses from shocks is that they identify how much New Zealand would be willing to pay to avoid the impacts of supply chain disruptions on people. In principle, any investment that is lower than the estimated loss might be considered worthwhile.

Any large shock is likely to prompt a government to act to protect livelihoods or support business continuity. The balance of economic policy objectives in “normal” times between business (and productivity) growth, stability and reducing inequality is likely to change. Government responses to past temporary shocks or structural change include support for a reallocation of economic activity and jobs across sectors and regions, to mitigate social harm and longer-term structural unemployment (Easton, 2023).

Policy responses could, for example, try to protect “critical” sectors. They could target certain industrial arrangements to retain some form of capability. Alternatively, they may focus on maintaining a functioning labour market while industrial reallocation takes place. Choices among these objectives pose important trade-offs that can be hard to evaluate and justify without transparently quantifying impacts.

If a shock is temporary, keeping businesses operating will limit the loss of management capability and productivity. Keeping workers in an affected industry employed while the economy adjusts may also limit the risk and associated costs of long-term unemployment (labour market scarring). Alternatively, supporting workers with retraining opportunities might facilitate faster resource allocation and adaptation to a “new normal”.

A big enough or long-lasting shock might prompt widespread wage support. However, if fiscal firepower is limited (see Box 4), options may be needed to target assistance where it is needed most. The COVID-19 experience highlights that governments will differ in how they approach support, but that that this support can have macroeconomic implications (Moretti et al., 2021; OECD, 2022c).

CGE modelling can generate broad estimates of the fiscal implications of a support package to mitigate the effects of a supply chain shock on economic activity and the labour market. In our modelling, we chose to estimate alternatively the effects of output subsidies and wage subsidies in ameliorating the impacts of shocks. With output subsidies, the government provides support to suppliers to offset production costs or losses as a way of encouraging them to maintain output without raising costs for consumers. Alternatively, wage subsidies focus on maintaining employment – for example, with a labour subsidy provided to workers directly or through their employers.

Under an assumption of 50% reemployment, our modelling found that it would be more expensive, after a supply chain shock, to maintain employment with output subsidies than labour subsidies (see Table 10). Caution is required in interpreting this result, because if the shock was temporary, the relative cost of alternative interventions might change.

Table 10: Subsidy per job preserved under several shock specifications (NZ\$/year)

Sector	Trade shock		Tech shock	
	Output subsidy	Labour subsidy	Labour subsidy with land-use change	Labour subsidy with no land-use change
Coal mining	1,060,000	422,000	-	-
Forestry	1,910,000	355,000	-	-
Mining	1,180,000	301,000	-	-
Accommodation and food	170,000	68,000	-	-
Wood and paper	100,000	65,000	-	-
Dairy products	1,670,000	99,000	50,000	30,000
Dairy farming	-	-	360,000	130,000

Source: Based on estimates from White and Winchester (2023)

Note: Subsidy calculations assume that 50% of displaced workers are reemployed, and that support is given to the sectors with proportional decreases in employment greater than 0.4 standard deviations from the mean.

Our modelling therefore suggests that labour subsidies to support employment in selected industries are likely a more efficient way of cushioning the immediate impacts of supply chain shocks than output subsidies. Since labour subsidies apply only to the labour costs of firms, not the full capital and lost revenue costs, they allow for more reallocation of resources to other industries. We note that the growth benefits to the economy of reallocation would not be costless, as they could involve firm closures, hardship for laid-off workers and “labour market churn”.

Finding 14.

Modelling shows that, as a response to an enduring supply chain shock, wage subsidies to support employment in selected industries cost less than output subsidies and would better protect incomes overall. However, they would still involve hardship for those involved, resulting in more firms failing and more workers looking for new jobs, compared to no shock.

Labour market impacts and policy interventions

This subsection first looks at evidence on reemployment outcomes of laid-off workers in New Zealand. It then uses this evidence to compare the outcomes of policy interventions (output subsidies and wage subsidies) under an assumption of full reemployment with outcomes under an assumption that only 50% of laid-off workers are reemployed.

While CGE models often employ a full-employment assumption, incorporating structural unemployment adds some realism. Workers may take longer to find new jobs, or they may leave the labour force forever. A large supply disruption could therefore prompt calls for fiscal support for policies to enhance labour attachment and social equity. To test the reasonableness of our different assumptions and the usefulness of our representative scenarios, we commissioned research on the reemployment experience of workers facing involuntary layoffs.

Maré et al. (2024) used anonymised data from Stats NZ’s IDI to explore how different types of workers who became involuntarily laid off from their jobs move to new jobs across industry, location, and firm type. This dataset provides detailed insight into the likelihood of reemployment following displacement – including actual pathways to, timeframes and quality of the next job – and how much these aspects are affected by the existing structure of the regional labour market.

Maré et al. (2024) found that only about 50% of displaced workers find new jobs immediately after a layoff (similar to the friction we imposed on our CGE model), and it takes almost six months for reemployment to reach two-thirds (see Figure 19). The remaining third leaves employment by retiring, leaving New Zealand, or becoming long-term unemployed. Post-layoff earnings are substantially below pre-layoff earnings, suggesting that the first job post-layoff may be an inferior option for the worker. On average, earnings can take almost three years to recover to pre-layoff levels, even for those who avoid long-term unemployment.

Figure 19: Employment outcomes following involuntary layoff (months after disruption)

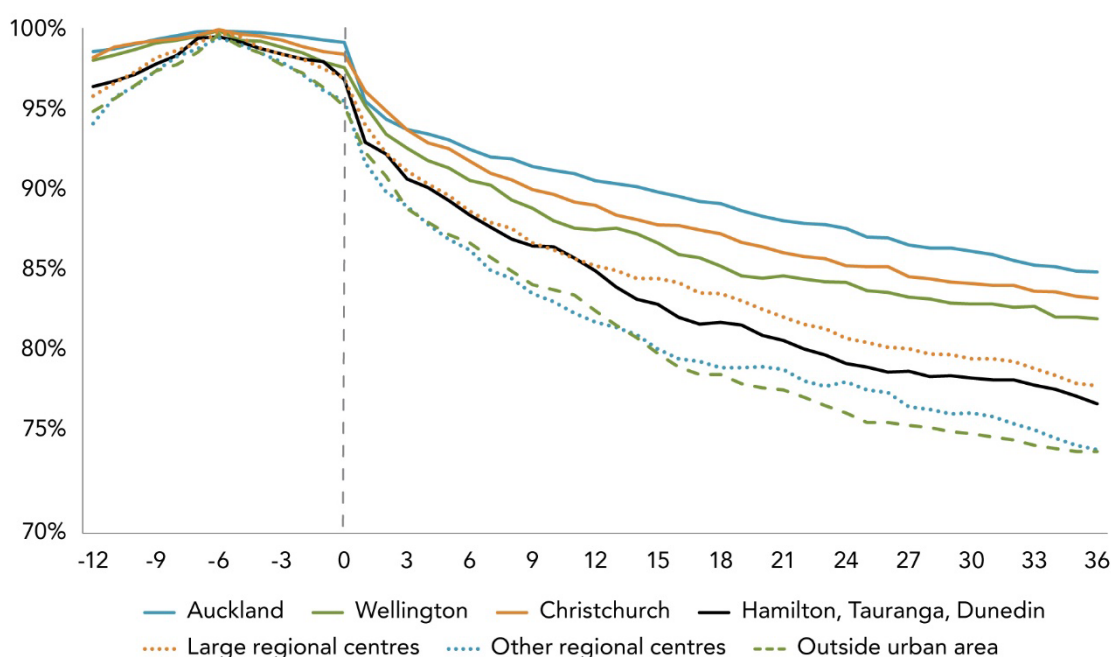


Source: (Maré et al., 2024)

The probability and quality of reemployment varies by both industry and region. Maré et al. (2024) found that, if they are employed again, around 60% of laid-off workers return to the same industry, indicating how shocks can affect workers’ normal employment paths. However, earning losses are slightly larger if a worker is reemployed in the same industry (6% below pre-layoff earnings, compared to 4% below for those reemployed in a different industry). Following layoffs, fewer workers in more-urban and higher-populated regions (Auckland, Christchurch, and Wellington) relocate, compared with workers in smaller, rural and less-populated regions (see Figure 20).

At the same time, the broad regional analysis in this research may disguise variations in outcomes for laid-off workers in sub-regional communities. For example, job-match quality (measured as the proportion of laid-off workers who still reside in their pre-layoff region) appears to be stronger overall in Auckland than in other regions. However, since some South and West Auckland suburbs score highly on the New Zealand Deprivation Index, outcomes for laid-off workers in those suburbs may be worse than in Auckland overall.

Figure 20: Job-match quality by region (months after disruption)



Source: (Maré et al., 2024)

Note: Job-match quality is measured as the proportion of laid-off workers who still reside in their pre-layoff region.

Comparing the findings of Maré et al. (2024) with CGE results, adding the 50% friction to the CGE model increases affected jobs by around 20% for both the trade and technology shocks (29,000 rather than 24,000 for the trade shock, 134,000 rather than 112,000 for the technology shock, and friction was not modelled for the oil shock).

Finding 15.

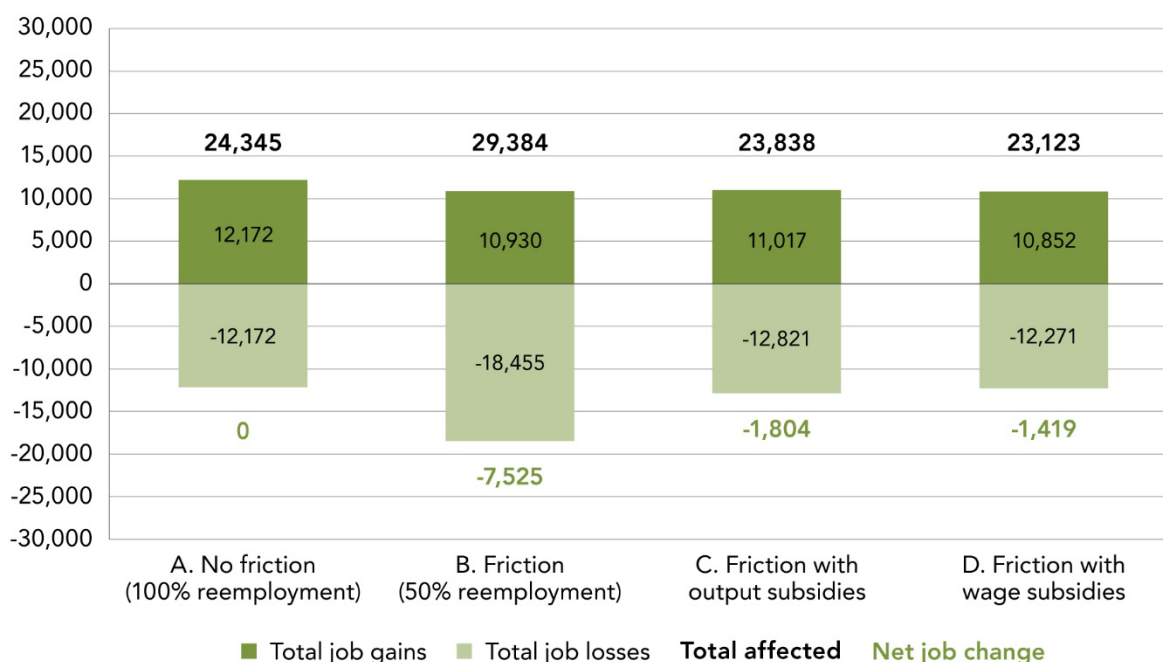
In a detailed study of Aotearoa New Zealand workers involuntarily laid off, only 50% of displaced workers find new jobs immediately after layoff and only two-thirds find new jobs within six months. Earnings of workers who find new employment take almost three years to return to pre-layoff levels.

Comparing different support policies and enabling mobility

We used the insights from Maré et al. (2024), to explore the labour market effects of alternative policy interventions under assumptions of full reemployment and 50% reemployment of laid-off workers. The trade shock was used to highlight these dynamics, but any of the other shocks can be examined in the same way.

A full reemployment assumption means that net job losses in declining industries are exactly offset by net job gains in growing industries. This represents what could happen in the long run, where redundant workers are mobile, staying in the labour force and finding new jobs. Nevertheless, this assumption contains significant churn – 24,345 jobs are affected (see Figure 21-A). Most of the overall net labour market change is driven by industries that did not grow as much as they would have without the shock.

Figure 21: Jobs affected by the trade shock with and without friction and subsidies – compared with the “no-shock” baseline



Source: (Riggs, 2024)

Figure 21-B shows the same shock with 50% of workers not finding a new job. The impacts are large: there are 7,525 fewer jobs, while the number of affected jobs increases by around 5,000 (compared with the full reemployment scenario). This could reflect circumstances a few months into a shock, in which firms and workers do not yet understand the full nature or persistence of the shock, and growing firms are not yet advertising new positions.

Alternatively, it could describe a long-run result, in which many people leave the labour market because of daunting transition costs and barriers to mobility (such as the challenges in finding a new job, reluctance to move regions, obstacles to retraining, or difficulties accessing capital). Note that this scenario shows a 1.9% reduction in GDP, compared with 1.7% under a full reemployment scenario (see Table 6).

For a scenario with 50% reemployment, we compared doing nothing (Figure 21-B) with an output subsidy that supports firms in the worst-affected sectors⁸ (see Figure 21-C) and wage subsidies to affected workers (see Figure 21-D). This does not greatly alter the number of jobs affected or the net number of jobs lost because of the shock.

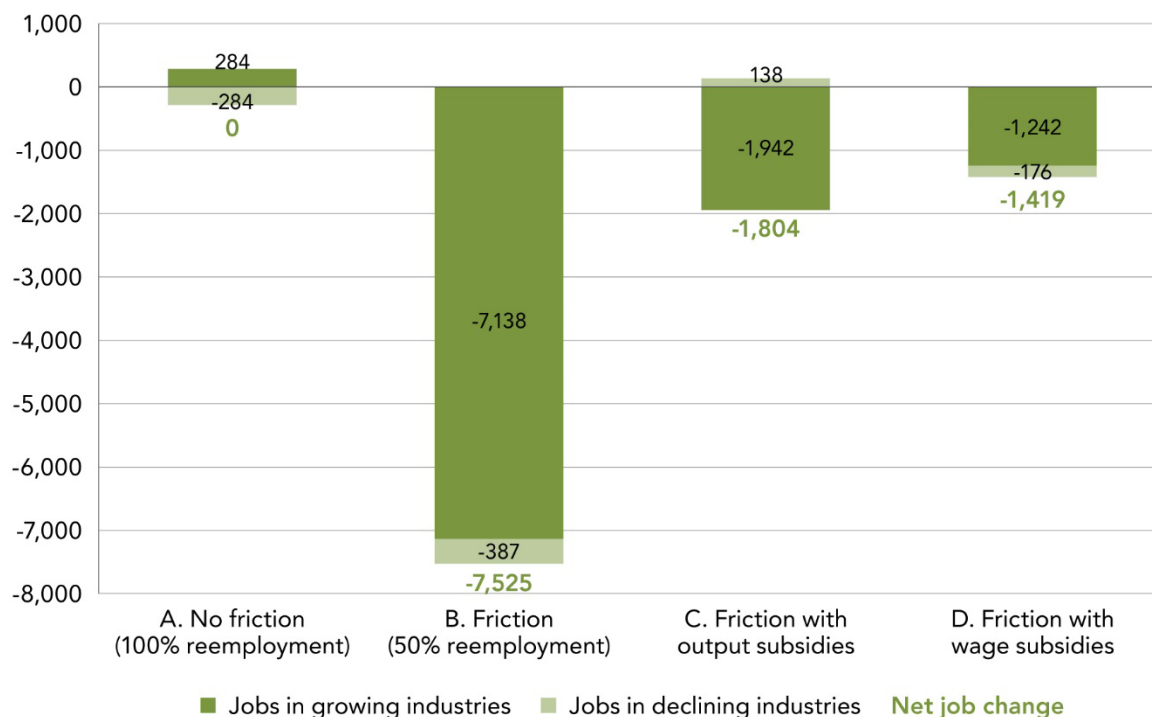
Output subsidies support existing firms and so maintain existing industry structures. Wage subsidies support employment and promote labour attachment or preserve some skills in these worst-affected industries. Unsurprisingly, both types of subsidy result in fewer jobs overall being affected than without the subsidy.

Figure 22 shows the net employment impacts of a trade shock with full reemployment (see Figure 22-A), 50% reemployment (see Figure 22-B) and with output subsidies (see Figure 22-C) and wage subsidies (see Figure 22-D). As expected, 50% reemployment results in a substantial decrease in employment compared with the full-employment scenario, and a larger net decline in employment in exposed industries.

⁸ Worst-affected sectors are those with employment decreases more than 0.4 standard deviations from the mean.

Both types of subsidies (but especially wage subsidies) greatly reduce the negative impact of shocks on employment. On the other hand, output subsidies increase employment in the sectors exposed to the shock (138), while wage subsidies result in more job losses in those exposed sectors (176).

Figure 22: Net employment impacts of the trade shock – friction scenarios with and without subsidies compared with the ‘no-shock’ baseline



Source: (Riggs, 2024).

Finding 16.

Modelling shows that when there is a supply chain disruption and 50% reemployment, wage subsidies reduce the negative impact on employment overall compared with output subsidies and compared with no intervention. Wage subsidies also result in more net employment in the growing sectors that would underpin recovery, compared to output subsidies.

Lessons from modelling supply chain disruptions to industries and labour markets

This chapter has identified some of Aotearoa New Zealand’s vulnerabilities and exposures to supply chain disruptions and the potential magnitude of such disruptions. Our modelling cannot identify the timing or likelihood of such an event. Understanding where the relative impacts might fall can help inform policies and interventions that protect the most exposed. Modelling can potentially also help identify where the benefits of preparation might outweigh a simply reactive response.

The analysis in this chapter relies on data drawn from different sources and largely from before the COVID-19 pandemic. The CGE model captures the structure of the New Zealand economy in 2014, updated with GDP, labour force, and land-use projections. The value of this work has been to design a model with expert input, to estimate the outcomes of shocks under different assumptions.

A next step could be to test a set of common shocks across the different models used in New Zealand, including more advanced dynamic CGE models and models that capture more detail about the New Zealand economy. A transparent process could add legitimacy and certainty to subsequent choices, noting that industry experts may not have a view across the whole economy.

For policymaking, it would be useful to complement production-sector and labour-market analysis of different types of shock (including potential supply chain disruptions, policy shocks and proposed significant regulatory reforms) with insights from a modelling community of practice and from industry experts. Making this analysis publicly available would help raise awareness of the exposure and vulnerability of different industries, regions and communities to supply chain disruptions. This in turn would help people make informed choices about how they prepare.

2.3 Implications for policy and practice

This section draws out the three most important implications of our empirical analysis for policy and practice to build economic resilience in Aotearoa New Zealand.

Impacts are potentially large

Our empirical analysis shows that the impact of supply chain shocks on Aotearoa New Zealand's economy is potentially large (up to 7.5% of GDP). Different shocks will impact regions, industries, and communities in different ways, depending on their source. A significant number of jobs will be lost, while others will be created as economic resources move to new uses. Evidence suggests that over 50% of laid-off workers could be unemployed after a shock, that it could take up to six months for their employment to reach two-thirds of its previous level, and that it could take almost three years for the earnings of workers who find new employment to return to pre-disruption levels.

Our analysis shows that a trade shock is likely to have a greater negative impact on New Zealand's regional economies than on the main centres. Workers in regional economies are less likely to return to working in the same industry after a disruption.

Investments to build economic resilience are warranted

The potential for large impacts from trade shocks on Aotearoa New Zealand's economy and communities warrants investments in measures to build economic resilience. Our analysis shows that economic models can contribute to assessing the relative effectiveness and costs of alternative investments. [Chapter 4](#) discusses New Zealand's current policies and strategies that contribute to economic resilience.

The ability of workers to move to new jobs, and the movement of the economy's resources to take advantage of new opportunities, are key to reducing the negative impact of shocks. A range of cross-economy policies that support innovation and enable mobility are important levers held by the government. [Chapter 5](#) sets out how the government can take a more strategic approach to reviewing and adjusting these policies to better build economic resilience.

Finding 17.

The ability of workers to move to new jobs, and the movement of the economy's resources to take advantage of new opportunities are key to reducing the negative impact of supply-chain shocks. Policies and investments that support workers to move to new jobs across industries and regions, and support firms to invest in new uses of land and physical capital make the economy more resilient to supply chain disruptions.

Making best use of data and analysis to prepare

Our work illustrates how data and analysis can contribute to a better understanding of the likely impact of supply chain disruptions on the Aotearoa New Zealand economy and its communities. History demonstrates the potential for analysis of supply chain data to have real impacts on outcomes (see [Box 9](#)).

Box 9. Leontief's analysis of German ball-bearing factories in World War II

The effective selection of bombing targets in World War II required the identification of Nazi Germany's economic vulnerabilities. Some industries had relatively unimportant impacts on the rest of the economy, but others were the opposite. If bombing could disrupt production in the latter type of industry, it would have very significant effects through many other industries, causing major bottlenecks. Economists used Leontief's input-output work to develop a map of the German economy to identify key weak points which could create bottlenecks (Bollard, 2020). Based on their findings, Allied forces targeted aircraft factories and ball-bearing plants.

We have identified the value of combining data analysis with expert judgement in assessing vulnerabilities. [Chapter 5](#) recommends that the government takes a more deliberate approach to working with industry networks to develop a common understanding of vulnerabilities and of the best means to build economic resilience.

During the course of this inquiry, we have learnt of new approaches and frameworks being employed to understand economic resilience and vulnerability (see Baldwin et al., 2023; Farrell & Newman, 2023; Grossman et al., 2023; Qiu et al., 2023). New analytical tools have been developed and others updated, including keys to resilient supply chains (OECD, 2021b), the Global Value Chain Development Report (WTO, 2023), the Global Trade Explorer (McKinsey Global Institute, n.d.), World Integrated Trade Solutions (World Bank, 2023), the Observatory of Economic Complexity (The Observatory of Economic Complexity, 2023), the IMF's New Industrial Policy Observatory (Evenett et al., 2024), and the Port Monitor (IMF, 2023a).

Researchers are also using datasets beyond trade data to understand exposures with global supply and production networks. These include financial transaction data (Farrell & Newman, 2019) and value-added tax transaction data (Diem et al., 2022).

These innovations are gradually advancing the conceptual and empirical understanding of supply networks. Even so, collaboration between industry networks and government agencies remains an important option for gathering intelligence on potential shocks and vulnerability to them, as a complement to the analysis of trade data (as discussed above and in [Chapter 5](#)).

Finding 18.

Data analysis and modelling can inform resilience-enhancing policy interventions by guiding and complementing industry expertise, supporting an ongoing identification of vulnerabilities, and comparing the outcomes of alternative interventions.

3 Lessons from international responses to a more turbulent world

This chapter describes recent international responses to supply chain disruptions, as well as longer-term approaches to improving economic performance and sustainability. We examine the objectives that underlie the different approaches to managing geopolitical and climate change uncertainties that are likely to increase the future frequency of supply chain disruptions. All countries now recognise that people's livelihoods, the success or failure of firms, and the future of entire national economies can depend on reliable access to specific goods and materials.

3.1 Geopolitics is driving a concern for economic security

Many countries are pursuing national economic security objectives as part of their management of supply chain risks. The goal of securing the supply of economically significant goods and raw materials sits alongside industrial and geopolitical objectives, inextricably connected through international trade.

National economic security objectives include increasing self-reliance, along with “de-risking” and “decoupling”. De-risking aims to protect domestic sectors and technologies against national security risks, and decoupling aims to separate economic ties with nations deemed to be national security risks (MFAT, 2023a, p. 24).

“Re-shoring”, “on-shoring”, “friend-shoring” and “near-shoring” are types of de-risking and decoupling strategies (see [Glossary](#) for definitions). Friend-shoring is seen as the next best objective when re-shoring or on-shoring options are unavailable or too costly. But the trade-off for shifting manufacturing to prioritise national economic security is forgoing the benefits of comparative advantage, efficiencies of scale and lower production costs.

