

Supply chains to the last bus stop on the planet: An international perspective on strengthening New Zealand's supply chain resilience

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Prepared for the New Zealand Productivity
Commission

December 2022

ISBN: 978-1-98-851995-1 (online)

Executive Summary

After a few decades of intense globalisation, a structurally changed model of globalisation is emerging. This is not deglobalisation but rather a fragmented global economy in which trade and investment flows are more regional and shaped by political dynamics. Global supply chains are changing their shape.

There are both economic and political drivers of this global economic fragmentation. Firms are actively strengthening supply chain resilience in response to the increased costs and risk profile of far-flung supply chains and just in time production. And new technologies support capital intensive production in high wage economies.

This is leading to some re-shoring and near-shoring, although this is happening in a gradual, product-specific manner. In addition, firms are building up inventory levels, diversifying across suppliers, and adding redundancy into supply chains – paying an ‘insurance premium’ to reduce downside costs.

These changes to firm decision-making were reinforced by the disruptions to global supply chains through the pandemic and Russia’s invasion of Ukraine. Although supply chains continued to function, there were increased costs and delays. And looking forward, an increased incidence of supply chain shocks (from conflict and environmental shocks, to increased direct costs) is likely.

Political and geopolitical dynamics are also causing disruptive changes to supply chains. Many large economy governments are pushing for greater independence of supply in technology, energy, pharmaceuticals, and so on (‘strategic autonomy’). Industrial policy is crossing into protectionism, which will reshape supply chains. Geopolitical rivalry will lead to ‘friend-shoring’, in which firms and countries do business with like-minded countries, together with the increasing use of economic sanctions.

Looking forward, these economic and political dynamics are likely to escalate – leading to a powerful reshaping of global supply chains. Although the data does not yet suggest material changes, the impact will strengthen as firms and governments adapt to new realities.

Small economy policy responses

Small advanced economies continue to prioritise international engagement; this remains an imperative for productivity growth. But the resilience of import supply chains has moved up the policy agenda, with analysis to understand the exposures and policy measures to reduce or manage exposures. Small economies are deeply exposed to global supply chain disruptions, due to their higher import shares and relatively high sectoral concentrations and import dependencies.

Through the pandemic, small economies like Singapore and New Zealand were active in signing agreements (food, pharmaceuticals) and pushing for global action to keep supply chains open. This continues, with small economy governments emphasising the importance of an open, rules-based system. They were also able to ‘scramble’, managing to secure the essential supplies required and keep supply chains functioning in an improvised manner.

Governments are continuing to respond. There are examples of energy and food security strategies, as well as for other essential goods, to strengthen supply chain resilience. This often includes initiatives around minimum inventories/reserves, supplier diversification, as well as long-term contracts. For

example, European governments are diversifying away from Russian energy; and Singapore is developing initiatives to strengthen food and energy independence. The decarbonisation agenda also serves to reduce exposure to some energy supply chain risks.

Relative to larger economies, small advanced economies are more inclined toward market-oriented strategies – and less focused on strategic autonomy and strengthening domestic production capacity than is the case in the US, China, and the EU. However, technology provides small economies with some options (renewables, precision fermentation, 3D printing) to reduce exposures to global supply chains.

Of course, not all small economies have the same exposures and policy options. For example, small economies in the EU have a measure of ‘artificial’ scale and resilience. They benefit from collective procurement arrangements (vaccines, energy) in ways that ‘stand-alone’ small economies cannot. And remote small economies (New Zealand) are more exposed than small economies that are close to large markets (Switzerland), or that are densely integrated into global logistical networks (Singapore, UAE). These characteristics shape the nature and urgency of the observed policy responses.

Implications for New Zealand

New Zealand’s economic geography and institutional context means that New Zealand has one of the most exposed supply chain positions across advanced economies.

Although New Zealand has a low imports share of GDP, a low imports share of value added in exports, and has a high measure of food and energy independence (ex liquid fuels), New Zealand is heavily reliant on imports across a range of categories (machinery, vehicles, and energy) and multiple areas of specific import reliance. China has become New Zealand’s largest source of imports, followed by ASEAN, with Australia reducing in importance. This country mix has changed substantially over the past 15 years, lengthening New Zealand’s supply chains and adding to the geopolitical risk profile.

New Zealand’s physical remoteness means that New Zealand’s supply chains face unique physical connectivity risks, with long and thin servicing from shipping lines and airlines. These exposures were evident through the pandemic, with delays and higher costs.

Looking forward, New Zealand will be deeply challenged by global dynamics that are shaping global supply chains. There are several classes of change to which New Zealand is particularly exposed.

- *Structural changes in logistics:* changes in the economics of airlines and shipping may lead to higher costs and reduced servicing of small, distant markets; potentially weaker inbound international tourism growth; and higher transport costs (e.g. due to emissions pricing).
- *Geopolitical rivalry:* New Zealand will increasingly face pressure to make choices about sourcing of some import categories from China, which may increase costs and delays.
- *Physical disruptions to production and supply chains:* increased frequency of supply chain disruptions due to conflict, environmental shocks/natural disasters, pandemics, and so on.

New Zealand’s well-developed network of FTA’s and other international agreements, its flexible economy, and its ability to respond quickly to shocks, has supported supply chain resilience. But this policy approach may not be as well suited to a more challenging and turbulent world, with geopolitical

tensions, more stretched physical supply chains, and increasingly uncertain shocks. And international trade will become more costly, with increased frictions, delays and uncertainties.

Many of these dynamics are challenging for firms – particularly smaller firms – to prepare for or respond to. The incentives, resourcing, and capability may not be sufficient in all cases. And for policy-makers, a measure of anticipatory positioning for these structural changes is important; structural changes to the geopolitical or logistical context require deliberate responses in advance. In many cases, responding to a shock (such as a closure of a large market) after the event may be suboptimal.

Given New Zealand's particular supply chain exposures, the deliberate policy actions being taken in other advanced economies to respond to global supply chain risks should be taken seriously.

Firms will continue to be the primary agent in responding to supply chain disruptions (inventories, diversification, identifying substitutes, and so on), but there is an important role for government. Although specific risks are difficult to predict, there is much that can be done to position New Zealand to be resilient and prosper in a new world.

Three broad classes of policy response are identified:

1. *Analysis & institutions* to identify key supply chain risk exposures (including scenario analysis) that generate material economic exposures. Institutions need to be established to link this analysis to practical action to reduce risks, and to develop capabilities to respond to shocks.

2. *Insurance*: Consider policy options to reduce exposure to supply chain disruption risk for essential/strategically vital goods: minimum reserves/inventories, diversification of markets/suppliers, long term contracting, physical and digital connectivity initiatives, development of strategic partnerships/international partnerships, and so on.

3. *Economic structure*: apply a supply chain resilience perspective to strategic policy decisions such as the speed of electrifying the economy (renewable energy, green hydrogen), the support for new modes of production (3D printing), and the international tourism strategy (value v volume). To strengthen the resilience of outbound supply chains, policy can support a weightless export economy and encourage outward direct investment by New Zealand firms.

Global supply chain dynamics pose a first order economic challenge for New Zealand. These issues need to be treated as a matter of strategic importance, affecting the nature of New Zealand's broader economic strategy as well as its conventional supply chain responses.

Introduction

From the pandemic to the economic consequences of Russia's invasion of Ukraine, global supply chains have been exposed to significant disruptions over the past few years. Although world trade has proved resilient, economies and firms are increasingly aware of the vulnerabilities of far-flung global supply chains and are acting to strengthen the resilience of these supply chains. This is reinforced by a series of structural economic, political, and geopolitical changes underway – from new technologies and climate change to friend-shoring and US/China strategic competition.

Small advanced economies around the world, including New Zealand, are deeply exposed to these changes. Small economies have high import shares of GDP and are frequently reliant on imported goods in key parts of their economies, from energy to technology. This exposure creates a motivation for small advanced economies to build resilience in response to the increasing risk of global supply chain disruption.