As discussed in Box 10, geopolitics contributes to strategic competition in emerging technologies such as advanced computer chips that are a growing part of modern economies and military capability. Disruptions to their supply are therefore raising national economic security concerns. For instance, the US has imposed export and investment controls to restrict China's access to advanced chips (Palmer, 2023) and has pressured the EU into following suit (Economist Intelligence Unit, 2023). In response, China has announced export restrictions on critical metals (Economist Intelligence Unit, 2023). Large economies like the US, China, the EU, Japan, and India have poured billions into subsidising domestic production of chips (Cheng & Li, 2022).

Box 10. The growing dependence on semiconductor computer chips

The rapid pace of technological development is driving global demand for semiconductor computer chips. Semiconductor chips, oil and cars are the most traded goods globally by export value (The Observatory of Economic Complexity, 2023). But manufacturing modern computer chips is complex and depends on many intricate steps, with exacting standards. Either end of the process, from raw materials to component parts, can bring a host of vulnerabilities, and shortages can cascade through supply chains (Cheng & Li, 2022; Palmer, 2023). In 2021, global chip shortages wiped \$240 billion off the US GDP (Cheng & Li, 2022).

For most major economies, chips are essential for building everything from computers and data centers to appliances and cars. They are central to the battle for supremacy in space, science, artificial intelligence and EVs, and will be crucial to the military and defense equipment of the future.
(Cheng & Li, 2022)

The complexity of manufacturing computer chips, together with growing global demand, has driven the need for deep specialisation and scale. This has resulted in a highly specialised and integrated global supply chain, with different economies performing different roles according to their comparative advantages. With world-class universities, a vast pool of engineering talent and market-driven innovation, the US dominates R&D-intensive activities, including chip design and advanced manufacturing equipment. Other economies, such as South Korea and Taiwan, are at the forefront of manufacturing, drawing on robust infrastructure, government incentives and a skilled workforce. China is a leader in assembly, packaging and testing, which is relatively less skill and capital intensive. China also has significant reserves of raw materials critical to the manufacture of new technologies (Economist Intelligence Unit, 2023).

There is almost no part of the chipmaking process that does not require deep specialization and no part of the supply chain that can be simply and quickly duplicated.
(Cheng & Li, 2022)

Geographic specialisation has served the industry well but does create vulnerabilities. For example, the vast majority of the world's advanced manufacturing capacity is in Taiwan (92%), with the remainder in South Korea (Varas et al., 2020, 2021). Both economies are exposed to natural hazards and regional conflict. Elsewhere, conflicts have caused shortages – for example, the Russia-Ukraine war has affected supplies of some raw materials.

In an increasingly turbulent world, the US has seen its share of semiconductor manufacturing drop to just 12%, from 37% in 1990. Meanwhile, China could become world's largest manufacturer within the next decade (Varas et al., 2020).

Addressing over-concentrated supply chains and other national security risks as a priority typically increases costs. Manufacturing computer chips in the US is estimated to cost 30% more than in Taiwan or South Korea, and 50% more than in China (Varas et al., 2020). The global structure of the semiconductor value chain delivers clear efficiencies and value. The annual cost efficiencies of an integrated and specialised globalised value chain model are estimated at US\$45–125 billion. A hypothetical alternative with fully self-sufficient local supply chains in each region to meet 2019 levels of semiconductor consumption is estimated to require at least US\$1 trillion in incremental upfront investment and result in a 35% to 65% overall increase in semiconductor prices (Varas et al., 2021).

Trade measures and retaliation also reduce domestic economic performance. Between 2018 and 2019, the US imposed tariffs of around 25% on thousands of products from China, targeting roughly US\$350 billion of imports. China followed, with tariffs targeting about US\$100 billion on imports from the US (Fajgelbaum & Khandelwal, 2022). The two parties agreed to halt further tariff escalations in January 2020 but did not remove existing measures (Fajgelbaum & Khandelwal, 2022). Studies on the economic impact of the US tariffs have found the tariffs have cost the US – through increased prices for consumers and importers, and through reduced export growth, employment and aggregate income (Freund et al., 2023). Tariff costs passed on to consumers and firms in 2018 resulted in losses of \$51 billion, or 0.27% of GDP (Fajgelbaum et al., 2020).

*Instead of being slashed, trade links between America and China are enduring –just in more tangled forms.
(The Economist, 2023)*

The US tariffs on imports from China had limited impact on friend-shoring or the shift of market share from China. While direct trade with China in “strategic goods” fell 14% between 2017 and 2022 due to US tariffs, these products were likely rerouted through other countries (Freund et al., 2023). Some products can only be sourced in China, while other products are repackaged to avoid tariffs. Many products contain inputs that are cheaper and more readily available in China. Production in Asia, Mexico and parts of Europe also rely on investment from China (The Economist, 2023).

*Ironically, then, the process driving America and China apart in trade and investment may actually be forging stronger financial and commercial connections between China and America’s allies.
(The Economist, 2023)*

As the evidence in this section highlights, pursuing national economic security objectives can be expensive and ineffective. There is also a risk that protecting “critical” industries is used to justify protectionist industry policies. As set out above, globalised value chains deliver clear economic benefits, while import tariffs impose costs. Protectionist industry policies can privilege politically and economically powerful sectors at a cost to wider society.

Major economies have a greater influence on international trade settings, just as politically powerful sectors have more ability to influence domestic industry policy. Protectionist policies can trigger trade disputes between World Trade Organization (WTO) members, but successive US administrations have disabled the WTO’s dispute-settlement mechanism (Horton & Hopewell, 2021). Along with undermining the rules-based international trading system, this has limited the ability of countries to challenge protectionist policies.

Finding 19.

Evidence suggests that policies to promote national economic security can have high economic costs. Although national economic security is a valid policy priority, there is also a risk that it is used for unjustified protectionist industry policies.

3.2 Managing supply chain risks

The national economic security approaches discussed in [section 3.1](#) mostly aim to ameliorate geopolitical risks to supply chains. Supply chains are also vulnerable to natural disasters, climate change, labour disputes and other economic shocks. This section looks at international and national initiatives to manage risks to supply chains more generally.

International agreements to manage supply chain risks

While recent progress on multilateral trade negotiations has been frustratingly slow, smaller blocks of countries have increasingly turned towards bilateral and plurilateral trade agreements.⁹ Despite the concerns mentioned, these agreements continue to advance open trading among willing nations. As of August 2023, 360 such agreements are in force (WTO, n.d.).

Increasingly, countries are turning to the use of partnership agreements at plurilateral, regional or bilateral levels to secure access to critical goods and promote resilience. One recent example – the Supply Chain Resilience Initiative – was developed and agreed between Australia, India and Japan and launched during the COVID-19 pandemic. Its initial projects are sharing best practices on supply chain resilience and promoting diversification between stakeholders, through investment promotion and buyer-seller matching events. Future policy measures may include supporting the enhanced use of digital technology and supporting trade and investment diversification (Department of Foreign Affairs and Trade (Australia), 2021).

Another partnership agreement is the Minerals Security Partnership. This partnership involves multiple members with a shared interest in critical minerals, including Australia, Canada, Finland, France, Germany, Japan, South Korea, Sweden, the UK, the US, and the European Commission. They have agreed to share information and to collaborate to fund mining and mineral processing and recycling projects (United States Department of State, n.d.). The European Commission has also established raw materials partnerships between its member nations that are open to firms from other countries (European Raw Materials Alliance, 2023).

Indo-Pacific Economic Framework for Prosperity

The *Agreement Relating to Supply Chain Resilience* is a recent initiative to establish a baseline of policy coordination on supply chain management in the Indo-Pacific. It was signed as part of the Indo-Pacific Economic Framework for Prosperity (IPEF) (see Box 11). The agreement promotes collaboration on sharing information to develop a mutual understanding of global supply chain risks. The agreement requires partners to identify and

⁹ Multilateral agreements require all WTO members to be party to the agreement, while plurilateral agreements are agreements that members agree to on a voluntary basis. Bilateral agreements are agreements between two countries.

monitor supply chains for critical sectors and key goods, improve coordination of responses during crises, strengthen supply chain logistics, develop the workforce, and identify opportunities for technical assistance and capacity building (OECD, forthcoming).

The agreement establishes three new regional bodies: the Supply Chain Council, the Supply Chain Crisis Response Network, and the IPEF Labour Rights Advisory Board. The Supply Chain Council will establish teams to develop sector-specific “action plans” designed to promote supply chain diversification and improve supply chain resilience among IPEF partners and periodically monitor and review the partners’ efforts towards implementing the Agreement.

Under the agreement, parties are required to identify critical sectors and key goods that are essential for their national security, public health, safety, and economic stability. They must do so within 120 days of entry into force of the agreement for that party and share this information with other IPEF partners. Factors to be considered in the identification of critical sectors and key goods include the degree of reliance on a single supplier or location, the potential for transportation issues (especially in remote or island regions), the availability of alternative suppliers and locations, the quantity of imports needed to meet domestic demand, the capacity for domestic production, and the level of interconnectivity with other critical sectors and key goods. These factors align with the trade data analysis discussed in [section 2.1](#), but are likely to focus on the critical supplies and infrastructures not within the scope of this inquiry because other public agencies work on them (see [section 1.1](#)).

Box 11. Indo-Pacific Economic Framework for Prosperity

US President Joe Biden launched the Indo-Pacific Economic Framework for Prosperity (IPEF) in 2022. The IPEF is a regional initiative intended to recover the economic and foreign policy ground lost through the withdrawal of the US from the Trans-Pacific Partnership in 2017 (Mulopulos, 2023).

The IPEF covers four pillars: trade, supply chains, clean economy, and fair economy. The IPEF allows parties the flexibility to decide which pillars to join. None of the IPEF agreements include tariff reductions.

Fourteen nations (New Zealand, Australia, Brunei, Fiji, India, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand, the US and Vietnam) – representing 40% of global GDP and 28% of global goods and services – have joined the initiative (Bergoltsev & Snyder, 2023). All have pledged to collaborate on closer economic integration in “new and novel ways, not limited to trade”.

If implemented successfully, the collaborative efforts of IPEF partners will bring benefits to New Zealand by establishing a shared understanding of global supply chain risks. The supply chain agreement actively promotes transparency by facilitating the exchange of information concerning critical sectors, key goods, and supply chain risks among member countries. This enhanced transparency can lead to better-informed decision making.

National initiatives to manage supply chain risks

Many countries have established dedicated initiatives to identify and address supply chain vulnerabilities. Comprehensive supply chain assessments typically require both government and industry experts with deep knowledge and extensive relationships. The *Executive Order on America's Supply Chains* required federal agencies to assess and report back on the supply chain risks of critical goods and materials within 100 days, including semiconductor manufacturing, high-capacity batteries, critical and strategic minerals, and pharmaceuticals. Sectoral supply chain assessments were required for manufacturing and defence, public health and biological preparedness, information and communication technology, energy, transport and agriculture (Biden, 2021; Sullivan & Deese, 2022).

Collaborative initiatives between the private and public sectors can generate the knowledge and relationships needed to identify and respond to supply chain vulnerabilities. Singapore was able to leverage a pre-existing industry-government body in its COVID-19 recovery (see Box 12).

Box 12. Singapore's Future Economy Council: Fostering collaboration and supply chain innovation

Singapore has embraced a technology-driven approach to enhance supply chain resilience. The Trade Data Exchange serves as common data infrastructure to enable businesses to optimise supply chain flows through Singapore and expand their export markets (Emerging Stronger Taskforce, 2021). A pilot initiative that started in November 2020 – the Supply Chain Digitisation Alliance for Action – led to the Trade Data Exchange being officially launched in June 2022 (Yu, 2022).

The Supply Chain Digitisation Alliance for Action was one of nine industry-government alliances established by the Emerging Stronger Taskforce (EST) (Emerging Stronger Taskforce, 2021). The Singapore Government set up the EST in 2020 under the umbrella of the Future Economy Council (FEC) to “oversee the longer-term work of responding to the structural shifts in our economy”, using existing governance arrangements and collaboration between industry and government to rapidly develop new approaches to respond to the economic challenges of the COVID-19 crisis (Ministry of Trade and Industry Singapore, 2020).

The purpose of the FEC is to drive Singapore's economic growth and transformation (Ministry of Trade and Industry Singapore, 2023). The EST was set up to drive Singapore's recovery from the COVID-19 pandemic, along with its adaptation to the changing geopolitical environment (Emerging Stronger Taskforce, 2021).

The EST recognised six critical shifts that Singapore needed to prepare for: global fragmentation, industry consolidation, reconfiguration of global supply chains, accelerated digital transformation, changing consumer preferences, and an increased focus on sustainability (Emerging Stronger Taskforce, 2021). The EST worked closely with the FEC and its industry clusters, and consulted widely with businesses, unions and Singaporeans. The EST then formed the Alliances for Action with key stakeholders from the public and private sectors, to swiftly test and pilot ideas using an agile startup approach (Emerging Stronger Taskforce, 2021).

The EU also promotes collaboration between industry and government to manage supply chain risks. It has established industrial alliances to facilitate stronger cooperation and joint action between interested parties, covering technologies such as clean hydrogen, batteries, low-carbon fuels, solar energy, zero-emissions aviation, and semiconductors (European Commission, 2024). The alliances have identified supply chain vulnerabilities and designed and implemented responses. The European Raw Materials Alliance has a goal to increase economic resilience through diversifying supply chains, fostering innovation and attracting investment to the raw materials value chain (European Raw Materials Alliance, 2023).

3.3 Policies to promote diversification

An alternative approach to greater self-sufficiency or de-risking is diversification – diversity being an essential characteristic of resilient systems. Industries with geographically diversified suppliers and low market concentration are better equipped to withstand supply shocks (Schwellnus et al., 2023). Diversification focuses on reducing the overreliance on individual goods or markets that characterises New Zealand’s trade (see [section 2.1](#)). Markets become concentrated when there are limited suppliers, or where firms are getting a better deal than available elsewhere. This means that diversification can increase costs when supply chains are operating normally.

Free trade and partnership agreements (of the type discussed in [section 3.2](#)) can facilitate diversification of supply chains. However, while governments can open access to markets to provide firms with opportunities to diversify, firms may not take up these opportunities for cost or other reasons.

In addition, free trade agreements (FTAs) can contain provisions that restrict the efforts of countries to improve their resilience through means such as government procurement policies or placing conditions on foreign investors. Another potential weakness is that other countries may breach FTAs or WTO rules when it suits them, so in turbulent times they do not guarantee market access as fully as they might appear to.

Most governments have programmes to support exporting firms (see [section 4.1](#) for New Zealand’s approach). A wider range of cross-economy innovation policies are also relevant for diversification in exports and building resilience in times of disruption (OECD, 2023b). [Section 4.2](#) discusses New Zealand’s cross-economy policies that underpin economic resilience.

The concentration of trade creates risks that governments may reduce by using sanctions. For instance, they could withhold support (such as export credits) for firms exporting to already concentrated markets. Germany has considered this approach as a way to reduce the dependence of German firms on the Chinese market (Federal Foreign Office, 2023). [Section 3.1](#) discussed how governments can use tariffs and other trade measures under the guise of national security to reduce dependence on specific markets, albeit risking costly retaliatory measures in response.

Collaboration on innovation in small, advanced economies

Unlike major trading powers, small economies do not have the influence to reshape global supply chains or rebuild their parts domestically. Instead, as illustrated in the case of Singapore (see Box 12), smaller economies adapt to emerging changes in the global environment. Focused innovation policy to achieve economic success builds resilience through increasing prosperity and so raising capabilities (including innovation capabilities) to respond to shocks. Increasingly, small, advanced economies (SAEs) are using focused

innovation policies to tackle the challenges which are likely to be the source of future economic shocks.

Research for the Commission's *Frontier firms* inquiry demonstrated the critical importance of frontier firms to the performance of small economies (Crawford, 2021; Skilling, 2020). Small economies need strong productivity performance in internationally orientated sectors to offset the productivity disadvantage of small domestic markets. Large, internationally orientated firms can enable small economies to generate strong economic and social outcomes, despite their size disadvantages.

Small economies are not just scaled-down versions of larger economies. The small size of their domestic markets limits competition between firms and limits local opportunities to scale and specialise. Ambitious firms in small economies must turn outward, towards international markets, where they must find niches in which firms from large economies do not already have an advantage. This requires them to leverage any comparative advantages they do have, and to continually scan for and seize opportunities in new areas of specialised production. For example, smaller economies such as Taiwan and South Korea are capitalising on the deep specialisation required for advanced manufacturing. The same capabilities that enable their frontier firms to maintain a competitive edge also facilitate their economic resilience to supply chain disruptions challenging their lead industries.

As part of this inquiry, we have extended and built upon work for our *Frontier firms* inquiry on focused innovation policy in selected SAEs (Crawford, 2021). The countries – the Netherlands, Finland, Sweden, Denmark, and Singapore – were chosen then for their similar scale to New Zealand. These nations have a population of between 1 and 20 million, and per capita GDP over US\$30 thousand. SAEs typically employ complementary strategies to achieve the goal of exporting specialised, distinctive products at scale (NZPC, 2021), namely:

- attracting high-quality foreign direct investment
- supporting individual companies to meet the fixed costs of innovation and exporting
- investing in building “innovation ecosystems” around frontier firms, in selected focus areas.

Innovation is unpredictable and requires a long-term focus – much like working with the complexity of supply chains and the uncertainty of future disruptions. Building successful innovation ecosystems requires attention to the key complementarities within them across businesses, researchers, skills development, investment, regulation and other elements. Having independent multi-stakeholder governance bodies for each ecosystem is the best way to develop shared views on where public and private resources are best applied (NZPC, 2021).

Governance of focused innovation policy in SAEs varies in scope from specific innovation initiatives (such as a programme to develop new technologies to reduce agricultural greenhouse gas emissions) to broad national missions that aim to tackle societal challenges, and so encompass multiple complementary policy arenas.

Governance of specific initiatives may be nested within a broader agenda. Governance sometimes has a regional dimension (for instance, covering geographically concentrated technology clusters) and may provide a strong sense of directionality (for example, to tackle a specific source of emissions), or it may, for instance, be designed to raise rates of innovation of any sort within technology clusters.

Box 13 describes Sweden's National Innovation Council (NIC) as an example of using collaborative multi-stakeholder governance to support innovation policy. Such governance bodies can be used to respond proactively to disruptions as they develop capabilities to anticipate, prepare for and learn from unexpected shocks and opportunities as they arise in domestic and global environments.

Box 13. Political prominence and pioneering thinkers enable innovation policy shifts in Sweden

The creation of Sweden's National Innovation Council (NIC) in 2015 followed the emergence of a political will and openness to try new approaches to innovation policy. Before the NIC, innovation policy was subsumed within research policy, and subject to an ineffective "supply-side" linear model. The creation of the NIC gave Sweden separate innovation and research policy councils. A new government in 2022 discontinued the NIC.

...research does not automatically lead to innovations, and research is never sufficient to achieve innovations.
(Edquist, 2019, p. 870)

Innovation researchers and practitioners long ago replaced the linear model of innovation with a systems approach, but there was no organised way for the government to absorb and operationalise new approaches. The NIC provided such a mechanism.

Sweden's NIC consisted of five government representatives and ten external advisors from industry, unions, and academia. Government representatives included the Prime Minister, (who chaired the meetings) and Ministers of Finance, Research, and Enterprise and Innovation. Industry advisors included CEOs of large firms, as well as entrepreneurs and investors with early-stage innovation expertise. External advisors were appointed in their personal capacity, not as representatives of their organisations. A small secretariat was housed within the Office of the Prime Minister.

The existence and prominence of the NIC gave innovation policy a much higher status within the government and in government agencies.

The NIC's achievements included using functional procurement as an innovation policy instrument, and the establishment of a state-owned investment company with a mandate to focus funding on early-stage innovation. Shifting from specifying products to specifying functions opened government procurement to innovation, provided a demand-side spur to innovation, and increased resources for solutions that were new and higher quality. Investing in early-stage innovation represented a shift in innovation policy by emphasising the need for government support to complement the private sector to achieve this. The shift addressed a historical focus on later-stage innovation.

The Prime Minister's presence and support provided a strong profile and mandate for driving innovation policy. It strengthened high-level accountability for private- and public-sector stakeholders, while also presenting a continuity risk. In the Swedish case, policy gains and enduring relationships produced benefits that outweighed this risk (Edquist, 2019).

Collaboration spreads risk and provides access to a wider pool of resources, including more diverse ideas and skills (NZPC, 2021). Collaboration is a hallmark of innovation policy in SAEs, to the extent that it is often a prerequisite for public funding (Crawford, 2021). [Chapter 5](#) recommends that New Zealand establishes some high-level body providing strategic direction and a point of accountability for public and private participants. This is based on our view that multi-stakeholder collaborative governance can help to improve New Zealand's economic resilience, as well as its innovation and productivity performance.

Finding 20.

Prioritising higher productivity and better economic performance through focused innovation policy is an approach that aligns with promoting resilience, because it embraces change, as well as fostering innovation and adaptability.

This chapter highlights that some responses to global disruptions are better suited to small economies. A national economic security focus, involving tariffs and subsidies to protect critical industries, is suited only for economies with large and diversified internal markets. Such economies are less dependent on trade and therefore better positioned to replicate parts of global supply chains domestically. In contrast, diversification – facilitated through international relationships with trusted trading partners and dedicated supply chain risk-management initiatives – can be implemented by large and small economies alike.

In addition, experience with volatile global market niches led many SAEs to develop the focused innovation approach. This involves frontier firms and industry ecosystems continuously innovating and adapting to maintain their global lead. These policies typically rely on collaborative, multi-stakeholder governance bodies of various forms sharing information and taking joint decisions on how to build successful innovation ecosystems. Such mechanisms are also well suited to identifying and addressing the risks of supply chain disruptions.

The next chapter examines Aotearoa New Zealand's own efforts to improve the productivity performance of specific industries and strengthen economic resilience.

Finding 21.

Countries pursue a mix of objectives and approaches to address supply chain risks. Large countries may be able to balance national security through strategic trade policies that incentivise re-shoring and on-shoring against the risks of facilitating protectionism. Such policies are much less suited to small economies. Rather, the approach of some small, advanced economies – to build focused innovation ecosystems – offers scope to both improve productivity and build greater economic resilience.

4 Strengthening resilience in Aotearoa New Zealand

This chapter first examines Aotearoa New Zealand’s past and recent efforts to respond to immediate and known risks to supply chains and economic resilience (see [section 4.1](#)). It then looks at New Zealand’s cross-economy policy settings that support economic resilience (see [section 4.2](#)). [Section 4.3](#) describes the economic and sectoral development strategies that successive governments have implemented to improve New Zealand’s productivity and raise economic growth.

4.1 Responding to supply chain disruptions and known threats to economic resilience

Section 4.1 describes how:

- Aotearoa New Zealand firms and the government manage supply chain risks
- the government plays an active role in managing international agreements that facilitate trade
- the government provides support to raise the success of export firms
- New Zealand has a statutory framework to guide the reduction of greenhouse gas emissions and to adapt to the impact of climate change on the economy and society
- the government has released a National Security Strategy that includes a focus on economic security.

Managing supply chain risks

New Zealand firms are aware of supply chain risks. The COVID-19 pandemic led firms to manage supply chain risks more actively, primarily by strengthening relationships with their suppliers and customers. Submissions to this inquiry showed most respondents (97%) had undertaken at least one type of action to manage risks within their supply chains (see [Figure 23](#)).

Figure 23: Most responding businesses have taken initiatives to manage supply chain risks



Note: The chart shows the number of submitters per option (out of total 59 submitters, who were able to choose multiple options).

BusinessNZ and ExportNZ’s submission (sub. 7) noted a wide range of actions taken by businesses, including:

- diversifying their supply sources into supply chain networks
- increasing stock on hand
- investing in digital technologies
- developing closer relationships with their suppliers
- adopting agile manufacturing strategies that allow them to quickly pivot production processes as demand patterns change
- increasing investment in manufacturing outside of New Zealand.

Māori small and medium-sized enterprises (SMEs) and Māori business networks emphasised the importance of strong relationships and networks for managing supply chain risks (Haemata, 2023).

We have had strong and loyal relationships with our local suppliers which have paid off for us when supply lines were under pressure. They looked after us like we looked after them.

(Haemata, 2023, p. 15)

Finding 22.

Aotearoa New Zealand firms, industries and communities actively manage their own supply chains to improve resilience in anticipation of a more volatile future. Their dominant approach is to strengthen relationships with suppliers and customers.

New Zealand has not adopted the more hands-on supply chain risk-management strategies used by large economies (see [section 3.1](#)), though it has entered into specific agreements to manage supply chain disruptions during periods of crisis. For example, during the COVID-19 response, strong diplomacy and networks with other small advanced economies (SAEs), including Singapore, helped with the supply of personal protective equipment and COVID-19 vaccines (New Zealand Government, 2020).

During COVID-19, New Zealand Trade and Enterprise (NZTE) (sub. 9) provided additional support through a dedicated Supply Chain Team to assist with capability building, including education initiatives, one-on-one support, and coaching. However, NZTE submitted that opportunities exist for extra targeted support to businesses most exposed to supply chain disruptions, such as SMEs in Gisborne, Hawke’s Bay, and Waikato, as well as Māori businesses.

Māori respondents – especially those in rural and remote regions – paid particular attention to the role of public procurement in enhancing the capabilities of Māori businesses and improving economic outcomes for Māori. Māori perceive procurement as a way for central and local governments to enable “tuku mana” – localised responses with the potential to foster local capabilities, and so increase diversity in supply and resilience.

Māori enterprises saw limitations in the current public procurement programme (Haemata, 2023). For instance, the programme’s mandate did not extend beyond central public service agencies and so did not include local government procurement. Māori respondents argued that this reduces opportunities for Māori firms and land trusts to secure procurement contracts with local councils (Haemata, 2023).

Finding 23.

Central and local governments can use public procurement to foster “tuku mana” – localised responses to local issues. Such procurement can build local capabilities, and so increase diversity in supply and resilience, although any gains would need to be balanced against costs. Māori respondents – especially those in rural and remote regions – highlighted the role of public procurement in enhancing the capabilities of Māori businesses and improving economic outcomes for Māori.

COVID-19 stimulated work within the government on how supply chains might be managed in a worst-case scenario where the supply of essential goods and services breaks down. It concluded that adequate preparation would require significant proactive investment in new powers and capabilities (Box 14).

Box 14. Managing the economy in a worst-case COVID-19 scenario

During the lockdown in April 2020, the COVID-19 response group commissioned a paper exploring a worst-case scenario, in which the supply of essential goods and services breaks down (The Treasury, 2020). The paper looked at potential government interventions to support a base level of material wellbeing for all – to maintain social cohesion and the acceptance of the potentially extreme restrictions on normal freedoms that could become necessary to protect lives. The potential interventions included:

- repurposing facilities and reengineering supply chains
- rationing and price controls of staples
- the prevention of price gouging
- securing domestic production for the domestic market
- maintaining freight movements through vessel requisitions.

The paper also reviewed ways to address workforce shortages, including the redeployment of private-sector workers to essential public services or food-producing industries. It noted that implementing such measures may require legal powers to enable broad data sharing, price regulation, prohibiting exports, ensuring the continued operation of essential providers, or relaxation of labour and licensing rules.

Fortunately, there was no need for such last-resort interventions. Nonetheless, the Treasury (2020) recognised the limits of ad hoc responses to major disruptions. It was a clear call, amid the most serious crisis in living memory, for proactive investment in relationships, networks, rules, and powers that would be needed for the capability to respond to disruptions.

The Ministry of Transport published the government's Aotearoa New Zealand Freight and Supply Chain Strategy in August 2023 (Ministry of Transport, 2023). The strategy includes a focus on increasing awareness of (and ability to respond and adapt to) global supply chain threats and opportunities. It also includes sections on accelerating greenhouse gas emissions reduction and building long-term resilience to climate change and on reliable and resilient international freight services.

More trade agreements and greater export concentration

Trade concentrations create vulnerabilities in supply chains because they make it more difficult to access alternative import or export markets in the event of a disruption.

Chapter 2 describes how, since 2008, New Zealand's export trade has become increasingly concentrated both in products exported and in markets served. This followed the signing of a free trade agreement (FTA) with China as firms took advantage of lower costs and higher premiums in that market.

Over the last 30 years, New Zealand has expanded its access to markets through FTAs and other forms of international agreement (see Box 15). Having a large number and variety of trade agreements provides the opportunity for firms to diversify, but trade agreements do not, on their own, guarantee that firms will diversify.

Box 15. Recent changes in trade cooperation

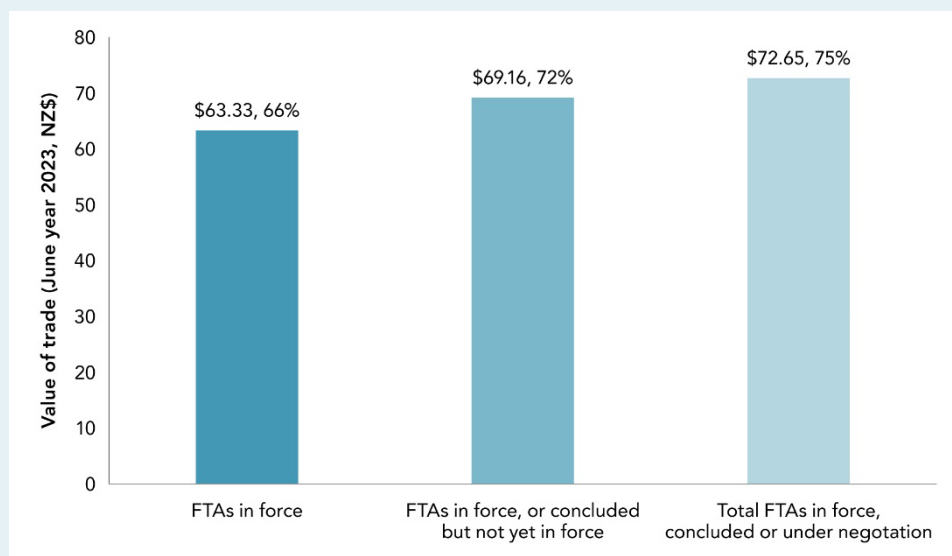
In 2023, the countries with which New Zealand has trade agreements in force collectively cover \$63.3 billion (66%) of New Zealand's exports and \$73.3 billion (65%) of our goods and services imports. Countries or regions where New Zealand has trade agreements either concluded but not yet in force (such as the EU) or under negotiation (such as the Gulf Cooperation Council,¹⁰ India, and the Pacific Alliance¹¹) push up the percentage of total trade value covered by nearly another 10% (see Figure 24).

Since 2021, New Zealand has entered an FTA with the UK and signed an FTA with the EU. Negotiations with the Russia / Belarus / Kazakhstan Customs Union have been suspended. In general, it appears that much of the low-hanging free trade fruit has been picked. With multilateral negotiations in the World Trade Organization (WTO) close to a standstill, there is a move towards more specialised plurilateral agreements and regional FTAs to invigorate trade. This includes smaller blocks of countries agreeing to cooperate on trade, with the aim of opening these agreements up to further nations over time (MFAT, 2023a).

¹⁰ Gulf Cooperation Council members include Saudi Arabia, United Arab Emirates, Qatar, Kuwait, Oman and Bahrain.

¹¹ The Pacific Alliance is a Latin American free trade area and economic integration initiative established by Chile, Colombia, Mexico and Peru.

Figure 24: New Zealand's FTA coverage and share of goods and services exports



Source: Stats NZ, using Ministry of Foreign Affairs and Trade calculations

New Zealand's trade policy recognises shifts in the international environment

As a small trading economy, New Zealand continues to have a vital interest in the ongoing operation of the WTO's open and rules-based trade norms. New Zealand has promoted an open, rules-based trade system for a generation or more. It has benefitted from the relative stability provided by plurilateral and bilateral trade agreements that underpin international trade cooperation.

This approach is being challenged by geopolitics, and by international responses to concerns about economic security and climate change (MFAT, 2023a) (see [Chapter 3](#)). The Ministry of Foreign Affairs and Trade (MFAT) (2023a) considers that, to grow economic resilience within a rules-based international system, policy should support “innovation and transitions in the national economy, including through innovative approaches to trade architecture, supporting exports to new markets, and promoting inclusive trade” (p. 36).

Barriers to trade diversification

Trade diversification involves firms moving into new markets with new products. Sanderson (2016) found that the most common barriers experienced by firms in New Zealand were a lack of experience in expanding beyond New Zealand, a lack of knowledge about specific markets, and difficulty accessing finance for expansion. Sim et al. (2021) also identified market understanding as one of the top challenges, alongside difficulties in building brand awareness, finding suitable partners and channels for entry, and fierce overseas competition. Overcoming barriers like these requires building capability at the firm or industry level; they cannot be overcome through trade agreements alone.

Finding 24.

Trade diversification cannot be solely achieved by the government negotiating new free trade agreements. It also relies on firms and industries being willing and able to make the move into new markets with new products.

Support for exporting firms

The government provides a range of support for exporting firms. In general, this support is not explicitly focused on an objective of trade diversification.

New Zealand Trade and Enterprise administers the International Growth Fund to help over 1,300 selected New Zealand Trade and Enterprise customer firms to accelerate their international growth, with 50:50 funding for approved initiatives. New Zealand Trade and Enterprise also supports these and other firms to make export deals, through its presence in 38 international locations (New Zealand Trade & Enterprise, 2023). From 2020, the International Growth Fund increased from \$30 million each year to \$40 million each year, funded from additional support for New Zealand Trade and Enterprise from the COVID-19 Response and Recovery Fund. The extra funding ends in June 2024, though this will be partially offset by an increase of \$10 million each year in New Zealand Trade and Enterprise's baseline from 2024/2025.

The New Zealand Export Credit Office, based in Treasury, works with exporters to help mitigate the risks they face with exporting and internationalisation. The New Zealand Export Credit Office provides insurance that allows firms to access debt finance to upscale their business to fulfil export orders (The Treasury, 2017).

Callaghan Innovation and the Ministry of Business, Innovation and Employment jointly lead the Regional Business Partner network. The network works with 15 regional development partners to connect small- and medium-sized business with government-subsidised service providers in their region (Regional Business Partner Network, 2024). The network is not explicitly focused on export success, but exporting firms and those with potential to export may benefit from its operation.

Our *Frontier firms* inquiry recommended that, as a complement to the cross-economy policies discussed in [section 4.2](#), the government should focus on building strong innovation ecosystems in a small number of high-potential export areas (NZPC, 2021). [Chapter 5](#) discusses how to implement this approach in the context of building resilience.

Climate change mitigation and adaptation policies

The frequency and severity of climate change related weather events will continue to increase, with the potential for causing disruption to supply chains (see [Chapter 1](#)). Climate change poses a significant challenge to resilience, as its impacts can be both acute (for example, Cyclone Gabrielle) and cumulative (such as sea-level rises over time). Policies to reduce vulnerability to climate change shocks – such as moving domestic supply routes out of harm's way – also contribute to economic resilience.

Governments everywhere, including in New Zealand, are putting in place measures to reduce greenhouse gas emissions. This will impact emissions-intensive industries (for example, manufacturing), as well as those (such as agriculture) that have comparatively high abatement costs and/or limited options to make emissions reductions (The Treasury & Ministry for the Environment, 2023).

With cross-party support, New Zealand has put in place a statutory Climate Change Commission to provide independent advice on reducing emissions to meet a legislated target. The legislation requires the government to produce an emissions reduction plan every five years.

The Climate Change Commission will next report in 2024 on the country's progress on meeting its emissions budgets, emissions reduction plans and the net-zero 2050 target. The Ministry for the Environment will devise a second emissions reduction plan in 2024 and a national adaptation plan in 2028.

The Climate Change Commission also produces a national climate change risk assessment every six years, and it monitors and reports every two years on how the government's national adaptation plan is implemented. The plan sets out how the government will respond to these risks, and its overall objectives for climate change adaptation in New Zealand. The government produced the first national adaptation plan in 2022, and the CCC is due to produce its first monitoring report in 2024.

National security strategies

New Zealand's approach to national security emphasises building awareness of the emerging international geopolitical situation and fostering cooperation with international partners to reduce risks. The approach does not propose policies to “re-shore” or “on-shore” critical industries such as those being actively pursued in some larger jurisdictions (discussed in [Chapter 3](#)).

New Zealand released its first set of strategies related to national security in 2023, partly in response to the terrorist attacks in Christchurch. These include the National Security Strategy 2023–2028 (DPMC, 2023b) and an assessment of New Zealand's Security Threat Environment (New Zealand Security Intelligence Service, 2023).

The National Security Strategy identifies economic security as one of 12 core national security issues. Actions proposed to enhance economic security include supporting the rules-based international system, diversifying trade, strengthening critical infrastructure, and scrutinising national security risks associated with government science and research funding. These actions aim to safeguard New Zealand's economic security and independence from external shocks and pressures. More broadly, the strategy “recognises the value that close international partnerships contribute on every security challenge that we face” (DPMC, 2023b, p. Foreword, i).

The strategy also outlines the importance of building community awareness and capability to manage economic security. It makes the case that the economic security of New Zealand depends on the actions of individuals and businesses across the country (DPMC, 2023b).

The New Zealand Security Intelligence Service's assessment found that increased strategic competition and global economic instability could reduce the resilience of New Zealand to forms of foreign interference, including economic coercion.

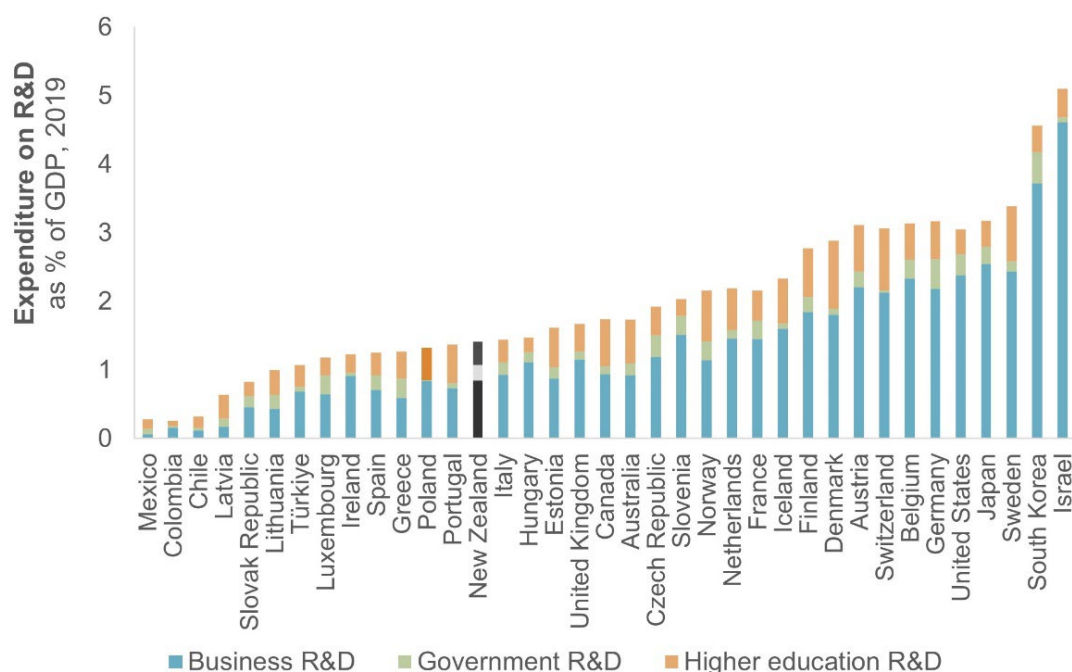
4.2 Cross-economy policies that support economic resilience

A resilient economy can adjust to shocks (including supply chain shocks) through firms and workers finding different ways to produce goods and services, producing different goods and services, and finding different markets for their goods and services. The capacity to innovate is a key underpinning for resilience.

The dynamism of the economy is another key to resilience. A well-functioning economy is constantly changing, as new firms enter markets, successful firms grow and employ more workers, and less successful firms decline and exit markets. Workers keep looking for new opportunities for success in their current firms or elsewhere, often building their skills and experience to do this. From a dynamic perspective, resilience does not necessarily depend on the survival of existing firms and jobs – but rather on the ability of Aotearoa New Zealand’s economic resources to move flexibly to new more productive uses.

The Commission has found that Aotearoa New Zealand’s innovation performance has notable weaknesses that likely contribute to its poor productivity performance (NZPC, 2021). As compared to other SAEs, New Zealand’s weaknesses include relatively low levels of business expenditure on R&D as a percentage of GDP, low overall investments in R&D (see Figure 25), low levels of internationally significant patenting, and low levels of collaboration between businesses and researchers.

Figure 25: Low levels of investment in research and development



Source: New Zealand Productivity Commission calculations based on OECD. Stats, Main Science and Technology Indicators database (NZPC, 2023c).

Chapter 1 and section 4.2 highlight the importance of New Zealand’s export performance for resilience. New Zealand performs poorly compared to other SAEs, with a relatively low ratio of exports to GDP, and a lack of innovative anchor frontier firms exporting distinctive, knowledge-intensive goods and services (NZPC, 2021).

New Zealand’s economy appears dynamic. While international comparisons require caution, our research suggests that New Zealand has high rates of firm births and deaths relative to other OECD countries (NZPC, 2023c). Our *Technological change and the future of work* inquiry found that New Zealand’s labour markets are relatively dynamic on multiple measures (including high job-to-job transition rates and low rates of long-term unemployment) (NZPC, 2019, 2020).

Governments in developed countries typically employ a range of cross-economy policies that impact innovation and economic dynamism. Support for R&D and innovation, education and skills development, and openness to international connections are important for innovation (NZPC, 2021). Regulation that meets its purpose, but is not too restrictive, is important for economic dynamism. While labour market and business regulation is particularly important, other regulation that impacts how firms and households use resources such as land, or how they connect internationally, can also influence economic dynamism (NZPC, 2020).

Our previous inquiries have variously assessed and made recommendations to improve the effectiveness of cross-economy policies that impact innovation, economic dynamism – and therefore, resilience (for example, NZPC, 2014b, 2017, 2020, 2021, 2022). Both policy settings and economic and social circumstances have evolved since these inquiries; many of the recommendations are likely still relevant but need updating. In [section 5.3](#), we recommend a process through which the government and other stakeholders can review and update key cross-economy policy-setting impacting resilience and innovation.

Support for R&D and diffusion of innovation

In our *Frontier firms* inquiry, we looked at policies that support innovation by firms at or near the productivity frontier. We found that innovation is pervasive in successful economies. Leading firms innovate to reach the global technology frontier, while best domestic practice diffuses to other firms. We also found that a firm has many ways to innovate, ranging from how it organises its business, through what it offers, to how it serves its customers' ongoing needs.

We found that governments have an essential role in shaping and contributing to the environments in which innovative firms operate. For example, they support R&D directly and through the training and supply of skilled workers. They own or fund research and educational institutions and incentivise their behaviour through governance and funding instruments. They provide regulatory and social assistance frameworks that affect the risks and rewards for both firms and workers that innovate (NZPC, 2021).

Diffusion of innovation through the economy is important for aggregate productivity and resilience (Australian Productivity Commission, 2023). Diffusion happens through firm dynamics and labour mobility; through education and training opportunities available to workers; through imitation and learning by doing; and through international connections, including through multinational corporations and foreign direct investment. Many of the policies that support innovation at the frontier and economic dynamism also support diffusion of new ideas to other firms (NZPC, 2021).

Research for our *Frontier firms* inquiry found that the distribution of productivity among firms behind New Zealand's national frontier appeared relatively compact, and that this could indicate that diffusion between firms within New Zealand is working relatively well (NZPC, 2021, pp. 43, 91). In contrast, the large productivity gap between firms at New Zealand's national frontier and those at the global frontier is a substantial component of New Zealand's relatively poor productivity performance.

In our *Frontier firms* inquiry we found that, despite successive government strategies, New Zealand's innovation effort lacked sufficient scale and prioritisation to materially raise the productivity and export performance of its existing and potential frontier firms (see [Chapter 5](#)).

On the other hand, we found that the Research & Development Tax Incentive, introduced in 2019, is a desirable, broad-based innovation policy that recognises the wider social and

economic benefits of business innovation. Strong evidence exists that tax incentives to raise firms' R&D are effective, both in increasing private sector effort and in raising productivity. Although starting from a low base, business expenditure on R&D in New Zealand as a percentage of GDP has been steadily increasing over the last decade (NZPC, 2021, 2023a).

Regulatory policy and stewardship

New Zealand ranks highly on international measures of regulatory quality (NZPC, 2023c). Even so, poor-quality, or outdated regulation has the potential to undermine innovation and economic dynamism, putting a premium on ongoing review of regulatory settings. Our previous inquiries have identified labour market, business, and land-use regulation (among other forms) as particularly important for adaptability of firms and communities facing disruption.

Regulatory stewardship is the governance, monitoring, and care of regulatory systems to keep the systems fit for purpose over the long term. Stewardship contributes to economic resilience through a continuing search for proactive improvements to regulation. Since our *Regulatory institutions and practices* inquiry (NZPC, 2014b), the public sector has strengthened system stewardship and developed new tools for this purpose, such as Regulatory Systems Amendment Bills (see Box 16). However, regulations that are overly complex, restrictive or obsolete remain.

Box 16. Case study: Regulatory Systems Amendment Bills

Regulatory Systems Amendment Bills (RSABs) enable a package of separate omnibus Bills that amend multiple pieces of legislation to progress through the parliamentary process together. Major regulatory agencies have used RSABs to improve the quality of legislation they administer, including through:

- clarifying and updating statutory provisions in each Act amended, to better give effect to the purpose of that Act and its provisions
- addressing regulatory duplication, gaps, errors, and inconsistencies within and between different pieces of legislation
- keeping the regulatory system up to date and relevant
- removing unnecessary compliance and implementation costs (MBIE, 2023).

Using RSABs is an efficient way for departments to maintain and improve existing legislation to ensure ongoing fitness for purpose. To date, several major regulatory agencies have benefitted from regulatory system improvements through RSABs, including the Ministry of Business, Innovation and Employment, the Department of Internal Affairs, the Ministry for Primary Industries, the Ministry of Education and the Ministry of Transport (McLiesh, 2022; Ministry of Education, 2023; Ministry of Transport, 2022).

Competition policy

Competition is an important contributor towards economic resilience. In the long run, competition in markets fosters innovation, drives productivity growth, and ultimately improves material living standards. Competition can foster resilience in firms' supply chains by enabling firms to acquire inputs from a wider variety of sources. Industries that employ diverse supply chains and business strategies are inherently more resilient, reducing the risk of disruption to their associated communities of workers and customers.

Because of its small, dispersed population and distance, New Zealand is prone to comparatively weak competition in some markets (Conway, 2018).¹² For example, the Commerce Commission found that competition in the market for key building supplies was weak (Commerce Commission New Zealand, 2022). This almost certainly exacerbated the 2021–2022 plasterboard shortage. Similarly, weak competition among supermarkets may delay the transmission of reduced global costs to New Zealand retail prices (Commerce Commission New Zealand, 2023d).

The Commerce Commission regulates competition in New Zealand through:

- preventing the misuse of market power and anti-competitive arrangements and monitoring and promoting competition in telecommunications, fuel, and grocery markets
- combatting cartel behaviour
- preventing mergers and acquisitions that substantially lessen competition
- addressing poor, misleading, or unbalanced information affecting competition in a market
- achieving the best possible outcomes in regulated markets (which generally are natural monopolies – for example, telecommunications and electricity distribution networks) for the long-term benefit of both consumers and businesses (Commerce Commission New Zealand, 2023a).

Competition policy that tackles anti-competitive behaviour can, for instance, reduce barriers to new firms entering a market, or to existing firms expanding in a market. Lower barriers to entry or expansion could lead to a shorter period of disruption and reduced harm if suppliers are able to quickly enter or expand in response to shocks.