This paper contributes to the Productivity Commission's Inquiry on strengthening New Zealand's supply chain resilience by providing an international perspective on how small advanced economies are exposed to global supply chain dynamics and the nature of their policy responses. This can inform the New Zealand policy debate on these issues. The paper is structured in three Parts.

Part I describes the economic, political, and other dynamics that are shaping the nature and functioning of global supply chains. Several key risk archetypes for the functioning of global supply chains are identified. The particular exposures faced by small advanced economies are discussed.

Part II provides an overview of the way in which other governments, particularly from small advanced economies, are strengthening supply chain resilience. Some overall policy insights are identified.

Part III applies this analysis of changing global supply chain dynamics and the policy responses across small advanced economies to identify policy implications for New Zealand: from those directly relating to physical supply chains to broader strategic choices with respect to New Zealand's economic model.

I. The changing global context

This opening discussion describes the key structural dynamics at work that will impact on the functioning of cross-border supply chains. It begins by providing a sense of the state of play with respect to global flows and global supply chains, the way in which these have been impacted by various shocks over the past few years (from the pandemic to the economic impact of Russia's invasion of Ukraine). It then looks forward to provide a perspective on how these dynamics will change over time, and identifies several key risk archetypes. It closes with some observations on the specific exposures faced by small advanced economies.

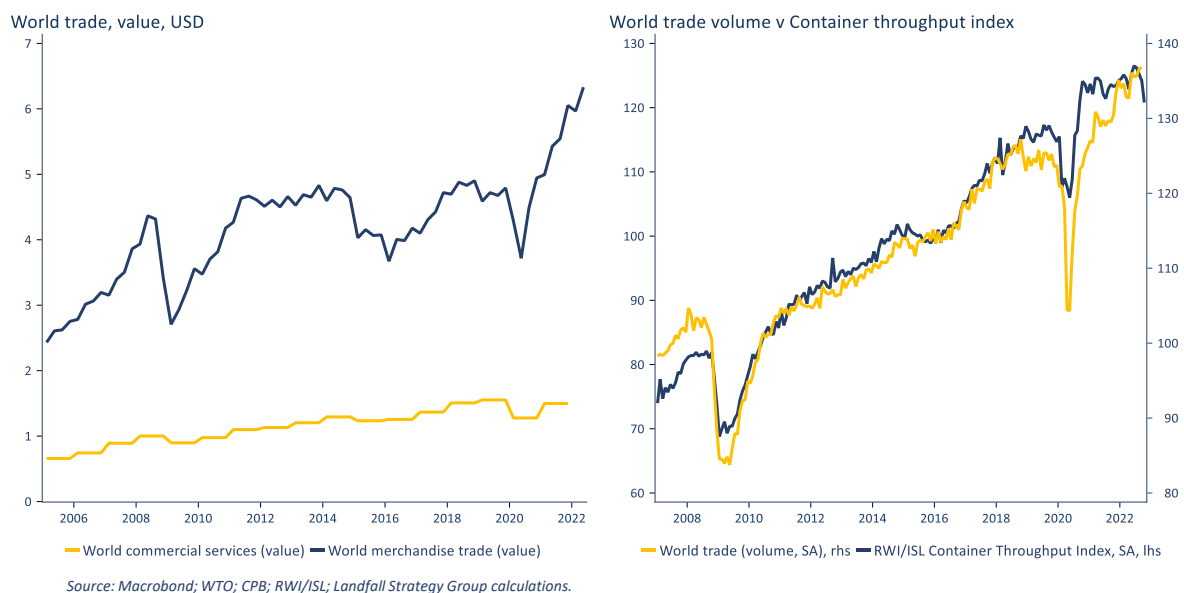
What is happening?

Over the past few decades, world trade and investment flows have surged – importantly because of the development of global supply chains, as emerging markets integrated into the global economy. The

average physical distance of merchandise trade has increased.¹ It has been a period of intense globalisation, with most economies experiencing marked increases in their export and import shares of GDP.

However, since the global financial crisis, there has been an approximate flat-lining of the intensity of global trade flows (world exports/GDP). Despite this, there is little evidence of deglobalisation occurring. Indeed, world trade flows (excluding international tourism) have been robust through the pandemic – and FDI flows are also recovering. It may be that world merchandise trade as a share of GDP has reached a high water mark; indeed, the near-term outlook for international trade growth is relatively soft. But this is not the same as deglobalisation.

Exhibit 1: World trade in goods has been resilient through the pandemic, leading to significant increases in international container shipping movements (until recently)



Rather than an unwinding of globalisation, it is more appropriate to see globalisation as changing structurally. A fragmented global economy is emerging, in which trade and investment flows are more regional in nature and shaped by domestic and global political dynamics to a greater extent.

This transition to a more fragmented global economy is caused by a combination of economic as well as domestic and international political factors.

Economic factors

Firms are actively strengthening supply chain resilience in response to the increased costs and risk profile of far-flung supply chains. The material disruptions to global supply chains over the past decade have made the risks of ‘just in time’ production models more apparent (from Thailand floods in 2011 and the Fukushima-related disruptions in 2015 to the US/China trade wars). Supply chain risks are increasingly systemic in nature (like the pandemic), impacting multiple geographies and sectors

¹ DHL Global Connectedness Index 2021 Update, November 2021.

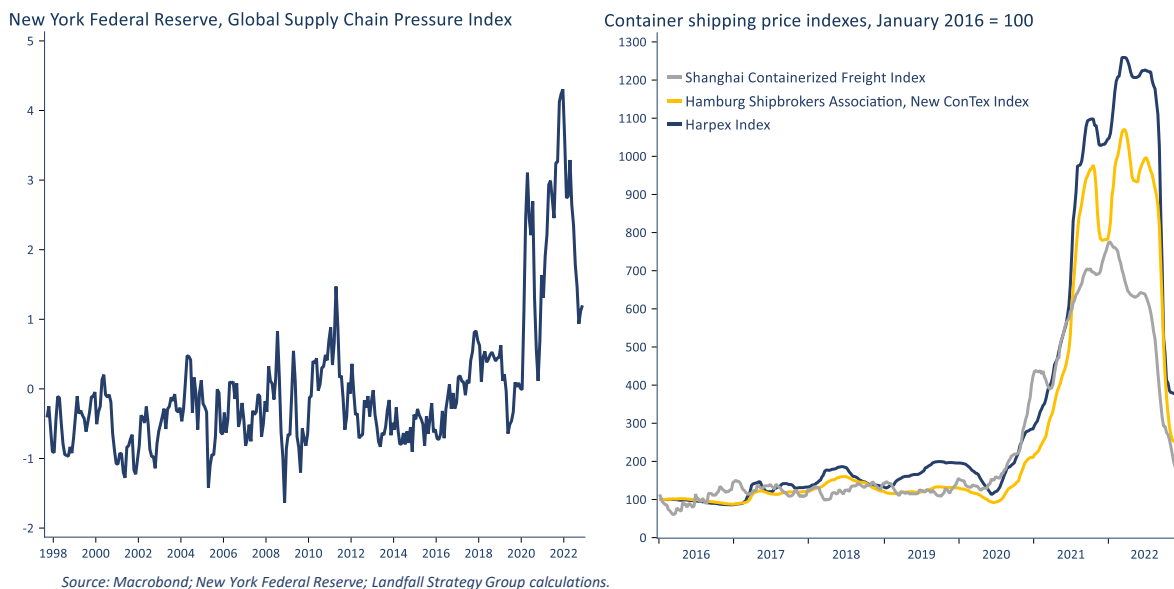
simultaneously, rather than simply idiosyncratic shocks with a more targeted impact (such as the temporary closure of the Suez Canal earlier this year).² This shift in risk profile is a challenge to prevailing supply chain models.