The relationship between competition and resilience is not linear and typically depends on specific circumstances within each industry. It likely resembles the link between competition and innovation; Aghion et al. (2005) found robust empirical evidence that too little competition can reduce innovation, but too much competition can have a similar effect. This “inverted-U” pattern could explain why empirical studies of competition and resilience struggle to identify any simple relationship (see Box 17).

¹² Empirical statistical studies of competition in New Zealand's markets use various measures of competition that are complex to summarise (see Maré & Fabling, 2019; Schiff & Singh, 2019). Maré and Fabling (2019) found results suggesting that, in more competitive industries, the least productive firms were more likely to exit than in other industries. International comparisons of competition are challenging – one study (MBIE (2016b) suggests that manufacturers in New Zealand face lower competition than their counterparts in Finland and the Netherlands, but more than those in Portugal.

Box 17. Competition and resilience in banking: friends, foes, or both?

The economic resilience of industries is a relatively new topic in empirical research. Banking is one industry where the relationship between competition and resilience has been studied systematically for many years.

One school of thought is that when banks are protected from competition by high barriers to entry, they tend to be more profitable. This allows them to hold more capital reserves (Hellmann et al., 2000) and invest more in borrower risk assessment to reduce risks (Boot & Thakor, 1993). Also, higher profits may motivate bank managers and shareholders to maintain the bank as a going concern (Keeley, 1990).

In contrast, others argue that more intense competition prevents individual banks from misusing their too-big-to-fail position (Mishkin, 1999) and reduces perverse incentives to issue excessively risky loans (Caminal & Matutes, 2002). Intense competition lowers economy-wide interest rates, thus making the portfolios of all banks less risky, as loans are easier to repay (Boyd & de Nicoló, 2005).

A systematic review of 31 studies covering 598 estimations found that competition among banks has close to no effect on resilience (Zigraiova & Havranek, 2016). Other reviews confirmed that it is a complex and ambiguous relationship, where results often depend on the selected time period and country (Beck, 2008; López-Penabad et al., 2021).

We believe that competition policy needs greater attention to resilience than in the past decades. Cocselli and Thompson (2022) and Deutscher (2022) argue for balancing competition and resilience concerns when, for instance, deciding whether to approve mergers, or when allowing firms to cooperate to tackle new threats. This would include sharing information about risks and possible solutions among firms.

The New Zealand Commerce Commission has issued guidelines for firms on collaboration in a declared emergency and has drafted guidelines on collaboration for sustainability. In [Chapter 5](#), we recommend that these be extended to cover collaboration for tackling medium-term risks to resilience from slow-moving shocks.

Finding 25.

Competitive markets generally foster innovation and higher productivity. They can also enhance resilience through a diversity of suppliers, business models and locations of key assets. Even so, when competition in a market is too intense, it can reduce resilience, through driving firms to an excessive focus on efficiency and leanness in their supply chains and business operations, and through undermining collective action to tackle risks to resilience. Balancing the benefits of competition against resilience poses a challenge to competition-policy regulators.

Skills and workforce development

Skills and workforce development policies are vital inputs into firm resilience. They were top concerns voiced by submitters in relation to COVID-19 labour-supply disruptions.

New Zealand's education and training policies produce mixed results. The quality of maths, science and reading literacy of New Zealand 15-year-olds has been declining over the last 15 years but remains above the OECD average. Large disparities in education outcomes in New Zealand schools exist between socioeconomic groups. The New Zealand education system produces persistently poor outcomes for some young people, especially children from socioeconomically disadvantaged backgrounds, and Māori and Pasifika students (NZPC, 2020, 2023c).

The percentage of adults of working age with a bachelor's degree or higher in New Zealand is close to the OECD average. Many New Zealanders with tertiary education emigrate, but, on the other hand, immigrants tend to have higher qualifications on average than resident New Zealanders. New Zealand workers participate at relatively high rates in job-related education or training (NZPC, 2020, 2022, 2023c).

We have recommended improvements to education and training policies in previous inquiries. In the *Immigration – Fit for the future* inquiry (NZPC, 2022), we emphasised the need to link skills shortages to education and training policies. In our *Technological change and the future of work* inquiry (NZPC, 2020), we recommended that the government monitor indicators of technology adoption and labour-market change, in New Zealand and internationally, to help anticipate and prepare for such changes. We recommended greater flexibility in the qualifications system and in tertiary education, to make it easier for adults to retrain and continuously upgrade their mix of skills.

In our *Technological change and the future of work* inquiry, we also recognised the need to support people through job transitions arising from disruptions. We recommended greater income smoothing for displaced workers, measures to assist reskilling them, and improved employment services for workers who are displaced or at risk of displacement (NZPC, 2020).

Institutional trust and social cohesion

Institutional trust and social cohesion increase the effectiveness of policies to build resilience. The OECD's research, using its Trust in Government Index, found that reduced trust in public institutions is a major risk for economic resilience (OECD, 2021a). Risks are increased through greater polarisation and lower compliance with protective measures (Devine et al., 2020). High levels of trust in institutions benefitted New Zealand during the COVID-19 pandemic (see Box 18).

Box 18. The role of institutional trust in building economic resilience in New Zealand

New Zealand scores well on international measures of institutional trust, integrity and transparency (NZPC, 2023c). High levels of trust in public institutions helped the government navigate the COVID-19 pandemic with minimal impact on the economy (OECD, 2023a).

However, emerging economic and sociopolitical issues in the global context may pose a threat to social cohesion in New Zealand. Disinformation, societal division, and polarisation amplify this threat. Gluckman et al. (2023) found that resilience is not merely a function of the effectiveness of local and central governance. Resilience also depends on the psychological, social, and economic wellbeing of the community, as well as on the ability of individuals to work with each other, and their degree of trust in institutions.

The Public Service Commission, in its three-year briefing to Parliament on the state of the public service, outlined how the public service could deliver better outcomes. It proposed increasing engagement and partnership with communities, using co-design and innovative engagement models, and “stepping aside” when communities can deliver a better service (Public Service Commission, 2022). [Chapter 5](#) looks at how the government can work with industry and community networks to develop greater capability in the face of risks to economic resilience.

Experience in one New Zealand community illustrates the benefits of building trust in local networks to enable resilient responses – in this case, in relation to the Cyclone Gabrielle crisis (see Box 19).

Box 19. Case study: Far North community response to Cyclone Gabrielle, facilitated by governance networks built through previous disruptions

Strong existing community networks were a critical part of the Far North region’s successful response to the Cyclone Gabrielle emergency in February 2023 (Jensen, 2023). The Far North had only two full-time emergency management professionals when the cyclone struck. However, collaboration between local iwi, community groups, government agencies, health and emergency services supported “epic resilience” in the face of disaster.

The Te Hiku Delta group was formed during COVID-19 lockdowns and met regularly after the end of the pandemic. Two months before Cyclone Gabrielle, key stakeholders met to discuss the region’s emergency plan in anticipation of the cyclone season. This preparation allowed the region to mobilise resources swiftly when the cyclone struck.

The Far North region’s response demonstrates the value of established governance networks for community resilience. The group used these networks to put together a rapid-response plan to support the local community. This showed that formal, dedicated emergency response structures are not essential for community resilience. The key is having the right people and the right connections at the table to think ahead, for when an emergency arises.

4.3 Successive economic and sectoral development strategies

Section 1.3 documents the long-term weakness in Aotearoa New Zealand's productivity performance, relative to comparator countries. This is one of the legacy challenges that shape the economic context for resilience to new and more frequent disruptions. Other overlapping challenges are the country's low levels of innovation, continued underinvestment in infrastructure, and its weak impetus for adaptation to climate change. Continued efforts to tackle these challenges are needed to build economic resilience, as well as the capability to anticipate, learn about, and prepare for uncertain challenges to come.

This section briefly surveys the efforts of successive governments over the last 25 years to use various sectoral and cross-cutting economic development strategies and initiatives to improve New Zealand's poor productivity performance. It then looks at recent public-private efforts to improve coordination to build resilience (among other objectives). Finally, it identifies a multitude of current strategies that could contribute to building economic resilience but finds that overall, they do not constitute a coherent approach to achieving this objective.

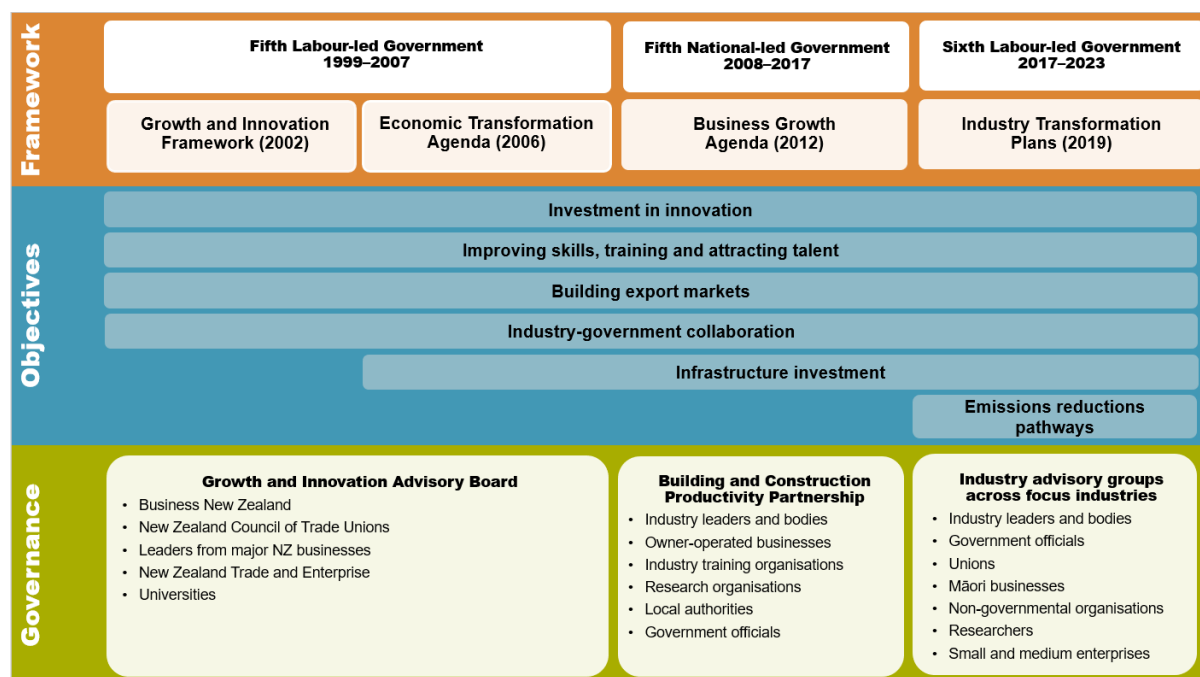
A succession of innovation and productivity strategies

Since 1999, national economic development strategies have included both cross-cutting and sectoral elements. The need to improve innovation and productivity has been a constant theme. Examples of the strategies are the Growth and Innovation Framework (2002), the Economic Transformation Agenda (2006), the Business Growth Agenda (2012), and the last Government's Industry Transformation Plans (2019).

These strategies have used and tested various approaches, ranging from direct government support for industry, to more indirect and delegated ones that aim to foster a business and regulatory environment that encourages innovation (see Figure 26). Despite changes in governments and their programmes, the core objectives – centred around innovation, improved skills, and exports as key pathways to improved productivity and higher living standards – have remained consistent. Each strategy has also included investments in collaborative governance networks (with public and private-sector participants) for implementation and oversight.

The 2002 Growth and Innovation Framework aimed to give the government a more proactive role in the economy, with a focus on innovation as the catalyst for economic transformation. The 2006 Economic Transformation Agenda maintained the same principles and objectives, albeit with greater focus on communicating the government's goal of economic development. The aim of the 2012 Business Growth Agenda was to boost economic growth, productivity, and employment opportunities by developing infrastructure, expanding trade and export opportunities, fostering innovation and research, improving education, and training, and reducing regulatory burdens to create a favourable business environment. The 2017–2023 Labour Government's sectoral strategy focused on the development of Industry Transformation Plans (ITPs) (now discontinued). ITPs sought to transform parts of the economy seen as having significant potential to contribute to a high-productivity, high-wage, low-emissions economy. During COVID-19, the then-government refreshed the focus of ITPs and included sectors seen as "critical" to the economy, even if these sectors did not meet the "high potential" criteria set before COVID-19.

Figure 26: Economic development strategies since 1999



Source: (Cabinet Policy Committee, n.d.; Crawford, 2021; Minister for Economic Development, 2019; MBIE, 2016a, 2020b; New Zealand Government, 2002; Office of the Minister for Economic Development, 2020; Productivity Partnership, 2015)

Part of the motivation for the series of government initiatives aimed at improving sectoral performance over the last quarter of a century was to support desirable features at an industry level, which firms typically do not invest in on their own. These features include relevant R&D, skills and training, industry-specific regulation and infrastructure, and vibrant early-stage capital markets. Typically, firms underinvest in these features due to their inability to capture many of the benefits associated with their investments. Accordingly, there is a persuasive argument to coordinate and collaborate across firms and with government to make them happen. As we described in our *Frontier firms* report, one example of success is when an industry operates as a thriving ecosystem that evolves over time. Policies and arrangements in other SAEs demonstrate how governments can lead but not dominate this evolution, and so speed it up (Crawford, 2021; NZPC, 2021) (see also [Chapter 5](#)).

Governance arrangements have evolved in some industries or sectors over successive iterations of the strategies. Recognition of the case for collaboration between the private sector, government, and other stakeholders has been a common thread across all governments in this century (see Figure 26).

- The Growth and Innovation Advisory Board comprised 15 representatives from diverse organisations and was chaired by business leaders. It convened every two months to deliberate on proposals formulated by action groups.
- Under the Business Growth Agenda, the then government established another form of public-private governance. This was the Building and Construction Productivity Partnership, set up in 2010. It was funded jointly by BRANZ (a building research organisation), the Built Environment Training Alliance, and the Department of Building and Housing. This partnership orchestrated sector-led initiatives to generate transformative changes in the building sector. However, its primary role was to give the

sector a voice to advise the government, rather than to enjoy any shared power to make decisions on issues.

- The development of ITPs further expanded the scope of public-private industry collaboration. ITPs aimed to foster the development of more productive and globally competitive enterprises. They were designed to be driven by the industry itself, with input from advisory, steering, and working groups comprising government officials; business and union interests; Māori representation; and, in certain instances, academic and research voices. The structure and role of the sectoral advisory groups varied according to the specific industry. For example, the Advanced Manufacturing ITP used regional action groups to support the implementation of ITP initiatives, which unlocked synergies across regional and sectoral strategies.
- With the discontinuation of the ITPs (and the end of the Construction Sector Accord) the new Government is now considering how, with what resources, and in what form it will carry on its engagements with industry sectors (Slade, 2024).

New Zealand's productivity growth has continued to underperform, relative to many other developed countries since the 1970s (NZPC, 2023c). Although successive administrations from the late 1990s onwards have made significant efforts with innovation and sectoral development strategies, the intended outcomes have largely not happened. Despite persistent application of these strategies, they have not achieved productivity catch-up.

Our follow-on review of our *Frontier firms* inquiry (NZPC, 2023a) identified several reasons for this lack of success:

- An overly top-down (rather than a collaborative and devolved) approach for selecting the sectors for attention and designing their governance arrangements¹³.
- The problem of “sub-therapeutic doses” of public investment that are insufficient or too unstable to make a difference, and fail to stimulate stakeholder commitment and co-investment.
- Failure to require and practice quality monitoring and evaluation to learn and apply more widely what works.
- Insufficient alignment of effort across government silos to reduce fragmentation and unlock synergies – for instance, developing stronger business-researcher links.

Despite these gaps, our follow-on review acknowledged that recent developments have demonstrated some progress in fostering genuine dialogue across stakeholders and with government. It is also possible that a more volatile future will strengthen incentives for industry collaboration.

Finding 26.

Successive governments have participated in industry-government networks to raise Aotearoa New Zealand's economic performance through increased innovation and exports.

¹³ The Commission's review notes that governance of the strategy for each ITP effectively still was in the hands of Cabinet, which approved the final form on the advice of officials. This means that, while stakeholder groups may offer valuable insights through advisory roles, there was little evidence of genuinely devolved decision making.

Recent public-private coordination efforts have helped with resilience

The signs of progress from within industry-government networks are observable in the construction industry, which has one of the longest track records of sectoral initiatives. A comparison of the 2020 and 2022 construction ITP documents reveals a shift from explorative actions (aimed at a better understanding of industry challenges) to more specific and implementable plans. An evaluation of the initial three-year transformation plan found progress in building strong relationships that could have a tangible impact on the sector (Chen et al., 2022). Submitters to this inquiry noted the benefits of these networks in tackling the recent plasterboard shortage.

At the height of the Gib shortage, the Construction Sector Accord through the Ministry of Business Innovation and Employment (MBIE) played a key role in facilitating direct government-to-sector engagement. A taskforce was then established by the Minister for Building and Construction to engage industry expertise and provide plasterboard substitution guidance. In its building materials market study, the Commerce Commission drew lessons from this period in its recommendations to establish a national key building product register and build on knowledge sharing arrangements through a building consent authority “centre for excellence”.
(Infrastructure New Zealand, sub. 14, p. 3)

Māori businesses and business networks noted that one of the positives of the COVID-19 pandemic was greater connection between government officials and Māori (Haemata, 2023). However, this was tempered by a desire to maintain these connections with government for the long term, rather than abandoning them post-disruption. The te ao Māori principles of whanaungatanga, aroha and tuku mana, and the partnership principle embedded in te Tiriti o Waitangi (outlined in the draft Māori resilience framework in [section 1.1](#)) provide a framework for medium- and long-term thinking about improving resilience.

Venture Taranaki’s experience with the Just Transitions programme¹⁴ showcased the significance of investing in relationships across government (central and local), local communities, industry, and Māori. These prior relationships and pre-existing plans facilitated a well-coordinated response by the Taranaki region to the pandemic.

Because people had been working together on Just Transitions and there was a good leadership group with local government, central government, representatives from Iwi and other community groups and business leaders who had become used to meeting and talking strategically when the pandemic hit because everyone knew each other and there were existing plans and thoughts that could be rapidly pulled together in a responsive situation...We felt we hit the ground with a lot of those foundations in place without having to scramble around looking for who’s who and who needed to be connected up.
(Anne Probert, General Manager, Venture Taranaki, (NZPC, 2023e))

¹⁴ The Just Transitions programme was established by the sixth Labour-led Government in 2018 to help share and coordinate the work of transitioning New Zealand to a low-emissions economy.

These examples highlight the advantages of nurturing relationships and collaborative ties well before crises emerge. They emphasise the importance of establishing key relationships during periods of relative stability, which can support a faster and better-informed response when disruptions arise. Although evidence is not currently available on whether established networks have a similar positive impact on the response to slow-moving persistent disruptions, our discussions with various stakeholders suggest they would. These discussions have revealed a range of perspectives on expected impacts of private-public coordination on economic resilience. Five broad themes have emerged.

1. Enhancing resilience through governance networks and learning

The Construction Sector Accord stands as a notable example of fostering a cohesive industry voice while cultivating greater trust and collaboration between the industry, the government, and public-sector agencies. This unity – especially evident during crises like the COVID-19 pandemic, the gib board shortages, and Cyclone Gabrielle – underscored the significance of existing relationships and preparedness for potential future disruptions. The Accord’s leadership helped steer the industry through these challenges, affirming the potential of collaborative initiatives. Although the journey towards robust governance networks among stakeholders has not been straightforward in construction and other industries, several of them have achieved tangible progress over the past years.

2. Inclusive engagement with diverse enterprises is possible

Collaboration with SMEs and Māori entities remains a work in progress, but the Construction Accord’s supply chain approach has shown promise. By working closely with contractors who, in turn, disseminate information to subcontractors, the governance structure of the Accord facilitates knowledge dissemination to smaller players in the sector. As with many industries in New Zealand, a handful of major construction firms coexist with many smaller counterparts. Developing networks between SMEs, Māori businesses and government, albeit gradually, is crucial to help ensure that government support is not concentrated solely on larger players.

3. Addressing slow-moving challenges through industry engagement

Industry often focuses on short-term, immediate concerns like bottom lines and workforce availability in the upcoming six to twelve months. However, discussions in the Construction Futures Think Tank reveal a potential for pragmatic solutions to medium-term challenges. These discussions help to identify slower evolving but significant industry issues, such as climate change and technological innovation. Fostering greater awareness of, and capability to respond to, gradual changes enhance an industry’s resilience to supply chain disruptions that evolve slowly from minor to more serious.

4. Extending the collaborative model to address resilience in other sectors

Submissions in response to the issues paper for this inquiry noted the value of established governance arrangements for including a resilience perspective in ongoing work. Some submissions recognised that other industries could benefit from similar collaborative governance structures. CentrePort (sub. 11) proposed policies and long-term investments in an overall supply chain approach for Aotearoa New Zealand, including how distribution centres and inland hubs could support regional and economic development. This could be developed by a sectoral initiative in logistics and transport.

5. Potential for progress

The examples of the Construction and Advanced Manufacturing ITPs and Venture Taranaki show promise as ways to help navigate both rapid-onset disruptions and long-term industry challenges. Although these endeavours do not offer quick fixes to vulnerabilities, they lay the foundation for gradually strengthening industries and communities into effective ecosystems capable of developing skills, adapting to climate change, and innovating. This capacity to tackle complex issues is required to respond to both swift and gradual disruptions in supply chains. The examples represent early progress on initiatives that can build economic resilience via innovation and economic adaptation in SAEs (see [section 3.3](#)).

Finding 27.

Existing networks involving industry, government, Māori and other stakeholders are valuable in building economic resilience. They can facilitate innovative solutions when rapid-onset disruptions occur, and they can guide investment to prepare for slow-moving disruptions.

A large portfolio of strategies and initiatives lacks overall strategic direction

This inquiry has identified around 70 sectoral and cross-sectoral strategies and initiatives designed to support policy objectives relating to productivity, climate adaptation, foreign policy, defence, support for Māori businesses, immigration, transport and infrastructure, and regional development (see [Appendix A](#)). The pursuit of these objectives will quite often contribute to economic resilience.

Numerous initiatives and strategies, with related and overlapping objectives, reflect relatively narrow and ad hoc policy development in individual government agencies. Distributing resources and effort across many agencies and many narrow strategies risks administering sub-therapeutic doses that are insufficient to achieve their stated policy objectives (McGuinness Institute, 2022; NZPC, 2021, 2023a; Skilling, 2020). The portfolio currently lacks overall prioritisation of effort and medium-term strategic direction that could consolidate resources to achieve observable changes.

...it would be beneficial to strengthen the co-ordination, alignment and prioritisation across these agencies and strategies. There may be some opportunity to use the Government's Industry Transformation Plan framework to address these issues in a coordinated way.
(NZTE, sub. 9, p. 5)

Finding 28.

Successive governments have put in place a range of strategies and initiatives with objectives that overlap with economic resilience. These strategies and initiatives relate to productivity, climate adaptation, foreign policy, defence, support for Māori businesses, immigration, transport and infrastructure, and regional development. Resources distributed across many strategies and initiatives are often insufficient to achieve their stated policy objectives. From an economic resilience perspective, these strategies and initiatives have lacked coherence, prioritisation, and a focus on results – including across funding mechanisms that build economic resilience across the various strands of economic strategy.

Our primary recommendations in [Chapter 5](#) reflect the need to set strategic alignment between government and industry. Governance at a high level, with active involvement from business and industry, can assist New Zealand to determine its strategic priorities to enhance economic resilience and innovation.

The role of a high-level governance body would be to maintain an overview of, and recommend adjustments to, the scope and scale of the government's portfolio of initiatives, for the purpose of building resilience. The work of such a body would help the government to take a more strategic approach to building economic resilience over the medium term.

5 Pathways to economic resilience

We set out in [Chapter 1](#) why we are taking a medium-term, industry-level approach to economic resilience in this inquiry, and broadly what this involves. Firms and communities are key players in anticipating, preparing for, and responding to economic disruption. Industry-government networks enable firms and communities to do this more effectively. Well-functioning networks can support the development of collective capabilities and a culture of trust, which in turn underpin the reliable deployment of public and private resources to meet emerging and actual disruptions.

This chapter looks mainly at policies and interventions that will strengthen the “generic” economic resilience of firms, industries, and associated communities through industry-government networks. More specifically, it will cover:

- sharing information with industry experts to assess vulnerabilities to trade exposures (see [section 5.1](#))
- improving coordination of public and private investments to build resilience (and innovation) (see [section 5.2](#))
- setting strategic directions for effort to build resilience (see [section 5.3](#)).

[Section 5.3](#) also discusses how the government can work with the private sector to monitor and adjust how cross-economy policies (described in [Chapter 4](#)) are impacting on economic resilience and innovation.

5.1 Sharing information with industry experts to assess vulnerabilities

Building medium-term economic resilience requires businesses to understand their supply chains, to identify trade exposures, undertake analysis of risks, and design strategies to mitigate those risks. Firms are the first movers in assessing their own potential supply chain disruptions, and they have strong incentives to cover them off (Easton, 2023; Skilling, 2022). Most businesses submitting on this inquiry reported taking steps to manage their supply chain risks (see Figure 23 in [section 4.1](#)).

The pandemic-related supply chain bottlenecks have incentivised investments in supply chain digital infrastructure, as firms search for ways to reduce costly shortages and manage the shift from just-in-time to just-in-case logistics (Choi et al., 2023). At the same time, global supply chains have been increasing in length and complexity (Skilling, 2022). Large firms likely have better information than other firms about their supply chains, using their own and their counterparts’ data, and through acquiring commercial data.

Small firms may lack the capacity to acquire information on vulnerabilities and supply chain management tools at a reasonable cost. As a result, industries where small firms predominate would benefit from a coordinated approach to assessing supply chain risks. Better information on systemic vulnerabilities facing industries would also have other public benefits, such as reducing the risk of disruptions on associated communities.

Use trade data to identify exposures and vulnerabilities

Trade data can complement other information, such as expert judgement, to identify exposures and vulnerabilities to economic shocks. [Chapter 2](#), for example, uses trade data to show which industries and regions are more exposed to vulnerable imports and exports. These data can complement market intelligence provided by the Ministry of Foreign Affairs and Trade (MFAT), New Zealand Trade and Enterprise (NZTE) and other public agencies. These agencies monitor relevant market and trade news to help anticipate future supply chain disruptions for Aotearoa New Zealand.

Stats NZ updates trade data monthly, with consolidated releases every quarter (Stats NZ, n.d.). In 2022, the Ministry of Business, Innovation and Employment (MBIE) used these data in a pilot project (unpublished) to identify concentrated imports and exports. We have made use of the Australian Productivity Commission's methodology to analyse Aotearoa New Zealand's trade data for the same purpose (see [Chapter 2](#) and (NZPC, 2023d, Legge & Temple, forthcoming). Regular published analysis would, with expert judgement, help firms and industries to identify their vulnerabilities to economic shocks.

New Zealand is a signatory to the Supply Chain Pillar chapter of the Indo-Pacific Economic Framework for Prosperity (IPEF). This includes a commitment to periodic reporting on supply chain risks in critical sectors in consultation with stakeholders (including the private sector, government agencies, academia, non-government organisations and representative worker organisations) (MFAT, 2023b).

Complement trade data with expert judgment

[Chapter 2](#) discusses the need to use a “data with experts” approach to identify trade vulnerabilities. Expert judgement is needed around the cause and likely duration of fluctuations in trade flows, the availability of substitute products and markets, and the likely impact of disruptions on production and consumption.

The government, primarily through Ministry for Business, Innovation and Employment and the Ministry for Primary Industries, participates in a range of networks with industry (see [Chapter 4](#), [Appendix A](#) and NZPC, 2023a). These networks provide the opportunity for government agencies to work with industry and other experts, to build a better understanding of an industry's exposure to potential trade disruptions. Using these networks would help identify, prioritise and coordinate resilience-enhancing investments (as discussed in [section 5.2](#)).

Recommendation 1.

The Ministry of Business, Innovation and Employment should regularly undertake the analysis of trade data to identify concentrated imports and exports. It should publish the results in a form that will help firms and industries to identify their vulnerabilities to economic shocks.

Recommendation 2.

The Ministry of Business, Innovation and Employment and the Ministry for Primary Industries should encourage and support industry networks to use trade data and expert judgement to further refine supply chain analysis. This work should include that required for reporting on supply chain risks in critical sectors under the Indo-Pacific Economic Framework for Prosperity.

5.2 Co-ordinating investments in resilience

Firms operate in an environment shaped by many other economic actors, including government, education providers, research organisations, and worker organisations. Together, the capabilities held by firms themselves, and the capabilities of those embedded in the business, social and administrative environment impact how firms perceive and respond to potential vulnerabilities. This provides opportunities for industry and government to work together to identify and implement complementary investments that will increase resilience.

Our analysis in [Chapter 2](#) shows that supply chains are complex and dynamic. As a result, measures to build economic resilience cannot rely on a static list of vulnerable goods, services and markets.

Resilience-enhancing policy interventions must match the evolving and changing nature of vulnerabilities and disruptions propagated through supply chains. This in turn requires ongoing connections among the actors who have insights on disruptions, vulnerabilities and measures to address them proactively.

Gains from co-ordination of investments

Firms have the most immediate information and strong incentives to identify vulnerabilities and emerging disruptions (see [section 5.1](#)). But individual firms may lack the means to take effective action if it involves co-investments by other parties (such as new technologies by suppliers, redesigning training or changing regulations). The government has an important role in making credible commitments to the complementary investments for which it is responsible (see Box 20).

In past inquiries, we have identified different coordination mechanisms involving government, businesses, communities, and firms – varying by level of centralisation and formality (see Figure 27). Choice of a mechanism should consider the scope of the issue and its duration, its complexity, and the presence, role, and composition of existing bodies.

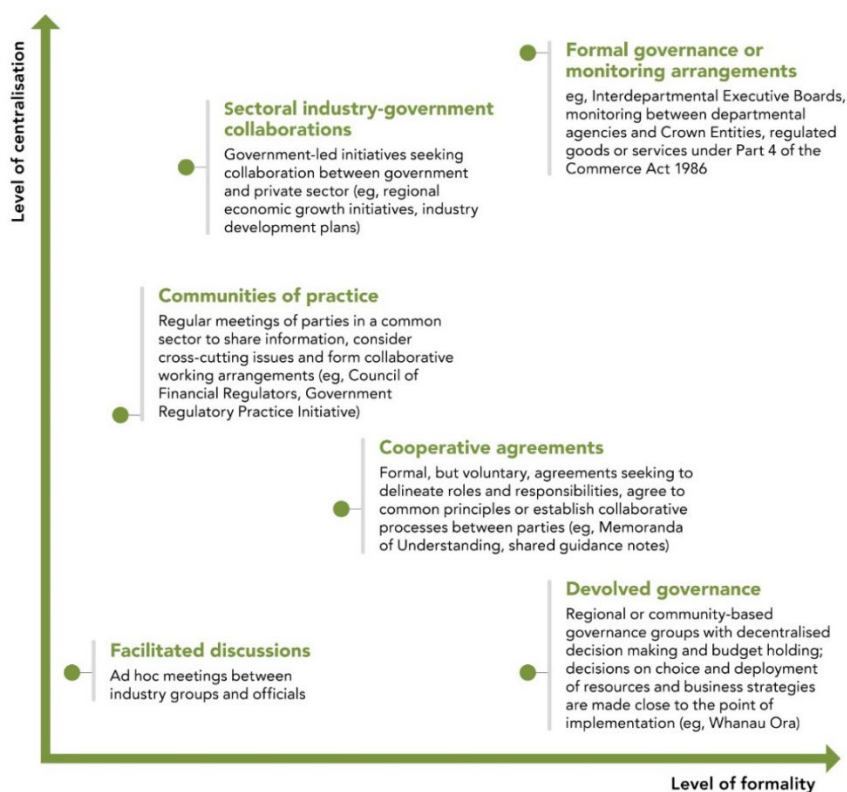
Box 20. Credible commitment from government can improve coordination of investments in resilience

Economists use game theory models to represent outcomes when the interests of parties diverge. In a simple model, parties get the best overall payoff when they select complementary strategies. In comparison, a failure to coordinate can result in worse outcomes for both parties. Coordination games can model the interactions between government and the private sector around decisions that require some degree of public-private collaboration. Examples include investments in infrastructure or economy-wide efforts to reduce greenhouse gas emissions.

Governments, through making credible commitments, can support coordination of government and private strategic investments (Cooper, 1999). Commitment strategies that are credible (and therefore effective) vary according to the extent of alignment in parties' interests and objectives, and the policy context. For example, climate-change mitigation policy faces challenges that are complex, long-term and uncertain in their impacts. In our *Low-emission economy* inquiry, we found that well-designed laws and institutions can play a critical role as "commitment devices" to signal a clear and stable strategic direction, and so shape the development and implementation of effective policies to reduce greenhouse gas emissions (NZPC, 2018).

Investments in complementary infrastructure, in research and development, and through subsidies for preferred private sector investments are other ways the government can support alignment of investments across the public and private sectors.

Figure 27: Different types of coordination mechanisms in New Zealand



Source: Based on NZPC (2012, 2014a, 2018).

Our *International freight transport services* inquiry found that discussions facilitated by central government agencies were effective in coordinating the infrastructure investment plans of private, local government and central government agencies (NZPC, 2012). Strategic decisions should be left to decentralised bodies but informed by a shared understanding of the issues and participants' intentions. For example, the development of an Upper North Island Freight Plan in 2011 involved regional and local authorities, KiwiRail, the New Zealand Transport Agency, the Ministry of Transport, port companies, major freight owners (shippers) and freight transport and logistics operators. The plan provided a basis for greater alignment and integration of plans among private and public decision makers.

The follow-on review to our *Frontier firms* inquiry described how the government and large private-sector firms devolved governance through a joint venture company to coordinate their investments in research into on-farm solutions to reduce agricultural greenhouse gas emissions (NZPC, 2023a). The long-term joint venture (the Centre for Climate Action on Agricultural Emissions) involves ANZCO Foods, Fonterra, Ngāi Tahu Holdings, Ravensdown, Silver Fern Farms and Synlait, alongside the New Zealand Agricultural Greenhouse Gas Research Centre. The partners, including the government, together planned to invest around \$172 million over the first four years from 2022. The arrangement reflects the substantial investments needed to make progress on developing practical on-farm solutions to reduce emissions, uncertainties around the best path to do so (requiring governance to support close ties between researchers and implementers), and the diverse private and public benefits of success.

Coordinating investments through industry-government networks

Governments make indispensable contributions to the environment in which firms operate. For instance, governments provide or fund education and training on which firms rely, they provide physical and social infrastructure, they support research science and innovation, and they set the regulatory environment (see [section 1.4](#)). Governments in developed countries have taken on these roles because they involve the provision of public goods, or they produce benefits to the community over and above those that individual firms or people would produce with just their own interests in mind.

Industry-government networks can build the trust and fine-grained understanding that improve alignment of investment intentions (see [section 3.3](#) for examples from other small, advanced economies (SAEs)). Businesses are more likely to invest in resilience if they are confident that the government has made or will make well-aligned, complementary investments that will enhance the prospects of success.

Higher trust, possibly tested through past crises, enables participants more readily to agree on how collectively to prepare for, and respond to, emerging threats. For example, trust and understanding enabled more aligned and effective responses to the complex and uncertain challenges experienced during the COVID-19 crisis (Devine et al., 2020; OECD, 2021a) (see also Box 18 in [section 4.2](#)).

In our *Frontier firms* inquiry, we discussed how the government can work with industry networks to align public and private investments to promote innovation for export success (NZPC, 2021). This requires:

- a commitment to action, shared across government and other parties, that is sufficiently clear and enduring to provide confidence to make risky investments
- sufficient government and industry co-investments to make a material difference to outcomes
- shared governance of programmes and initiatives among those who have “skin in the game” (for example, firms, workers, Māori entities, education providers, research organisations, investors, and local and central government agencies)
- an experimental, adaptive and collaborative process that accounts for uncertainty and complexity around vulnerabilities and the opportunities to tackle them
- transparency around collective contributions, evaluation of programmes and initiatives, and periodic review of their progress.

The same elements are likely to be important for successful resilience-building investments identified through industry-government networks.

Section 1.1 introduced a model for Māori economic resilience, based on engagement with Māori by Haemata. Our recommended approach to working with industries and communities is congruent with the proposed Māori resilience model in significant respects. This includes a search for new ways, partnership, building connections, and devolved governance and empowerment. These factors together help align collective investments to build resilience. Our approach also recognises the diversity of business arrangements and seeks a longer-term outlook of the sort that Māori businesses contribute to their respective industries.

Diversifying exports

A key challenge for Aotearoa New Zealand is diversifying its export products and markets to increase resilience to future economic shocks (see [Chapter 2](#)). To do this, New Zealand needs more firms exporting specialised, distinctive, high-value products at scale (Easton, 2023; NZPC, 2021; Skilling, 2022).

However, despite the long-term gains from diversification, firms with relatively short horizons may continue to export concentrated export products into concentrated markets – because this is where they can maximise their current profits. Firms may also anticipate and expect a government bail-out in the event of a market disruption, as was the case with the COVID-19 wage subsidy. Even so, where the government credibly signals a direction, firms may follow. The potential gains from coordinating may still outweigh those from their first preference without coordination (Jan, 2003).

Governments can provide credible signals simply through facilitating discussions. Alternatively, they can change financial incentives around investment, or make active use of fiscal or regulatory levers. For example, the German Government recently signalled a commitment to trade diversification through its newly published Strategy on China. The Strategy set out its intention to pursue policies to diversify supply chains, analyse critical dependencies and support regular monitoring. Additionally, the strategy urged companies to take geopolitical risks sufficiently into account in their decision making, and it signalled a review to assess whether the State's export credit guarantees were reinforcing excessive economic dependencies on the part of companies (Federal Foreign Office, 2023).

Focused innovation policy for export success

Economic resilience and innovation are closely linked. Through innovation, businesses, communities, and societies continuously adapt to the opportunities and challenges they face. Over the longer term, modern societies prosper through innovation (Easterly, 2002). Prosperous societies have the resources and capabilities to be more resilient than others to economic shocks – whether through holding fiscal reserves, having good infrastructure, sound national and community institutions, or through having a well-educated, healthy population (Galt & Nees, 2022; Gluckman et al., 2023; Kaye-Blake, 2023; Martin & Sunley, 2020; The Treasury, 2021b). Innovation goes hand in hand with building “generic” economic resilience.

We recommended in our *Frontier firms* inquiry that the government complements economy-wide policies with focused innovation policy to better achieve export success (see Box 21). This requires building sufficient scale in chosen areas through public-industry co-investment and devolving governance to autonomous bodies to oversee the initiatives. Government commitment to initiatives should draw forth complementary industry investments.

Putting in place focused innovation policy should play a central role in making Aotearoa New Zealand's economy more resilient to shocks arising from concentrated export markets. In our *Frontier firms* inquiry, we emphasised that the government needs to engage in a high-level collaborative process to select a limited number of focus areas, and to set strategic directions for implementing and adjusting this portfolio over time. [Section 5.3](#) takes these recommendations further in the context of economic resilience.

Box 21. Focused innovation policy is key to export success

In our 2021 *Frontier firms* inquiry and its follow-on review in 2023 (NZPC, 2021, 2023a) we argued that the most productive firms are vital to lifting national productivity and wellbeing. To best enable these frontier firms to emerge and flourish, the government should focus on building strong innovation ecosystems in a small number of high-potential areas. This requires significant long-term investment in the focus areas. We recommended:

- a broad and collaborative process to reach agreement on the areas of focus for high-performing innovation ecosystems
- a high-level council to exercise strategic leadership and broad coordination, and a more bottom-up governance body for each of the areas for focused innovation
- avoidance of a “mish-mash” of uncoordinated and fragmented support schemes
- alignment of adequate resourcing with chosen focus areas, to avoid the risk of support “doses” being sub-therapeutic
- alignment of priorities for research, science and innovation funding with chosen areas for focus, and an increased emphasis on impact, to make science and research more responsive to industry needs
- alignment of policies to attract foreign investment and high-skill migrants, support for exporters and innovators, regulation, education and training, and investment in infrastructure, so that they are high quality in the chosen areas for focus
- transparency in decisions and regular independent monitoring and evaluation of projects undertaken in the areas of focus
- striking the right balance between long-term policy stability and a willingness to adapt when evidence shows that a particular approach or project is not working.

In the follow-on review, we found that “[w]hile some aspects of existing government processes and initiatives are promising, they lack key elements needed for successful focused innovation policy. These include a collaborative process for selecting a small number of focus areas; two-tiered governance arrangements, with appropriate membership and decision rights; and substantial funding for each focus area” (NZPC, 2023a, p. 5). For example, Industry Transformation Plans lacked the resources, co-investment by business, connection with researchers and enough focus and ambition to spark transformational change.

Strengthening government-industry networks

Beyond export diversification, economic resilience requires looking for opportunities in non-export areas of the economy. Such areas may (for example):

- be considered essential in declared emergencies (such as the COVID-19 pandemic and natural disasters)
- provide key inputs (such as energy and transport infrastructure and housing) to support economic success
- have significant distributional impacts on regions and communities when disrupted
- be established or emerging areas of growth for the Māori economy.

The government already participates in networks in some of these areas of the economy (see [section 5.1](#), [section 4.3](#) and [Appendix A](#)). These collaborations have intersecting objectives, including climate-change mitigation and adaptation, raising productivity, and managing impacts from economic change on affected communities.

SAEs and other somewhat larger economies typically use some form of focused innovation policy involving industry-government networks (see Box 22).

Adequate resourcing through co-investment and devolved governance go hand in hand. Stakeholders with “skin in the game” want meaningful involvement in decisions on resourcing, implementation, monitoring, and evaluation of the initiatives in which they are participating. The government should participate in an equitable way with other stakeholders, rather than exercising “top-down” control of decisions. Effective devolved governance and adequate resources will help realise the potential of current industry-government collaborations.

We recommend that the government works with industry stakeholders in existing relationships and networks to assess their respective industry vulnerabilities (including both export and import concentrations), and to design and implement initiatives to strengthen resilience to those vulnerabilities. This exercise may identify initiatives where success requires co-investments and governance arrangements that are akin to those we recommended for focused innovation policy. [Section 5.3](#) recommends a more strategic approach to deciding on the scope and scale of initiatives to build economic resilience.

Box 22. Industry-government networks for focused innovation policy in small-advanced economies

Many SAEs have experimented with different forms of networks to implement focused innovation policy, sometimes concurrently and with different objectives. In practice, these networks vary considerably in form, scope, and duration, and in the extent to which government is directly involved in governance arrangements. Objectives often align with resilience and include promoting export success, mitigating emissions and adapting to climate change, adapting to ageing populations, and anticipating and leveraging benefits from technological change.

For example, Denmark has developed and refined national technology clusters (it currently has 13). These are now membership-funded organisations whose initial operation was supported with time-limited government funding. A primary function of clusters is to promote networking and collaboration for innovation among members. Private research foundations (often linked to successful Danish multinationals) and the Danish Government fund specific innovation programmes under the auspices of the clusters. Current clusters include a focus on renewable energy, bioresources and food, and acoustic technologies.

Sweden and Canada have been using devolved arrangements and co-funding to support substantial decade-long innovation programmes involving large anchor companies, smaller enterprises, research organisations and other stakeholders. Independent stakeholder bodies decide how to allocate funding for specific initiatives. Independent evaluators periodically assess progress to guide further development.

Finland directly funds anchor companies to undertake innovation programmes, with the requirement that they contract other stakeholders (smaller companies and research organisations) to work with them, and with the intention of strengthening Finnish innovation ecosystems.

Singapore leverages strong informal networks that span government, industry and research organisations to guide innovation effort through committees operating under the auspices of government departments. Effort is organised around a series of industry transformation maps.

Each of these countries has developed an approach that builds on its own history, industry structure, culture of private-public collaboration and, importantly, builds on a willingness to learn from experience and to adapt. For example, Singapore, Canada and Denmark used these networks to mount rapid responses to the supply chain disruptions caused by the COVID-19 pandemic (Crawford, 2021; Crawford & Ashby-Ryan, forthcoming; NZPC, 2021).

Finding 29.

Opportunities exist for the government to work with other stakeholders in ongoing relationships with industry networks to build economic resilience. These relationships enable sharing of information about supply chain vulnerabilities and disruptions, and identification of initiatives to tackle risks. Further government co-investments and effective governance would enable industries and communities to pay sustained attention to supply chain risks and address them proactively in the context of related policy objectives, like innovation and climate-change mitigation and adaptation.

Recommendation 3.

The government should work with the other stakeholders in its ongoing relationships with industry networks to

- improve information about supply chain vulnerabilities and disruptions
- identify and collectively resource and oversee initiatives to tackle the risks.

It should support these initiatives on a sufficient, sustained scale, using suitable governance arrangements for success in building economic resilience over the longer term.

Incentivise “bottom-up” effort to build economic resilience

Chapter 1 highlighted the inherent uncertainty around the nature and potential impacts of future economic risks to Aotearoa New Zealand. It argued that the best approach in the medium term (particularly for disruptions that are “unknown unknowns”) was to build “generic” economic resilience capability – partly through building on existing industry-government relationships, networks and collaborations. Uncertainty means that value exists in maintaining an open approach to such collaborations, because firms and communities that are not part of existing industry-government collaborations may be the first to identify emerging risks and the capabilities needed to cover off those risks.

The government could complement its commitment to existing relationships by inviting industry groups and communities to propose future collaborative initiatives to enhance economic resilience. A contestable fund could resource agreed initiatives. Both Sweden and Denmark have used variations on a contestable funding process to incentivise fresh innovative initiatives. These initiatives involve collaboration between groups of businesses and research organisations to develop new commercial applications, and so to increase productivity, income and jobs (Crawford, 2021; NZPC, 2021). The government should use the institutions and strategic processes recommended in section 5.3 to decide on the size of such an economic resilience fund, the criteria for supported initiatives, and their scope and duration.

Contestable funds carry a risk of favouring proposals from applicants with well-developed capabilities and a knowledge of how the funding system works. Other potential applicants may have more innovative ideas that can provide greater public benefit, or better meet the needs of under-served communities. Fund administrators can mitigate this risk through proactively seeking expressions of interest from a broad range of applicants and working with applicants to help refine proposals.

Māori businesses and communities are key sources of potential innovation to build resilience. Cabinet agreed to a suite of progressive procurement settings in 2020 that included measures to build Māori business capability. Initial targets for the number of public service contracts awarded to Māori were exceeded (NZPC, 2021, 2023a). A similar approach could help Māori businesses and communities to participate in funding to build economic resilience capabilities.

Recommendation 4.

The government should establish a contestable fund to incentivise proposals for initiatives to build economic resilience capabilities, especially in parts of the economy not currently covered by substantial industry-government collaborations. Fund administrators should actively seek proposals from a broad range of applicants, including Māori businesses and communities. Fund administrators should work with less-experienced potential applicants to support their participation.

A stronger resilience lens on industry-focused innovation funds

The government co-funds businesses and industry groups to undertake innovative initiatives through a variety of programmes, with total government contributions in the order of hundreds of millions of dollars each year. Funds currently include the Sustainable Food and Fibre Futures programme, the Ārohia Innovation Trailblazer Grant, the Māori Agribusiness Innovation Fund, and the Māori Business Growth Fund. By their nature, these funds already help build economic resilience (see [Chapter 4](#), [Appendix A](#), and NZPC (2023b)) – but opportunities may exist to further enhance their focus on resilience.

The government should use an economic-resilience lens to review the criteria for grants from firm- and industry-focused innovation funds. At a minimum, this would require funding proposals to assess the relevance of innovative initiatives to building resilience (though this would not necessarily be given weight in the evaluation criteria). Questions that proposals would need to address could include the following:

- Will the proposed initiative impact on trade vulnerabilities stemming from concentrated imports and exports that your firm and/or industry rely on?
- Is the initiative likely to increase or decrease the demand for concentrated imports?
- Is the initiative likely to increase export concentration in a specific market, or does it support export diversification to new markets?