And the relative costs associated with locating in distant, low cost production platforms have increased, due to higher labour costs, new technologies that allow for capital intensive production in advanced economies, and higher transport costs. Taken together, recent McKinsey analysis finds that there is a strong commercial case to de-risk global supply chains.³

These changes to firm decision-making were reinforced by the disruptions to global supply chains through the pandemic. Supply chains remained resilient during Covid (given the scale of the shock), but they were highly stretched. The strong economic recovery combined with the rotation of consumer demand towards (traded) durable goods and away from (non-traded) services led to significant delays in shipping movements as well as congestion at major ports. Production processes were impacted around the world because inputs were delayed or not available.

In addition, the rapid increase in demand for international freight movement placed substantial upward pressure on shipping prices – with record prices being recorded on many indexes. International shipping and logistics companies, such as Maersk, made record profits.

Exhibit 2: Global supply chain pressures and international container shipping prices surged through the pandemic, but have since eased (although remain elevated)



Firms are aware of the vulnerabilities in supply chains, and the increasing incidence of shocks (from conflict to natural disasters, environmental shocks, and protectionist measures). New approaches are

² EBRD, 'Global supply chains in turbulence', 2022/23 Transition Report, 2022.

³ McKinsey Global Institute, 'Risk, resilience, and rebalancing in global value chains', August 2020.

being adopted in response to commercial incentives.⁴ This is leading to some re-shoring and near-shoring, and ‘just in case’ supply chain management, although this is happening in a gradual, product-specific manner. There is not yet strong evidence of growth in intra-regional trade shares in blocs such as the EU and ASEAN.

In addition, firms are building up inventory levels, diversifying across suppliers, and adding redundancy into supply chains – paying an ‘insurance premium’ to reduce downside costs. These efforts pre-dated the pandemic and the Russian invasion of Ukraine on concerns that supply chains had become over-extended.⁵

Another factor that is pushing towards localisation of supply chains is growing consumer/investor concern about the emissions intensity of supply chains. In addition, the pricing of emissions, and the tighter regulation of the fuels used in shipping, will add to the cost profile of far-flung supply chains. Lower emissions alternatives are coming on line, often as new ships are built, but these technologies are currently more expensive.

Overall, the compression of physical supply chains due to changing economic factors is not the same as deglobalisation. Global supply chains can be seen as a production technology, and can be replaced by other technologies. Indeed, some of this observed unwinding of global supply chains is efficient.

Political factors

Domestic and international political factors are also reshaping supply chains. In terms of domestic political factors, there is a greater desire to support the local production of goods – particularly those that are strategic or sensitive. This is partly to support local employment and economic activity, as well as to reduce exposure to external shocks. There is declining support for free trade across many advanced economies. Companies are being required or pressured to locate more economic activity at home.

In the US, industrial policy under the Biden Administration has included sweeping local content provisions (note the Inflation Reduction Act) – requiring local production to qualify for government support in activities such as electric vehicles, other green technologies, semi-conductors, and so on. This extends the Trump Administration’s ‘America First’ policy. Similar moves will likely be made in the EU over time as well, under a strategic autonomy focus.

The pandemic and the Russian invasion of Ukraine have powerfully illustrated the exposure that many economies have to imports of essential goods – from vaccines to energy. And there is lower confidence and trust in other countries to allow goods to flow in times of crisis.

Governments (notably in Europe) are also imposing additional requirements to audit supply chains for human rights and labour market behaviour. This adds to the cost for firms with complex supply chains in distant market – and particularly for smaller firms, which frequently lack the capability to undertake these reviews (particularly to second and third level suppliers).

⁴ <https://www.bloomberg.com/news/articles/2022-11-10/global-supply-chains-set-for-overhaul-next-year-hsbc-poll-shows>; EBRD, ‘Global supply chains in turbulence’, 2022/23 Transition Report, 2022.

⁵ For a useful discussion of these issues, refer: Richard Baldwin & Rebecca Freeman, ‘Risks and Global Supply Chains: What We Know and What We Need To Know’, NBER Working Paper 29444, October 2021.