This approach would increase attention to resilience challenges and provide data that could supplement analysis of vulnerabilities recommended in [section 5.1](#).

Recommendation 5.

The government should review the criteria for grants from industry-facing growth funds, innovation funds, and climate-adaptation funds to sharpen their focus on innovative projects to build economic resilience. Such funds include the Sustainable Food and Fibre Futures programme, the Ārohia Innovation Trailblazer Grant, the Māori Agribusiness Innovation Fund, and the Māori Business Growth Fund.

Reduce implementation risks

Focused innovation and resilience policy through industry-government collaborations is a form of modern industry policy. The strengths and weaknesses of past industry policies are hotly debated, but most developed countries use modern approaches. Juhász, Lane and Rodrik (2023) argued there is a strong economic case for modern industry policy, and that the debate should most usefully focus on how best to design and implement it. Modern industry policy is not a return to the protectionist industry policy of the past. However, as noted in [Chapter 3](#), an international trend towards more protectionist forms of trade policy poses real economic risks for small open economies (Evenett et al., 2024).

We have set out the rationale for economic resilience and innovation policy in [section 5.1](#) and the conditions for success above and elsewhere (NZPC, 2021, 2023a). With any form of monetary support, risks exist that powerful interested parties will disproportionately “capture” the benefits. Key measures to cover these risks and give value for money follow (Hausmann & Rodrik, 2006; Lerner, 2013; Rodrik, 2007, 2008; Warwick & Nolan, 2014; Wilkes, 2020).

- Base funding decisions on clear and transparent criteria that focus on new activities that would not go ahead without co-investment, and with clear measures of success.
- Be transparent around the nature, quantity, and target of any public assistance, as a spur to accountability and a brake on lobbying.¹⁵
- Require private co-investment in policy processes and projects, to ensure businesses have “skin in the game” and therefore to increase confidence around prospects for success.
- Ensure durable and stable policy and funding, to give stakeholders enough certainty to make investments over long enough time horizons (see [section 4.3](#)).
- Build the necessary public-sector capability and skills and apply them over a long enough time to create effective networks (see [section 4.3](#)).
- Use governance arrangements that give effect to an “all-of government” view, and that cut through the long-established agendas and priorities of individual government agencies (see [section 5.3](#)).
- Ensure that all initiatives are evaluated rigorously and regularly, with evaluations made public. Use evaluations to review and adjust the portfolio, including dropping or amending unsuccessful interventions.

Many SAEs have longstanding experience with focused innovation and resilience policies involving industry-government networks (Box 22). In these economies, the risk of policy capture is mitigated by competition in global markets that disciplines both the dominant incumbents (who are often exporters) and the government. Voters can observe the performance of domestic firms in global competition and make judgements about whether government policy is delivering on its public-interest objectives or facilitating rent-seeking and capture. In practice, focused innovation policy in SAEs does not feature strong concerns about capture, as such (Crawford & Ashby-Ryan, forthcoming).

¹⁵ For example, eligibility to apply for assistance should be as open as possible, and the target should be a clearly stated objective, rather than to develop a specific technology (NZPC, 2020).

Clarify competition law around firm collaboration to build resilience

Collaboration among firms may sometimes seem in conflict with the benefits of competition in stimulating innovation and building economic resilience. Collaboration risks anti-competitive behaviour, rent seeking, and reinforcement of market power. Competition law broadly reduces these risks, but it may discourage businesses from working together to prepare for and mitigate emerging risks.

The Commerce Commission provides guidance on how firms may collaborate in declared emergencies (such as those during COVID-19 and Cyclone Gabrielle) (Commerce Commission New Zealand, 2023b). However, the law is less clear on whether firms may collaborate in anticipating and responding to “slow-moving” disruptions, such as those stemming from climate change and geopolitical tensions, which do not require the government to declare an emergency.

The Commerce Commission has recently issued draft guidance on collaboration and sustainability (Commerce Commission New Zealand, 2023c) to help resolve similar tensions. The guidelines outline how the Commerce Commission would apply its rules when firms collaborate on activities focused on sustainability. They define sustainability as “the practice of future-focused development to ensure future generations have access to the resources they need to meet their needs” (Commerce Commission New Zealand, 2023c, p. 3).

While sustainability is closely linked to economic resilience (see [section 1.1](#)) it remains unclear how far the draft guidelines clarify the scope for firms to collaborate to mitigate risks to longer-term economic resilience. Given the potential for future disruptions (see [section 1.2](#)) the Commerce Commission should consider issuing guidelines on firms collaborating to build resilience to such disruptions. The guidelines could supplement and extend the approach taken in the draft guidelines on collaboration and sustainability.

Finding 30.

The Commerce Commission has issued draft guidelines on collaboration and sustainability. The extent to which these guidelines apply to firms collaborating to anticipate and build resilience to slow-moving disruptions (such as those arising from climate change and geopolitical tensions) is unclear.

Recommendation 6.

The Commerce Commission should extend its draft guidelines on collaboration and sustainability so that they apply (as far as appropriate) to firms collaborating to anticipate and build resilience to slow-moving disruptions (such as those arising from climate change and geopolitical tensions). However, guidelines and oversight should ensure that collaboration is not used for damaging anti-competitive purposes, particularly in markets where competition is already low.

5.3 Set strategic directions to build economic resilience

[Section 5.1](#) and [section 5.2](#) described how the government can work with industry to build resilience capabilities in selected parts of the economy. It can do so by using existing networks, and it can work with stakeholders to extend the scale and depth of these relationships and collaborations with appropriate devolved governance arrangements and co-funding. It can also seek new ideas for resilience-building collaborative initiatives through establishing a contestable fund.

The approach set out in [section 5.1](#) and [section 5.2](#) could contribute to lifting Aotearoa New Zealand's economic resilience. However, a more deliberate prioritisation of collective effort and investments across the economy is necessary for success. Public and private resources to identify, design and fund initiatives are finite.¹⁶ Initiatives and programmes need sufficient scale, co-funding, and effective governance to make a difference.

A clear and compelling strategy is required to prioritise among competing but overlapping objectives, transcend the established agendas of public agencies and private businesses, build a shared view of the way forward, and maintain consistent efforts over the medium term. The strategy needs to adapt over time as better information emerges about the changing nature of economic shocks and vulnerabilities. This requires strong institutions, effective leadership, and good relationships among government bodies (central and local), industry organisations and the community.

This section discusses the governance institutions and processes that will sustain an economic resilience strategy. It recommends that the government establish a Long-term Advisory Group for Economic Resilience and Innovation (LAGERI). Setting up LAGERI will require broad consultation and will take time to implement. [Section 5.3](#) also sets out a possible interim approach that aims to bring together public-sector resources to take a more coherent and strategic approach to building economy-wide resilience.

Establish a Long-term Advisory Group for Economic Resilience and Innovation

This inquiry shows that initiatives to support economic resilience potentially involve a wide range and variety of industry-government collaborations and need to be open-ended in scope to cover the potential for unexpected risks (“unknown unknowns”). Participants need a collective means to help prioritise and steer effort, conduct periodic reviews of outcomes and adjust course over time.

The primary task for the LAGERI would be to work with the government to help set strategic directions for, and oversee the implementation of, a national economic resilience and innovation strategy. The group should advise on priorities (including funding priorities) among the wide range of existing strategies and initiatives (discussed in [section 4.3](#)) with objectives that overlap with an economic-resilience objective. The LAGERI would develop a shared view of the way forward, transcending the established agendas of public agencies and private businesses, and would help steer consistent effort over the medium term. This would include maintaining a watching brief over the impact of cross-economy policies (such

¹⁶ The Controller and Auditor-General has recently argued that the government needs to improve the way it reports on its performance in tackling complex and long-term challenges such as climate change, child poverty, and inequity. “The reporting needs to shift away from a focus on inputs, activities and outputs to a focus on reporting on how the government is serving and making a difference for New Zealanders” (Controller and Auditor-General, 2023, p. 18). [Section 5.3](#) recommends governance arrangements that should provide for more effective reporting on the government's performance in building long-term economic resilience.

as regulation, competition policy, trade policy and export promotion, support for R&D and innovation, and education training) on national economic resilience capabilities. A key challenge would be to identify and tackle critical strategic risks to the economy.

The LAGERI should comprise senior leaders from across industry, central and local government, Māori, the research community, and educators. The government should select members for their individual expertise and promotion of the interests of New Zealand – rather than any specific interest areas they may represent. It should set the terms of reference for the advisory group to reinforce a focus on New Zealand’s interests. The Prime Minister, with Ministers of key economic agencies, should lead government input.

The LAGERI would perform similar functions to high-level research and innovation councils that are prevalent across the OECD (see Box 23)

Box 23. High-level governance of research and innovation policy in the OECD

High-level research and innovation councils are prevalent across the OECD (Borowiecki & Paunov, 2018; Paunov & Borowiecki, 2018). Only four (including New Zealand) of 31 OECD countries lack such a council (the others are Ireland, Italy and Norway) (Borowiecki & Paunov, 2018, p. 26). In 23 countries, national councils have a role in strategic priority setting. In nine countries, the mandate extends to policy advice, policy evaluation and policy coordination (2018, p. 27). In 12 countries, a combination of the prime minister, other ministers, and representatives from higher education, public research institutes and the private sector participate in their research and innovation councils (p. 35).

Finland’s Research and Innovation Council (RIC) (and its predecessors since its establishment in 1987), chaired by the prime minister, has taken the lead in shaping overall innovation strategy. It has historically “acted as an arena for debating innovation policy priorities from a holistic perspective and forming a national strategic consensus ...it monitored the state of Finland’s innovation system and supported strong coordination and high-level decisions” (OECD, 2022a, p. 87). In 2016, the government of the day, facing a fiscal crisis, reformed the RIC, abolishing its independent secretariat, and reducing its influence on setting strategy (Arnold et al., 2022). Recent governments, with cross-party support, have moved to rebuild the RIC’s strategic role and independence (Finnish Government, 2023, p. 123; Parliamentary RDI Working Group 2022, 2023).

An integral building block towards forming New Zealand’s economic resilience and innovation strategy would be a Māori economic resilience model drawing on mātauranga Māori and tikanga. The LAGERI provides for Māori voice at all levels – in the overarching group and across individual industry-government networks, relationships and collaborations. In all areas of economic activity – but especially where the Māori economy plays a significant role, or where high levels of Māori employment are present – it would be expected that innovative solutions rooted in mātauranga Māori can be brought to the forefront and the intellectual property of Māori upheld (see Box 24).

Box 24. Case study: Mātauranga Māori construction technique provides innovative solution to natural disaster resilience

Toka Tū Ake | Earthquake Commission (EQC) funded Māori architectonic researchers from the University of Auckland to work closely with local hapū Ngāti Ira o Waioweka in Opōtiki, on recreating the traditional mīmiro construction technique used to enhance the seismic resilience of the local wharehūi (University of Auckland, 2023). The prototype was tested against seismic requirements for modern buildings and has been “conclusively proven” to be capable of withstanding major earthquakes (McDonald, 2023).

The technique is rooted in mātauranga Māori and uses interlocking compression joints instead of bolting. It will make a useful contribution to future seismic resilience (RNZ, 2023). The case study demonstrates that funding and collaboration between government, research institutions and Māori communities have the potential to realise innovative approaches to resilience based on indigenous practices, as well as providing the opportunity to revitalise endangered knowledge.

Recommendation 7.

The government should establish a Long-term Advisory Group on Economic Resilience and Innovation (LAGERI) to help set strategic direction for, and oversee the implementation of, a national resilience and innovation strategy. The mandate of the group would include the following:

- Maintain an overview of, and recommend adjustments to, the scope and scale (including co-funding) of the government’s portfolio of industry-government collaborations for the purpose of building economic resilience and the related challenge of innovation.
- Advise on the choice of areas and strategic directions for focused innovation policy
- Advise on the design and operation of a contestable fund for new initiatives to build economic-resilience and innovation capabilities.
- Investigate sources of innovation stemming from mātauranga Māori through commissioning further research based on Māori economic resilience.
- Monitor the impact on economic resilience of cross-economy policies such as regulation, competition policy, trade policy and export promotion, support for R&D and innovation, and education and training, and recommend adjustments that will better support resilience.

The LAGERI should comprise senior leaders from across industry, government, Māori, the research community, and educators, chosen for their individual expertise and promotion of the interests of Aotearoa New Zealand. The Prime Minister, with Ministers of key economic agencies, should lead government input.

To be effective, the LAGERI would require an independent secretariat to enable it to carry out or commission monitoring and research, and to develop proposals to set strategic directions.

Align collective public sector efforts

Experience internationally and in New Zealand suggests that the LAGERI will be effective only if the government engages at a senior level, with a collective public-sector perspective and in good faith (see [Chapter 3](#) and [Chapter 4](#)). For instance, the Finnish Prime Minister and other Ministers participate in regular meetings of the National Innovation Council (see Crawford & Ashby-Ryan, forthcoming).

New Zealand, through the Public Service Act 2020, has recently developed the Interdepartmental Executive Board (IEB) model to pursue cross-agency objectives. The IEB model has the potential to provide more consolidated senior public-sector engagement with the LAGERI with a medium-term, economy-wide perspective. An IEB could also be a steward for developing public-sector capability to support a collaborative economic resilience strategy.

The IEB model is designed to overcome a tendency for individual government agencies to pursue their own agendas at the expense of gains to be had from a broader all-of-government approach. IEBs enjoy a Cabinet mandate, close engagement with ministers, and dedicated funding. They provide a formal structure for government agency chief executives to collaborate on significant cross-agency issues, supported by an independent secretariat that can be funded from the IEB's own appropriation. The secretariat can provide policy advice, ministerial servicing, and carry out reporting activities under delegation from the IEB.

The government has established five IEBs to date. Their responsibilities cover climate change emissions reduction, spatial planning, elimination of family and sexual violence, management of Aotearoa New Zealand's border, and coordination of the government's digital plan.

The IEB model is better placed than less formal mechanisms (such as the Economic Chief Executives group) to pursue cross-agency objectives. However, some participants in IEBs have highlighted that issues remain around the adequacy of resourcing for IEB secretariats, and around the clarity of roles and commitments across participating agencies.

The chair of the IEB would usefully be a member of the LAGERI, while the IEB's secretariat could also serve as its secretariat.

Finding 31.

Interdepartmental Executive Boards (IEBs) provide a novel mechanism to get better value and more aligned decision-making across public-sector silos. An IEB could support effective public-sector engagement with a national economic resilience and innovation strategy.

Recommendation 8.

The government should establish an Interdepartmental Executive Board (IEB) to support effective public-sector engagement with a national economic resilience and innovation strategy. The IEB's purpose would be to avoid fragmented efforts across public-sector silos and improve alignment by:

- supporting the Long-term Advisory Group on Economic Resilience and Innovation
- providing a single point of contact for businesses and communities
- providing a single hub for the collection, analysis and sharing of relevant information
- scanning the evolution of resilience efforts in other countries.

Make progress in the nearer term

It could take some time to design, marshal support for and resource a LAGERI and to get it fully functioning. It would also take time to authorise, establish and fund an IEB to provide senior public sector engagement with the LAGERI. A case exists for not waiting as long as this for greater coherence and leadership, so that the public and private sectors can start sooner to build longer-term economic resilience. A gap in our system to provide this advice currently exists.

The government could make more rapid progress towards a national economic-resilience strategy by tasking a subset of the Economic Chief Executives group with the initial work. The group should be led by the Treasury. The primary tasks of this group would be to develop advice on the key strategic priorities to build long-term economic resilience and the establishment of the proposed LAGERI over an 18-month period. It would also advise on the establishment of an IEB and its scope, role, and relationship with the LAGERI.

To lift the strategic capability of the public sector, we recommend forming a secretariat to support the subset of the Economic Chief Executives group. This group would bring together thinking on critical strategic risks facing Aotearoa New Zealand at the intersection between long-term economic performance and productivity, climate-change transition, and the impact of climate change and natural hazards.

Recommendation 9.

The government should establish a Chief Executives group to develop advice on the key strategic priorities to build long-term economic resilience, and on the establishment within 18 months of a Long-term Advisory Group on Economic Resilience and Innovation (LAGERI). The group should be led by the Treasury. The group should also advise on the establishment within 18 months of an Interdepartmental Executive Board (IEB) to support the LAGERI, and on the IEB's scope and role.

6 Making it work: Operational logic for implementation

Chapter 5 described how the government can work with industry to build resilience capabilities in selected parts of the economy, using existing networks. It can also extend their scale and depth with appropriate devolved governance arrangements and co-funding. This approach would increase attention to vulnerabilities and foster industry-level initiatives to address them. It would also see the establishment of two interdependent high-level bodies with an economy-wide overview (a Long-term Advisory Group for Resilience and Innovation (LAGERI) and a dedicated Interdepartmental Executive Board (IEB)).

While trends suggest there will be more disruptions in the next decade than the past three, there may be periods of stability where investments in resilience seem wasteful. Linking resilience and innovation policies helps spread fixed costs and address the cyclical attention to resilience that peaks after every disruption. The need to develop innovation capability is independent of uncertain disruptions, as the continuous sliding of Aotearoa New Zealand's economy in global productivity rankings amply demonstrates. Since innovation and resilience capabilities closely overlap (in that both require firms, industries and communities to anticipate and adapt to future changes, although resilience is driven more by negative disruptions than new opportunities), developing the former enhances the latter.

Overall, Chapter 5 set out our advice on how to replace ad hoc responses to supply chain disruptions with more proactive measures. If persistent disruptions become more frequent, as current trends suggest, there will be a demand for a more proactive approach to reduce their cumulative impacts. Postponing this upgrade from ad hoc to proactive until after the next disruption will reduce the odds that a major vulnerability is identified and addressed before a disruption turns it into material damage to New Zealand's industries and communities.

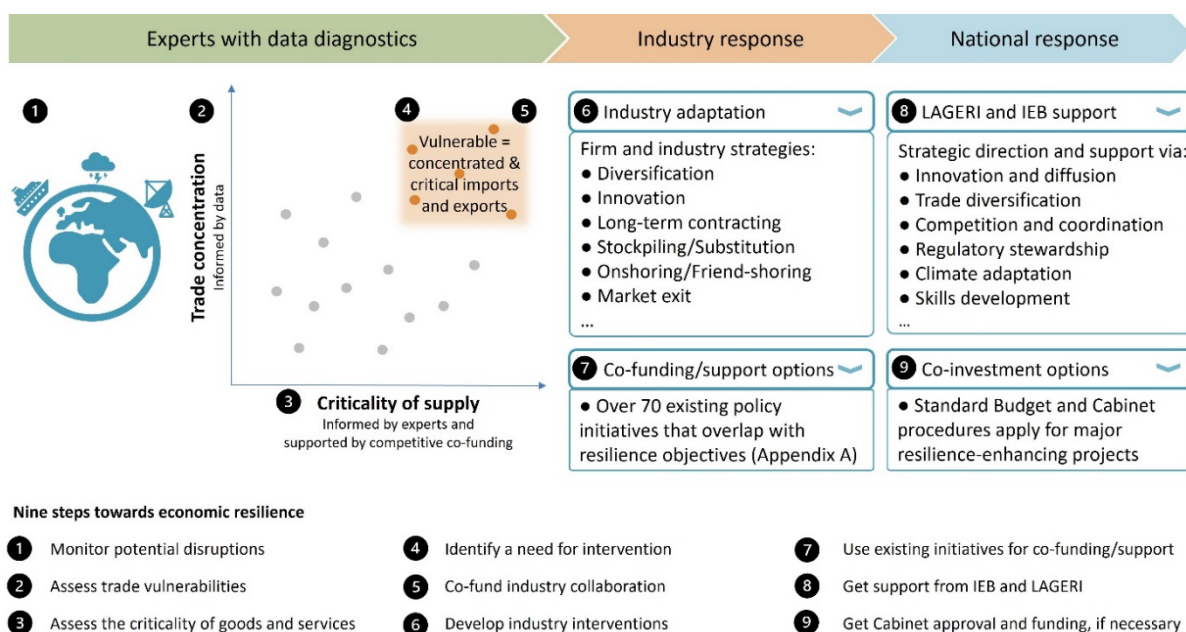
This chapter outlines the operational logic for our recommendations, which can be summarised in nine steps (see Figure 28). These steps represent the mechanics of responding to increased uncertainty and building generic resilience to a wide variety of potential shocks.

1. Monitor global and domestic sources of potential supply chain disruptions by firms, industry organisations and public agencies.
2. Assess trade vulnerabilities stemming from concentrations in import and export markets in the light of new information on emerging and potential disruptions.
3. Assess the criticality of imported and exported goods and services for the performance of New Zealand's industries and communities (this step is driven primarily by industry experts with in-depth knowledge of production technologies and supply chains).
4. Identify a set of goods and services that are both concentrated and critical under some plausible disruption scenario (this set is likely to change quite often as production technologies, supply chains, and knowledge about potential disruptions evolve).
5. Motivate firms and industries to take account of wider costs and benefits associated with resilience, innovation, and security through public co-funding of industry-government networks.
6. Firms and industries exposed to vulnerable and critical goods and services should proactively invest in their resilience by diversifying their imports and exports, moving to less vulnerable markets, or innovating to reduce exposure.

7. Firms and industries should use the existing portfolio of about 70 initiatives to co-fund their resilience-enhancing investments (see Appendix A). Their objectives overlap with resilience, and their criteria should include enhancing resilience – see section 5.3.
8. The LAGERI provides business with a voice to shape and commit to long-term policy challenges, including resilience and innovation – it can support larger co-investment projects addressing vulnerabilities requiring industry- or national-level response.
9. Cabinet, based on advice from the LAGERI, can rely on standard decision-making and budgetary procedures to implement national responses to particular vulnerabilities not already addressed through existing initiatives under step 7.

These steps are described in more detail in [section 6.1](#) to [section 6.9](#).

Figure 28: Operational framework for resilience-enhancing interventions



This framework reflects the recommendations in [Chapter 5](#), which emphasise industry-level collaboration between firms and relevant agencies in identifying and responding to critical vulnerabilities. Most vulnerabilities and emerging disruptions can and should be addressed without escalation to the national level. However, there needs to be a pathway to escalate vulnerabilities and disruptions of strategic importance to the proposed advisory group. The emphasis on industry-level collaboration distinguishes this framework from more top-down forms of public interventions, in which resilience decisions are made on the national level and imposed on industries and communities. At the same time, this framework is aligned with emerging public-sector-led initiatives centred on the economic security of critical supplies and infrastructure that are more likely to rely on top-down decisions stemming from national security considerations.

The [Chapter 5](#) recommendations build off legacies of past sectoral initiatives. These building blocks make implementation easier and cheaper. The diagnostic part can be done in the context of existing industry-government networks developed for innovation, industry transformation, biosecurity, dairy, kiwifruit or other purposes and industries.

Resilience-enhancing projects can be co-funded by existing government programmes, the objectives of which overlap with economic resilience. The coordination across public service could be done by teams at the Ministry of Business, Innovation and Employment (MBIE) (such as those leading on the Indo-Pacific Economic Framework for Prosperity (IPEF)). However, we think there are good reasons to establish an IEB to provide industries with a single point of contact on resilience and innovation and counteract the tendency to silos in the public sector. Finally, a formal mandate for the LAGERI would help it to replace and outlast similar ad hoc advisory groups to the prime minister that have existed over time. Such an advisory group, supported by an IEB, will help shape strategic direction and ensure commitments to policies for innovation and resilience for the next decade and beyond.

6.1 Monitoring of emerging disruptions

Firms naturally monitor their business environment, which includes supply chains. The higher uncertainty and volatility in the next decade will make this environment more challenging, as impacts from changing geopolitics and climate become more pronounced. Some geopolitical trends or potential trade disruptions might be more evident to public service agencies (such as the Ministry of Foreign Affairs and Trade (MFAT), Ministry for the Environment (MfE), Department of the Prime Minister and Cabinet (DPMC) or New Zealand Trade and Enterprise (NZTE)) than to firms. Moreover, firms will need input from public agencies to navigate new expectations imposed on trade by sanctions, trade restrictions, and re-shoring supported by the industrial policies of other countries. These measures can fragment global trade supply chains, and firms will struggle with compliance to formal requirements and informal expectations (such as the potential for large countries to expect to recoup some of their subsidies by selling more expensive goods to friendly countries).

Existing industry-government networks (see [section 5.3](#)) facilitate structured exchanges within industries and with related policy agencies to improve awareness of “known and unknown unknowns” that could impact their industry (see [section 1.4](#)). At the same time, mobilisation of these networks to respond to new vulnerabilities and emerging disruptions depends primarily on the ability and willingness of the firms and public agencies in the networks to engage and maintain multi-sided communication and coordination.

Steps 5 to 9 (outlined above and described below), based on our [Chapter 5](#) recommendations, will make industry collaboration with government easier, and more workable and efficient. While these steps may seem burdensome in times of relative stability, they are prudent investments to prepare for future disruptions, and we are confident they will deliver better outcomes than the alternative (that is, a reactive and ad hoc approach). Moreover, the available co-funding that existing industry-government networks can mobilise for resilience-enhancing projects is modest.

6.2 Assessing trade vulnerabilities

Filtering trade data, making input-output calculations and using tools that help monitor trade restrictions, sanctions or logistics bottlenecks provide evidence-based insights into trade vulnerabilities (see [Chapter 2](#)). The data-driven tools can unearth changing patterns of trade, concentrated markets, and other exposures that increase the vulnerability of industries and communities to supply chain disruptions. However, trade data alone cannot support decision making on economic resilience. Data findings need to be interpreted with industry expertise to distinguish between common market volatility and temporary disruptions (that do not require any adaptation), and persistent disruptions (that do require adaptation, possibly supported by some public intervention).

Consultation throughout this inquiry suggests that productive engagement with data tends to start from expert questions. Since trade-data analysis can produce a lot of false positives and false negatives, even experts find it difficult to identify which goods or services may require closer attention. A pragmatic approach would be to start with an expert hunch based on new information or unusual market signals, which IEB analysts (see [section 6.8](#)) can systematically evaluate using trade data. While truncated consultations at the end of this inquiry prevented us from reaching a more conclusive view, the most productive approach to identification seems to be to start with experts – more “experts with data” than “data with experts” (see [section 2.1](#) and Box 25).

Box 25. Experts with data: Sharing and assessing early warnings

The New Zealand Productivity Commission, along with our counterparts in Australia, Canada, or the European Union, concluded that trade-data analysis needs to be complemented by deep insights from experts in industry supply networks and production technologies. Data analyses can identify concentrated products but not their criticality, as that requires knowledge of alternative substitutes and technologies.

However, interactions with stakeholders during this inquiry suggest that data analysis is useful for assessing early warning signals identified by industry insiders. To ensure that early warning signals are not lost, industry insiders must be able to connect with trade analysts, and if needed, their advice should be shared with the relevant industry and government stakeholders. This need for proactively sharing information and insights is one reason that this inquiry emphasises industry-government networks.

6.3 Assessing goods and services criticality

Proactive investments in economic resilience require the identification of vulnerabilities and exposures. At the most granular level, trade statistics on exports and imports provide information on the prices and volumes for over 10,000 goods. In contrast, data on services are available only in a highly aggregated form. This data structure is suited to the identification of large vulnerabilities – major import and export items. While disruption to any of these would significantly impact the prosperity and wellbeing of industries and communities in Aotearoa New Zealand, vulnerabilities in “small”, much less visible items can also pack a large negative punch. They can trigger a domino effect, creating major adverse impacts throughout the economy. An example of such a vulnerability might be one of the highly skilled services needed to maintain public or corporate infrastructure, or the chip shortage that drastically reduced global car production after the pandemic.

Insights into production technologies and supply chain logistics are therefore needed, to complement data-driven assessment of vulnerabilities and indicate whether any given import or export is critical. Production knowledge is needed, to understand substitutability among various inputs and technologies. A vulnerable import can often be replaced by another one from a less vulnerable source. Even if an input cannot be replaced, there may be an alternative production technology that avoids exposure to that input. Moreover, these assessments must be done relatively frequently, because production technologies, supply and demand conditions, and the logistics of supply chains evolve rapidly, especially in turbulent times.

The depth of knowledge necessary to assess the criticality of vulnerable inputs is typically available only within the industry that needs such knowledge for its success and survival (see Box 26). However, firms have conflicting incentives to share insights on vulnerabilities and early warning signals. Clearly a firm with a reliable insight that an input that is about to increase in price due to disruption would have a strong incentive to pre-stock it. Such insights can also provide a competitive advantage – firms better prepared for a supply chain disruption can capture the market share of competitors. However, more systemic shocks to the whole industry or economy provide few arbitrage opportunities, and firms have incentives to share intelligence, provided there are established pathways to do so.

Our recommendations strive to leverage existing industry-government networks for the purpose of capturing and sharing information on vulnerabilities and emerging disruptions. There is too much uncertainty about supply chain disruptions to justify a dedicated governance mechanism just for resilience (beyond the few critical supplies and infrastructures that are outside of the scope of this inquiry). It is also possible that there will be no systemic supply chain disruptions in the next five years, followed by many in the subsequent five years. This would make it difficult to maintain attention and resourcing to a dedicated economic-resilience initiative. Instead, integrating resilience into industry-government networks developed over the past years around innovation, industry transformation, biosecurity, dairy, kiwifruit or similar is not only more efficient, but also more sustainable over time.

Box 26. MIQ insights into criticality

The criticality of specific goods and services is not easy to identify, because it depends on the nature of disruption and changes over time. The efforts to specify essential goods and services during the pandemic response provide ample evidence that many goods and services initially viewed as non-essential quickly became essential. For example, there was never any doubt that trucking was an essential service to maintain food distribution, but this also made essential the industry ecosystem that keeps trucks operating – service stations, spare parts, and new truck sales. These businesses, in turn, depend on other suppliers that also become essential over time.

During the pandemic, New Zealand introduced a Managed Isolation and Quarantine (MIQ) to prevent the spread of COVID-19 across the border. Firms and industries could request to bring in workers with essential skills from overseas (Office of the Minister for Economic Development & Office of the Minister of Immigration, 2020). However, to bring in migrant workers, firms needed to secure scarce MIQ places where they would stay until proven that they are not infected. MIQ requests provided a unique window into critical skills for New Zealand's industries.

Some anticipated requests were allocated MIQ quotas, including Recognised Seasonal Employer workers for primary industries, skilled workers for infrastructural projects such as Auckland City Rail Link and Wellington's Transmission Gully Motorway, or some sports teams (RNZ, 2021). However, MBIE's COVID-19 website documents many requests for specialised maintenance workers for healthcare, wind turbines, toilet paper manufacturers, space launch operators, oil and gas fields, and gas-fired, geothermal, and hydropower stations (COVID-19 Ministerial Group, 2020; MBIE, 2020a, 2020b). Specialist skills were needed to install new equipment across industries, from the food sector to fisheries, and from ski fields to wastewater treatment plants (All of Government Group, 2020; MPI, 2020b, 2020a; MBIE, 2020c, 2020d).

Although the MIQ experience is mostly anecdotal, it amply demonstrates the exposure of industries and communities to specialised services. Many firms were surprised that large projects hinged on getting a single specialist into New Zealand and made desperate pleas to bring them in. There is a case for experts and data analysts to consider whether some critical skills need to be on-shored if any emerging disruption challenges the flow of people in and out of the country.

6.4 Vulnerable and critical supply chains

The previous three steps imply that any supply chain concern requiring a proactive response (potentially including some form of public intervention) should fulfil the following criteria.

- **Disruption** – some change in the global environment explains why a good or service not previously considered vulnerable has become of concern.
- **Vulnerability** – trade data indicate that a good or service cannot be sourced from, or supplied to, an alternative market and a lasting disruption is likely to have a material impact on industries and communities that exceeds temporary trade fluctuations experienced in the past; and

- **Criticality** – insights of industry experts confirm that the supply chain disruption cannot be absorbed or adapted to by using alternative supplies, technologies or markets, and it is likely to have material impact on industries and communities.

These criteria present a relatively high hurdle to be cleared before exchanges among industry and government actors, and before considering some form of public intervention, would be called for. However, some industries – especially those with many dispersed small firms and information flows and few large firms – will likely struggle to undertake the necessary overview on whether the hurdle is cleared in specific cases. Current policy and institutional settings effectively require industry stakeholders to self-organise, identify an industry-wide vulnerability or disruption, jointly approach government agencies, and hope that the vulnerability and criticality will be recognised and escalated throughout the appropriate policy agency to the government.

The recommendations we make in [Chapter 5](#) aim to establish a practical process that will work. It will give firms an ability to collaborate in their collective interest; make the public service more proactive in soliciting and sharing insights to check whether the criteria are met; and provide business leaders with direct access to ministers to raise concerns and suggest solutions, and to implement them over time.

The [Chapter 5](#) recommendations do not guarantee identification of vulnerable and critical goods and services. This would be impossible, given the uncertainty about when any of the critical “known unknown” and “unknown unknown” disruptions might occur. However, integrating resilience into existing industry-government conversations and networks, combined with a single government contact point and an escalation pathway, increases the probability of successful proactive identification at modest cost.

6.5 Co-funding industry-government collaboration

The challenge in monitoring disruptions and vulnerabilities, and determining which are critical, is the complex and dispersed nature of supply chains. While the prosperity and wellbeing of a firm, industry or community depends on many tiers of suppliers, few parties have oversight beyond the link closest to them in the chain. Overcoming such information asymmetries is easier within dense networks that connect people and datasets across private-sector and public spheres. The pooling of information and insights is a prerequisite for anticipating and preparing for disruptions before they materialise.

[Section 5.3](#) argued for leveraging and strengthening existing networks and motivating the emergence of new ones by providing contestable public co-funding for them. This is a cost-efficient way to harness positive spillovers from better information-sharing and coordinated actions in the pursuit of resilience and related policy objectives. As noted in [section 4.3](#), every past government in the last quarter-century introduced initiatives to harness industry network externalities relating to innovation, skills, exports, and infrastructure. This inquiry recommends using these networks to internalise externalities related to economic security and resilience, given that the risk of disruptions has become more prominent owing to a more volatile and uncertain global environment (see [section 1.2](#)).

Government co-funding for industry networks is not new. Rather, it is a continuation of sectoral development strategies, building on and developing useful legacies of the Business Growth Agenda (BGA) or Industry Transformation Plans (ITPs) (see Figure 26 in [section 4.3](#)). Co-funding also builds on proposals in our *Frontier firms* inquiry (NZPC 2021, 2023a).

Given that some industry-government networks exist, it makes sense to use them to improve economic resilience. In the regions, these networks often represent decades of continuous practice since (by and large) the same people strive for progress towards similar long-term objectives in the same industries (see [section 4.3](#)). The case for maintaining and strengthening industry networks also comes from the COVID-19 pandemic and disaster response when these networks proved useful in responding to disruptions (see [section 4.3](#)). Given past investments in industry-government networks, strengthening them and including a resilience lens in their agendas can be a cost-effective way to pool information, access and use expert insights, and invest in resilience.

Contestable co-funding should be open to new and existing networks to incentivise industries to make new efforts to self-organise and work with public agencies like MBIE or the Ministry for Primary Industries (MPI). The criteria for co-funding should reflect the objectives of the government in the sectoral policy space as well as:

- the economic relevance of the industry to the Aotearoa New Zealand economy
- its likely exposure to vulnerable and critical supply chains
- the industry's "skin in the game", in terms of its committed funding and activity.

Public investments may require fiscal commitment comparable to the BGA or ITP funding and may build on successful previous models of co-funding industry-government networks (such as those around biosecurity). When networks develop worthwhile resilience-enhancing projects, government co-funding could come either from existing funding schemes (see [section 6.6](#)) or through budget bids (see [section 6.9](#)).

Collaboration within industry-government networks does not imply that a consensus will always exist on disruptions, vulnerabilities and criticalities. Individual firms' perceptions of relevant risks and uncertainties are going to differ, depending on their specific exposures. Moreover, the risk tolerances will also differ between firms, public agencies, and communities involved in the network. That said, the purpose of sharing information and discussions among stakeholders is not to produce a consensus on unified industry action. It suffices to produce a list of potentially vulnerable and critical goods and services.

An IEB or dedicated team within the public service (see [section 6.7](#)) could assess suggestions from industry-government networks using data and overseas experience, before advising on whether some form of public intervention or co-investment might be warranted (see [section 6.8](#) and [section 6.9](#)).

Alternatively, individual firms, groups of firms, or whole industries will sometimes have the capacity to take the initiative independently to invest in resilience-enhancing projects funded from existing pots of devolved funding (which could include varying degrees of government co-funding), without need for a wide consensus (see [section 6.6](#) and [section 6.7](#)).

Two-way communication and understanding between industry and government are also important to overcome extreme bargaining positions in favour of balanced compromises. Industry may view diversification and other resilience-enhancing investments as purely public concerns that the government should fully subsidise. The government may view such a position as moral hazard – large firms not preparing for disruptions are implicitly relying on government bail-out after the disruption – and threaten to regulate the industry to impose the costs of proactive investments entirely on firms. Progressing beyond such extremes – by sharing the costs of resilience investments and relying more on moral suasion and negotiation than adversarial regulation – is likely to achieve greater resilience before "known and unknown unknown" disruptions reach New Zealand shores.

6.6 Firm and industry investments in resilience

The inquiry analysis and case studies document that the private sector resolves most supply chain disruptions without targeted public intervention. The private sector should remain the first port of call to address vulnerabilities and disruptions as they emerge from behind the veil of uncertainty. While the government should incentivise firms to make proactive investments to realise wider industry or public benefits (see [section 1.4](#) and [section 6.7](#)), the choice of specific resilience-enhancing projects should be driven by firms and industry and community groups.

The choice of firm- and industry-level response to a vulnerable and critical good or service will be context-specific. At the same time, it is likely to rely on one or more actions from the following menu (Dormady et al., 2019, 2022) – as also indicated by firms in our stakeholder survey (see [section 4.1](#)).

- **Digitising supply chains.** Many firms in the last few years have proactively invested to leverage the power of digital technologies to enhance the transparency of their supply chains and understand their risk exposures. Some regulated industries, like banking, were required to undertake in-depth reviews of their exposures to outsourced suppliers (RBNZ, 2023). Many firms have invested in cloud computing and interconnectivity with their suppliers and customers and explored solutions based on novel concepts such as the “internet of things”, blockchain and smart contracting. Some firms are also using advanced analytics, artificial intelligence, and/or machine learning to analyse historical data, market trends, customer behaviour, and other factors influencing their demand. They may use pricing strategies, promotions, or incentives to stimulate or shift demand according to their supply chain capacity and availability.
- **Just-in-case stockpiling.** Global logistics bottlenecks in 2020–2022 led many firms to reduce reliance on just-in-time supply chain management and increase their stockpiles of critical and vulnerable inputs. This has increased their costs, but many questioned the benefits of this strategy when supply chain pressures in 2023 dissipated to the lowest levels in a decade (see Figure 6 in [section 1.2](#)). Businesses learnt lessons from that experience, and public agencies should be part of a process to understand industry exposures and help find solutions that reflect society’s tolerance of risk.
- **Diversification of import and export markets.** This is a long-standing challenge for Aotearoa New Zealand’s industries, and the re-concentration of exports is not an encouraging trend (see Figure 14 in [section 2.1](#)). Past governments have developed numerous initiatives supporting diversification that are executed through NZTE, MFAT and other agencies (see Box 15 and [section 4.1](#)). The *Frontier firms* inquiry (NZPC 2021) and its review (NZPC 2023a) extensively discussed innovation and export-promotion opportunities that can enhance diversification.

- **Innovation of technologies, products, and business models.** Innovation is the single most important response to persistent supply chain disruptions that could block access to critical import or export markets for years. Innovation can reduce costs, replace expensive inputs with cheaper or more reliably available ones, adapt products to succeed in new markets or meet new regulatory requirements, adapt and introduce new production technologies, or develop critical skills within existing ecosystems. Such innovations can make firms, industries, and communities more resilient, as well as more competitive.

Innovation and economic resilience require similar capabilities – to anticipate, prepare, absorb, recover and learn from change – which is why this inquiry emphasises public interventions that pursue both objectives jointly. It is important to note that for a firm to innovate does not imply it has to push the global envelope; rather, it should adopt and adapt technologies, substitute inputs, or adapt management practices (that is, benefit from what economists call diffusion).

- **On-shoring.** Unlike large economies, New Zealand cannot aspire to recreate parts of global supply chains domestically by pursuing subsidised industrial policies (see [section 3.1](#)). However, analysis of trade data reveals cases when industries export and import the same product. This pattern of trade arises, for example, when domestic competitors prefer to trade with overseas third parties, rather than with each other. However, it also indicates that, in the event of persistent disruption, domestic buyers could find domestic sellers. This potential for domestic trade reduces vulnerabilities, although it may also require public intervention to reconcile this form of on-shoring with competition policy (see [section 5.2](#)).
- **Long-term contracting.** When diversification is not feasible, strengthening the collaborative relationship with key suppliers or buyers is a way to reduce vulnerability. As opposed to spot market contracts, long-term ones often include contingency clauses addressing the more predictable disruption scenarios. It is also possible to reduce some vulnerabilities by contracting with parties in places where trade relationships are less likely to be disrupted by geopolitical ruptures (friend-shoring).
- **Market exit.** If the connection with key markets is persistently disrupted, a firm could also reduce its vulnerabilities by winding down its operations. While this is a legitimate strategy for individual firms, at an industry level it could have major impacts on associated communities. The problem here could involve a misalignment between the private and social costs of disruption, creating a potential moral hazard in which industries hold back on proactive investments in the expectation that the government would bail them out to reduce social impacts in the event of a major disruption.

The above firm- and industry-level strategies can be encouraged and supported by complementary public policies (see [section 4.3](#)). In particular, by keeping regulatory systems fit for purpose and compatible with trading partners, governments can support diversification and innovation. Similarly, reforming regulatory systems to make markets more contestable and competitive is generally good for resilience and productivity (although it may be difficult to achieve where domestic markets are already concentrated, and competition from overseas suppliers is more likely to be disrupted by future shocks).

6.7 Existing co-funding schemes can support resilience

Firms and industry groups investing proactively in resilience can take advantage of the existing portfolio of government co-funding schemes (see [section 4.3](#) and [Appendix A](#)). The government currently operates about 70 strategies and initiatives, including at least 9 co-funding schemes, the objectives of which overlap with enhancing resilience. In particular, diversification and innovation are supported by well-established public agencies and programmes.

While none of these strategies and initiatives were deliberately designed to support economic resilience, adding economic resilience to these programmes, at least as a secondary objective (see [section 5.3](#)), would ensure more attention to emerging disruptions and critical vulnerabilities. Within the scope of this inquiry (that is, excluding critical supplies and infrastructures) there is only a limited rationale to establish a separate, dedicated funding program for resilience investments. Rather, with resilience criteria added, existing support for innovation and diversification should provide suitable co-funding to help develop resilience capabilities. In addition, as emerging disruptions and vulnerabilities become better understood over time, the high-level governance settings we recommend can help public co-funding schemes to be responsive to the new information (see [section 5.3](#), [section 6.8](#) and [section 6.9](#)).

6.8 Interdepartmental Executive Board and Long-term Advisory Group for Economic Resilience and Innovation

Industry-government networks can provide a cost-efficient mechanism for identifying vulnerabilities and resilience-enhancing investments. However, the overlapping purposes, degree of informality and different levels of maturity of these networks create a risk that valuable insights and early warnings will not be shared and acted upon. A single point of contact to assess and develop industry insights and early warnings would mitigate this risk. A dedicated IEB could provide this contact point, while the high-level advisory group (the LAGERI) could help steer the strategic agenda for resilience and related objectives (see [section 5.3](#)).

An IEB, composed of a small team of senior public servants and analysts on secondment from key departments, could provide a contact point for industry suggestions and data-based assessments, and could scan the evolution of overseas resilience policies. It could connect industry and government silos better than multiple teams dispersed across MFAT, DPMC, MBIE, MPI and the Treasury. Building on secondment arrangements, the IEB could overcome a persistent complaint of industry stakeholders that, while individual departments are keen to discuss resilience issues, too often they find the problem concentrated in a portfolio of another department. This leads to the loss of valuable insights and private-sector frustration.

The IEB would take the industry insights, assess them using trade data and models (see [Chapter 2](#)), relevant overseas experience, and emerging multilateral initiatives on economic resilience such as the IPEF. If an issue can be resolved by relying on existing networks and co-funding schemes, the IEB could help with the development of a project application by firms or policy agencies. However, if a new systemic issue emerges that requires a strategic intervention, the IEB can escalate a relevant proposal to the lead department and the LAGERI. The LAGERI should ensure that the proposal is aligned with broader strategy on innovation and resilience, while the lead department should prepare a budget bid for the standard Cabinet process.

While a dedicated IEB may have higher fixed costs than a loose network of public agency teams, it can overcome the following barriers to the development of innovation and resilience capabilities.

- New Zealanders expect the government to intervene in case of major disruptions but get out of their way in stable times. However, the capability to intervene efficiently in disrupted times needs to be developed and honed in stable times. The IEB would work continuously on developing innovation capabilities across private-public industry networks, because the need for innovation is continuous and not subject to uncertainty in the way that resilience is. However, the overlap between innovation and resilience capabilities makes firms and agencies connected by active networks better prepared to respond to disruptions at any time.
- The alternative to an IEB is to rely on ad hoc mobilisation of relevant departmental teams in response to any slow- or fast-moving disruption. But such a reactive approach makes it less likely that proactive investments would have been made. It would be more cost efficient than an IEB only if systemic disruptions were to occur very infrequently. However, future trends indicate disruptions will occur with higher frequency, so the cumulative costs of setting up and dismantling response teams are likely to exceed the costs of maintaining a dedicated IEB unit.
- An IEB is likely to produce better oversight of international resilience policies than siloed teams focused on their specific domains. Trade restrictions, sanctions, sourcing expectations of friendly countries, the IPEF supply chain pillar requirements and other international developments will require two-way communication between government and industry. Concentrating these cross-departmental issues in an IEB – staffed by secondees who maintain connections with specialised teams at MFAT, DPMC, MBIE, and MPI – has the potential to both aggregate and distribute resilience know-how.

An IEB is a relatively new structure within the public service, but the initial experience indicates that IEBs can enhance the delivery of complex cross-cutting policies like responding to climate change. The innovation-resilience nexus bears similar characteristics, which an IEB can address efficiently and effectively. A risk exists that a poorly functioning IEB could overburden siloed teams in the departments that it aims to connect. However, an IEB is relatively easy to set up, adapt and, if unsuccessful, dismantle, especially when staffed through secondments. It would be wise to build in a compulsory evaluation of the IEB after two years, to ensure that it is meeting expectations.

The LAGERI is primarily an advisory group to the prime minister and economic ministers (see [section 5.3](#)). However, it should have a formal mandate to become a structure that spans multiple electoral periods, provides business with a voice on resilience and innovation policies, and oversees implementation with a long-term horizon. A weak or absent cross-party consensus on these structures risks dramatic policy shifts from one government to the next. This, in turn, would undermine business incentives to invest in, or even seriously explore, resilience-enhancing investment projects that could take years to plan and implement. The LAGERI would rightfully not fully constrain the policy pendulum, but it would enable businesses to rely on policies that underpin and spur long-term investments and enable ministers to make better informed choices.

6.9 Cabinet and budget rules

The responses to systemic vulnerabilities and disruptions in need of public co-funding beyond that available through existing initiatives will be subject to standard budget and Cabinet processes. The IEB can help to initiate and design them, and endorsement by the LAGERI can signal their priority. However, the budget bid would need to be developed by the appropriate department.

6.10 Ad hoc and recommended approaches: A comparison

The institutional structure introduced in [Chapter 5](#) provides an alternative to the current approach described in [Chapter 4](#). The current approach relies on ad hoc, reactive responses to supply chain disruptions and largely lacks any proactive effort to reduce their impact on industries and communities.

Continuing the status quo risks a resilience lens not being explicitly integrated into existing policy initiatives, and resilience improvements happening only when there happens to be an overlap with the objectives of these initiatives. While the next iteration of sectoral policies may build off some legacies of ITPs in individual sectors (as has been the case over the last 25 years – see [section 4.3](#)), no co-funding is likely to be available to establish these industry-government collaborations to industries outside the designated sectors.

Finally, there will be no long-term advisory group to provide business with a stronger voice on long-term challenges like innovation and resilience and no interdepartmental structure to reach across public service silos and provide industries with a single point of contact. The strategic response to new risks and uncertainties will rely on low-level networks linking industries to their corresponding public-sector departments, with high-level government involvement only triggered ad hoc in response to an escalating crisis. Table 11 provides a stylised comparison of the status quo and recommended approaches, structured along our procedural definition of economic resilience.

Table 11: A comparison of recommended and status quo approaches to resilience

Economic resilience	Recommended approach	Status quo approach
Anticipate	<p>Systematic and ongoing trade data analysis using “experts with data” approach.</p> <p>Single point of contact for firms and industries to investigate and verify early warning insights.</p> <p>Pooling of industry and government information</p>	<p>Ongoing data analysis by central agencies to meet the IPEF requirements, with ad hoc deeper analysis when disruptions occur.</p> <p>No point of contact for new information and insights.</p> <p>Public-sector silos fragment information flows.</p>
Prepare	<p>Ongoing work on focused innovation develops generic resilience capabilities.</p> <p>Pathways for early warnings that merit escalation.</p> <p>Public co-funding with negotiating mechanism to balance under- and over-investing risks.</p>	<p>Ad hoc governance that needs to be stood up for every disruption.</p> <p>Proactive investments by the private sector only, which ignore spillover benefits.</p> <p>Public co-financing is available only if objectives overlap with resilience.</p>
Absorb	<p>Proactive investments reduce exposures and increase absorption by adaptation.</p> <p>Established networks shorten reaction time and improve responses.</p> <p>Pooling of available resources reduces duplicated efforts.</p>	<p>A reactive approach means no buffers or mitigation.</p> <p>Ad hoc responses and political pressure for subsidies that maintain the status quo.</p> <p>Poor information sharing of available responses and resources.</p>
Recover	<p>High-level governance more likely to drive long-term change.</p> <p>Opportunities and silver linings more likely to be identified and seized.</p> <p>Shovel-ready portfolio maintained.</p>	<p>Low-level governance keeps responding ad hoc to each disruption.</p> <p>Opportunities and silver linings more likely to be overlooked.</p> <p>No shovel-ready portfolio maintained.</p>
Learn	<p>Resilience lessons integrated into ongoing innovation work and its prioritisation.</p> <p>Capability to learn systematically from overseas.</p> <p>Broader policy lessons for the more volatile and uncertain future uncovered.</p>	<p>Resilience lessons less likely to be integrated after each disruption.</p> <p>Missed opportunities to learn from resilience policies overseas.</p> <p>Broader lessons for the more volatile and uncertain future less likely to be identified.</p>

Our recommended approach emphasises more structured industry-government collaboration to support and enhance proactive investments in resilience. In the heat of a crisis, the key differences between approaches are twofold.

- The recommended approach will have initiated more proactive investments in generic economic resilience, thus positioning industries and communities better to absorb and recover from disruption.
- Collaborative networks and relationships, developed before disruption, will make crisis management better informed and more efficient.

The industry-government networks will also help to bridge work on, and investments in, generic resilience capabilities (the focus of this inquiry), with work and investments in response to specific disruption scenarios to critical goods, services, and infrastructure that the Ministry for Foreign Affairs and Trade, the Department of Prime Minister and Cabinet, Treasury and other public agencies are developing.

Findings and Recommendations

Chapter 1

Finding 1.

Global supply chains appear remarkably resilient. While indicators of their health returned to pre-pandemic levels in late 2023, pressure indices are starting to rise again, reflecting recent heightened risks and uncertainties.

Finding 2.

Aotearoa New Zealand's supply chains are among the most exposed of advanced economies due to geographical isolation, concentrated market structures, vulnerability to natural hazards, climate-related shocks, and ageing infrastructure, combined with chronic levels of underinvestment. These vulnerabilities create additional pressures on the resilience of the economy.

Finding 3.

Aotearoa New Zealand's existing policy challenges around productivity, innovation, emissions reduction and climate adaptation compound the risks associated with an increasingly volatile future. The interconnected nature of these challenges means that an integrated policy approach is called for, and that opportunities exist for initiatives that meet multiple objectives.

Finding 4.

A society or a firm invests in resilience by paying upfront to help offset the negative impact of a shock if it occurs. However, a society and/or firms can under or overinvest in resilience. They may underinvest because of competitive or social pressures to save short-term costs, and the deep uncertainties about future disruptions. Overinvestment is less likely but could arise from excessive risk aversion.

Chapter 2

Finding 5.

New Zealand's trade is concentrated. Since 2008:

- export products and destinations have both become more concentrated
- import product concentrations have remained at a high level
- import origin concentration has increased.

These trends have increased the vulnerability of industries and communities to future supply chain disruptions.

Finding 6.

Aotearoa New Zealand's trade may be even more concentrated than direct trade statistics suggest, due to indirect exposures through the country's trading partners.

Finding 7.

Vulnerable products are those where Aotearoa New Zealand has limited alternative import or export markets. Trade data analysis indicates that only a few products were persistently vulnerable over several years, but many products were intermittently vulnerable in individual years. Routine trade data analysis would provide early warnings on emerging vulnerabilities and disruptions, if combined with insights of industry experts on criticality and substitutability.

Finding 8.

China is a major source and destination of Aotearoa New Zealand's vulnerable products. Nearly three-quarters of New Zealand's vulnerable imported goods came from China, while two-thirds of New Zealand's vulnerable exports go to Australia and Japan. For most New Zealand industries, China is the most important source and destination of intermediate manufactured goods.

Finding 9.

Reliable conclusions about supply chain vulnerabilities require expert industry judgement, combined with the analysis of trade data. Conclusions need to consider developments in domestic and international markets, the availability of alternative markets, and the availability of substitutes for technology.

Finding 10.

Less-populated regions with economic activity based on natural resources have relatively more employment exposed to export disruption, while regions with larger populations, urban centres, and diversified economies have relatively more employment exposed to import disruption. Southland has the highest employment exposure to both vulnerable import and export industries.

Finding 11.

Regions with higher scores on the socioeconomic deprivation index appear to be more exposed to import and export disruptions.

Finding 12.

Supply chain disruptions are likely to cause significant losses in macroeconomic performance and employment. Computable general equilibrium modelling of three representative shocks to Aotearoa New Zealand's economy estimates reductions between 1.4% and 7.5% in GDP. Distributional modelling estimates between 24,000 and 112,000 jobs affected.

Finding 13.

The Commission modelled the distribution of the impacts of three representative disruption scenarios on different industries, regions, and socio-economic groups. Several high-level patterns stood out.

- The greatest impacts of each shock are felt in the industries most exposed to the disrupted supply chain.
- Most net employment gains are in manufacturing (aside from dairy processing), while net losses tend to concentrate in the services and primary sectors.
- Younger workers as a group experience net job losses and older workers experience net job gains.
- Highly educated workers as a group experience net job losses and workers with secondary and post-secondary (but not degree) qualifications experience net job gains.
- Experiences of ethnic groups are mixed with net losses in jobs employing many Asian, Middle Eastern, Latin American, and African workers, and net gains in jobs currently employing many Pasifika workers.

Less-urbanised regions are disproportionately more affected than the more-urbanised regions, particularly Gisborne, Tasman, the Hawke's Bay, the West Coast and Southland.

Finding 14.

Modelling shows that, as a response to an enduring supply chain shock, wage subsidies to support employment in selected industries cost less than output subsidies and would better protect incomes overall. However, they would still involve hardship for those involved, resulting in more firms failing and more workers looking for new jobs, compared to no shock.

Finding 15.

In a detailed study of Aotearoa New Zealand workers involuntarily laid off, only 50% of displaced workers find new jobs immediately after layoff and only two-thirds find new jobs within six months. Earnings of workers who find new employment take almost three years to return to pre-layoff levels.

Finding 16.

Modelling shows that when there is a supply chain disruption and 50% reemployment, wage subsidies reduce the negative impact on employment overall compared with output subsidies and compared with no intervention. Wage subsidies also result in more net employment in the growing sectors that would underpin recovery, compared to output subsidies.

Finding 17.

The ability of workers to move to new jobs, and the movement of the economy's resources to take advantage of new opportunities are key to reducing the negative impact of supply-chain shocks. Policies and investments that support workers to move to new jobs across industries and regions, and support firms to invest in new uses of land and physical capital make the economy more resilient to supply chain disruptions.

Finding 18.

Data analysis and modelling can inform resilience-enhancing policy interventions by guiding and complementing industry expertise, supporting an ongoing identification of vulnerabilities, and comparing the outcomes of alternative interventions.

Chapter 3

Finding 19.

Evidence suggests that policies to promote national economic security can have high economic costs. Although national economic security is a valid policy priority, there is also a risk that it is used for unjustified protectionist industry policies.

Finding 20.

Prioritising higher productivity and better economic performance through focused innovation policy is an approach that aligns with promoting resilience, because it embraces change, as well as fostering innovation and adaptability.

Finding 21.

Countries pursue a mix of objectives and approaches to address supply chain risks. Large countries may be able to balance national security through strategic trade policies that incentivise re-shoring and on-shoring against the risks of facilitating protectionism. Such policies are much less suited to small economies. Rather, the approach of some small, advanced economies – to build focused innovation ecosystems – offers scope to both improve productivity and build greater economic resilience.

Chapter 4

Finding 22.

Aotearoa New Zealand firms, industries and communities actively manage their own supply chains to improve resilience in anticipation of a more volatile future. Their dominant approach is to strengthen relationships with suppliers and customers.

Finding 23.

Central and local governments can use public procurement to foster “tuku mana” – localised responses to local issues. Such procurement can build local capabilities, and so increase diversity in supply and resilience, although any gains would need to be balanced against costs. Māori respondents – especially those in rural and remote regions – highlighted the role of public procurement in enhancing the capabilities of Māori businesses and improving economic outcomes for Māori.

Finding 24.

Trade diversification cannot be solely achieved by the government negotiating new free trade agreements. It also relies on firms and industries being willing and able to make the move into new markets with new products.

Finding 25.

Competitive markets generally foster innovation and higher productivity. They can also enhance resilience through a diversity of suppliers, business models and locations of key assets. Even so, when competition in a market is too intense, it can reduce resilience, through driving firms to an excessive focus on efficiency and leanness in their supply chains and business operations, and through undermining collective action to tackle risks to resilience. Balancing the benefits of competition against resilience poses a challenge to competition-policy regulators.

Finding 26.

Successive governments have participated in industry-government networks to raise Aotearoa New Zealand’s economic performance through increased innovation and exports.

Finding 27.

Existing networks involving industry, government, Māori and other stakeholders are valuable in building economic resilience. They can facilitate innovative solutions when rapid-onset disruptions occur, and they can guide investment to prepare for slow-moving disruptions.

Finding 28.

Successive governments have put in place a range of strategies and initiatives with objectives that overlap with economic resilience. These strategies and initiatives relate to productivity, climate adaptation, foreign policy, defence, support for Māori businesses, immigration, transport and infrastructure, and regional development. Resources distributed across many strategies and initiatives are often insufficient to achieve their stated policy objectives. From an economic resilience perspective, these strategies and initiatives have lacked coherence, prioritisation, and a focus on results – including across funding mechanisms that build economic resilience across the various strands of economic strategy.

Chapter 5

Recommendation 1.

The Ministry of Business, Innovation and Employment should regularly undertake the analysis of trade data to identify concentrated imports and exports. It should publish the results in a form that will help firms and industries to identify their vulnerabilities to economic shocks

Recommendation 2.

The Ministry of Business, Innovation and Employment and the Ministry for Primary Industries should encourage and support industry networks to use trade data and expert judgement to further refine supply chain analysis. This work should include that required for reporting on supply chain risks in critical sectors under the Indo-Pacific Economic Framework for Prosperity.

Finding 29.

Opportunities exist for the government to work with other stakeholders in ongoing relationships with industry networks to build economic resilience. These relationships enable sharing of information about supply chain vulnerabilities and disruptions, and identification of initiatives to tackle risks. Further government co-investments and effective governance would enable industries and communities to pay sustained attention to supply chain risks and address them proactively in the context of related policy objectives, like innovation and climate-change mitigation and adaptation.

Recommendation 3.

The government should work with the other stakeholders in its ongoing relationships with industry networks to

- improve information about supply chain vulnerabilities and disruptions
- identify and collectively resource and oversee initiatives to tackle the risks.

It should support these initiatives on a sufficient, sustained scale, using suitable governance arrangements for success in building economic resilience over the longer term.

Recommendation 4.

The government should establish a contestable fund to incentivise proposals for initiatives to build economic resilience capabilities, especially in parts of the economy not currently covered by substantial industry-government collaborations. Fund administrators should actively seek proposals from a broad range of applicants, including Māori businesses and communities. Fund administrators should work with less-experienced potential applicants to support their participation.

Recommendation 5.

The government should review the criteria for grants from industry-facing growth funds, innovation funds, and climate-adaptation funds to sharpen their focus on innovative projects to build economic resilience. Such funds include the Sustainable Food and Fibre Futures programme, the Ārohia Innovation Trailblazer Grant, the Māori Agribusiness Innovation Fund, and the Māori Business Growth Fund.

Finding 30.

The Commerce Commission has issued draft guidelines on collaboration and sustainability. The extent to which these guidelines apply to firms collaborating to anticipate and build resilience to slow-moving disruptions (such as those arising from climate change and geopolitical tensions) is unclear.

Recommendation 6.

The Commerce Commission should extend its draft guidelines on collaboration and sustainability so that they apply (as far as appropriate) to firms collaborating to anticipate and build resilience to slow-moving disruptions (such as those arising from climate change and geopolitical tensions). However, guidelines and oversight should ensure that collaboration is not used for damaging anti-competitive purposes, particularly in markets where competition is already low.

Recommendation 7.

The government should establish a Long-term Advisory Group on Economic Resilience and Innovation (LAGERI) to help set strategic direction for, and oversee the implementation of, a national resilience and innovation strategy. The mandate of the group would include the following:

- Maintain an overview of, and recommend adjustments to, the scope and scale (including co-funding) of the government's portfolio of industry-government collaborations for the purpose of building economic resilience and the related challenge of innovation.
- Advise on the choice of areas and strategic directions for focused innovation policy
- Advise on the design and operation of a contestable fund for new initiatives to build economic-resilience and innovation capabilities.
- Investigate sources of innovation stemming from mātauranga Māori through commissioning further research based on Māori economic resilience.
- Monitor the impact on economic resilience of cross-economy policies such as regulation, competition policy, trade policy and export promotion, support for R&D and innovation, and education and training, and recommend adjustments that will better support resilience.

The LAGERI should comprise senior leaders from across industry, government, Māori, the research community, and educators, chosen for their individual expertise and promotion of the interests of Aotearoa New Zealand. The Prime Minister, with Ministers of key economic agencies, should lead government input.

Finding 31.

Interdepartmental Executive Boards (IEBs) provide a novel mechanism to get better value and more aligned decision-making across public-sector silos. An IEB could support effective public-sector engagement with a national economic resilience and innovation strategy.

Recommendation 8.

The government should establish an Interdepartmental Executive Board (IEB) to support effective public-sector engagement with a national economic resilience and innovation strategy. The IEB's purpose would be to avoid fragmented efforts across public-sector silos and improve alignment by:

- supporting the Long-term Advisory Group on Economic Resilience and Innovation
- providing a single point of contact for businesses and communities
- providing a single hub for the collection, analysis and sharing of relevant information
- scanning the evolution of resilience efforts in other countries.

Recommendation 9.

The government should establish a Chief Executives group to develop advice on the key strategic priorities to build long-term economic resilience, and on the establishment within 18 months of a Long-term Advisory Group on Economic Resilience and Innovation (LAGERI). The group should be led by the Treasury. The group should also advise on the establishment within 18 months of an Interdepartmental Executive Board (IEB) to support the LAGERI, and on the IEB's scope and role.

Appendix A

Portfolio of recent strategies and initiatives

Sectoral strategies and initiatives (primarily vertical)

Industry Transformation Plans (now disestablished (N.D.))

- [Forestry and wood processing](#) (MPI)
- [Advanced manufacturing](#) (MBIE)
- [Agritech](#) (MBIE)
- [Digital technologies](#) (MBIE)
- [Construction](#) (MBIE)
- [Fisheries](#) (MPI)
- [Food and beverage](#) (MPI)
- [Tourism](#) (MBIE)

Continuity Strategies

- [Fuel resiliency plan](#) (MBIE)
- [Medical supplies](#) (Manatū Haora/Te Whatu Ora)
- [Financial services](#) (RBNZ)
- [Lifeline utilities](#) (NEMA)

Funding

- [Māori Agribusiness Innovation Fund](#) (MPI)
- [Sustainable Food and Fibre Futures](#) (MPI)
- [Screen Sector Production Grants](#) (MBIE)
- [Health Research Council](#) (MBIE)
- [Māori Business Growth Fund](#) (TPK)
- [Climate Emergency Response Fund](#) (TSY)
- [Government Investment in Decarbonising Industry Fund](#) (EECA/MBIE)
- [New Zealand Green Investment Finance](#) (NZGIF/TSY)
- [Distributed Flexibility Innovation Fund](#) (Ara Ake)

Industry Development Strategies

- [Fit For a Better World](#) (MPI)
- [Diary Industry Restructuring Act 2001](#) (MPI)
- [Retail grocery market study](#) (ComCom)
- [Retail fuel market study](#) (ComCom)
- [Building supplies market study](#) (ComCom)
- [Banking services study](#) (ComCom)
- [Decarbonising transport action plan](#) (MoT)
- [NZ Space Policy](#) (MBIE)
- [International Education Strategy](#) (MoE)
- [Building regulatory system](#) (MBIE)
- [New Zealand Energy Strategy](#) (MBIE)
- [Aotearoa New Zealand Aerospace Strategy](#) (MBIE)
- [New Zealand-Aotearoa Government Tourism Strategy](#) (MBIE)

Cross-sectoral strategies and initiatives (primarily horizontal)

Region based

- [Kānoa – Regional Economic Development & Investment Unit](#) (MBIE)
- [Regional Skills Leadership Groups](#) (MBIE) (N.D.)
- [Workforce Development Councils](#) (TEC)
- [National Disaster Resilience Strategy](#) (NEMA)
- [Equitable Transitions Strategy](#) (MBIE/MSD)

Nationwide: trade

- [NZ & Singapore partnership on supply chain disruptions](#) (MFAT)
- [Trade For All Agenda](#) (MFAT)
- [Trade Recovery Strategy 2.0](#) (MFAT)
- [Exporter support programme](#) (MFAT/NZTE)
- [New Zealand Export Credit](#) (TSY)

- [Just Transitions Guide](#) (MBIE)
 - [Upper North Island Supply Chain Strategy](#) (MoT)
- [Regional Business Partners Network](#)
(MBIE/Callaghan Innovation)

Nationwide: climate

- [National Adaptation Plan](#) (MfE)
- [Emissions Reduction Plan](#) (MfE)
- [NZ Green Investment Finance](#) (NZGIF)
- [Ngā Kōrero Āhuarangi Me Te Ōhanga: Climate Economic and Fiscal Assessment 2023](#) (TSY/MfE)

- [NZ Export Credit Office](#) (TSY)
- [Indo-Pacific Economic Framework for Prosperity](#) (supply chain pillar) (MFAT)
- [Market Intelligence Reports](#) (MFAT)

Nationwide: innovation

- [Ārohia Innovation Trailblazer Grant](#) (Callaghan Innovation)
- [R&D Tax Incentive](#) (Callaghan Innovation)
- [National Science Challenges](#) (MBIE)

Nationwide: security/emergency

- [New Zealand's National Security Strategy](#) (DPMC)
- [National Disaster Resilience Strategy](#) (NEMA)
- [Risk management programmes](#) (MPI)
- [Serious disease outbreak management plans](#) (MPI)
- [Defence Policy and Strategy Statement 2023](#) (MoD)
- [2023 Strategic Foreign Policy Assessment](#) (MFAT)
- [New Zealand's Security Threat Environment 2023](#) (NZSIS)

Nationwide: digital

- [The Government Data Strategy and Roadmap](#) (Stats NZ)
- [Strategy for a Digital Public Service](#) (DIA)
- [The Digital Inclusion Blueprint](#) (DIA)
- [Cyber Security Strategy](#) (DPMC)
- [Digital Strategy for Aotearoa](#) (MBIE)

Nationwide: transport/infrastructure

- [NZ Freight and Supply Chain Strategy](#) (MoT)
- [Government Policy Statement on Land Transport 2024](#) (MoT; final forthcoming)
- [Public transport 2045](#) (MoT)
- [Rautaki Hanganga o Aotearoa – New Zealand Infrastructure Strategy](#) (Infrastructure Commission)
- [Infrastructure Action Plan](#) (TSY)

Nationwide: other cross-system strategies

- [New Zealand Small Business Strategy](#) (MBIE)
- [Our Economic Plan](#) (MBIE)
- [Aotearoa New Zealand's Employment Strategy](#) (MBIE)
- [He Kai Kei Aku Ringa: Māori-Crown Economic Growth Partnership](#) (MBIE)
- [Immigration rebalance](#) (MBIE)
- [Procurement for the future](#) (MBIE)
- [Māori Economic Resilience Strategy](#) (TPK)
- [Regulatory Stewardship Strategy](#) (TSY)
- [Regulatory Systems Stewardship Strategy 2023–2028](#) (MBIE)

Appendix B

Engagement meetings

Ministry of Business, Innovation and Employment	Foodstuffs North Island
Callaghan Innovation	Te Puni Kōkiri
Ministry for Primary Industries	Venture Taranaki
Te Puna Whakaaronui	Lyttleton Port Company
Te Tai Ōhanga – The Treasury	Port of Tauranga
Fertiliser Association of New Zealand	New Zealand Trade and Enterprise
Ministry of Foreign Affairs and Trade	Toi Kai Rawa
Workforce Development Councils	Climate Change Commission
Haemata	Maritime Union of New Zealand
Richard Jefferies	Spatial Planning Board
Andrea Fox	Climate Change Chief Executives Board
KiwiRail	Infolog
Air New Zealand	Ministry of Primary Industries – Supply Chain Forum
COSCO Shipping Lines Co., Ltd.	Productivity Commission – Australia
CMA CGM Group	Department of the Prime Minister and Cabinet
Auckland Business Chamber	Māori Economic Development Advisory Board
Ports of Auckland	Federation of Māori Authorities
Commerce Commission	Brian Easton
WeCreate	New Zealand Council of Trade Unions
Employers and Manufacturers Association	BusinessNZ
Port CEs Group	Catherine Beard
Adapt Research	Ministry of Transport
Unite Union	New Zealand Transport Agency – Waka Kotahi
BlueFloat Energy	Reserve Bank of New Zealand
Zespri	Infrastructure Commission
Foodstuffs South Island	David Skilling

Wānanga and interview participants¹⁷

Tainui Group Holdings Ltd	Rangitāne Tū Mai Rā Trust
Ōpepe Farm Trust	Regional Skills Leadership Group – Wellington
Ngāti Ruanui	LM4 Group
Pakihiroa Farms Ltd	Te Runanga o Ngāti Porou
Te Runganga o Ngāti Hine	Te Runanga o Te Aupōuri
Manaaki Management Ltd	Te Runanga o Te Rarawa
P&P Building Ltd	Toi Kai Rawa
Huia Publishers	
Kiroa Station	
Toi EDA	
Wai Mānuka	
Liz Mellish	
Wellington Tenths Trust	
Wakatu Incorporation	
Shotcrete Auckland Ltd	
Te Runanga o Te Whānau	
Te Whānau o Waipareira	
Kiwa Digital	
Tōtika Ltd	
Whāriki	
Te Riu o Waikato Ltd	
Te Runanga o Ngāti Toa	

¹⁷ Wānanga and interviews conducted by Haemata (2023).

Glossary of terms

A glossary of terms used in this report is available on our website – see [Improving Economic Resilience inquiry – Online glossary](#).

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