And geopolitical factors are an increasingly important factor in reshaping supply chains. Geopolitical rivalry between the US (and the West more broadly) and China is growing. This has been underway over the past decade or so, but has picked up markedly since the Trump Administration. The Biden Administration has implemented a range of measures to reduce exposure to China, with a particular focus on technology and capital flows. Although US/China merchandise trade flows are currently sitting at record levels, there will be a gradual process of decoupling. And this will likely expand over time to cover a broader range of goods and services.

Strategic competition is leading to a push for greater independence of supply in technology, energy, pharmaceuticals, and so on, as seen in the America First agenda, strategic autonomy in the EU, and China's 'dual circulation' policies. This represents a shift away from reliance on the liberal, rules-based system, and will reshape supply chains. On a range of dimensions, the global economy is moving to a 'war-time' footing. US Treasury Secretary Janet Yellen has coined the term 'friend-shoring', in which trade and investment flows are shaped by the extent to which values and interests are aligned.⁶

Countries are increasingly being pressured to pick geopolitical sides: for example, many Western-oriented countries have chosen not to import Huawei components for their 5G networks. And over time these restrictions will likely extend to a broader range of Chinese technology inputs. Russia, of course, has already been largely removed from large parts of global economy – imports of energy from Russia have collapsed into Europe and elsewhere.

More broadly, some Western-aligned countries have been acting to reduce their exposure to China in order to manage geopolitical risk. The observations of the costs to economies and firms that were exposed to Russia has motivated consideration of decoupling. And economic sanctions are being imposed on geopolitical rivals with greater frequency. China is also acting to reduce its exposure to Western markets, and to develop greater self-sufficiency, on concerns about Western economic sanctions and restrictions.

The disruptions of global trade flows due to the Russian invasion and the accompanying economic sanctions show the potential impact on global supply chains of geopolitical factors. Prices of food and industrial metals spiked higher on concerns about reduced supply (these have now stabilised), and energy prices (oil and gas) have moved sharply higher. This is particularly the case in Europe where there was a heavy reliance on imports of Russian gas. And Europe's attempt to secure substitute supplies of gas have caused gas prices worldwide to increase.

These geopolitical pressures will drive a more fragmented global economy, in which trade and investment flows are shaped by political alignment – and in which supply chains are also configured accordingly. In some cases this will be because of legislative or regulatory requirements. In other cases, it will be firms acting to reduce their exposure to these political risks for commercial reasons (and perhaps also responding to stakeholder pressure). Firms are beginning to diversify away from countries with high geopolitical risk profiles.

The high degree of integration and inter-connectedness across the global economy (including between the competing geopolitical blocs) means that economic fragmentation is likely to generate substantial

⁶ <https://home.treasury.gov/news/press-releases/jy0714>

economic costs.⁷ Disruption to global supply chains because of geopolitics will add inefficiency and friction into the global system.

The international trade architecture that is being developed reflects these preferences. Progress on trade liberalisation will not be made in multilateral settings like the WTO, but increasingly in bilateral or regional settings (CPTPP, RCEP), and so on.⁸ These institutions will reinforce the tendency towards supply chains that are increasingly regional and shaped by political considerations.

To a first approximation, these economic and political forces both push towards a fragmented, regional, multipolar global economy. Re-shoring, near-shoring, and friend-shoring are likely to be an increasingly evident element of global flows. As noted above, this is not deglobalisation – trade is likely to be diverted as destroyed – but it is a structural shift.

Looking forward

Although some of the disruptions to global supply chains caused by the pandemic are easing, a return to the status quo ante is unlikely. The structural economic and political dynamics have been at work for some time, with factors such as the US/China trade wars and growing supply chain costs causing firms to reconfigure the geographical footprint of their supply chains. And the structural economic and political forces, from growing geopolitical rivalry to the greater frequency of shocks to physical supply chains, will continue to lead to a powerful reshaping of global supply chains.

The process of decoupling of economic relations and the reshaping of supply chains (reshoring, near-shoring, friend-shoring) is happening gradually; supply chains take time to unwind. But as with the impact of the Russian invasion of Ukraine, these political dynamics have the potential to lead to disruptive, fast-moving change as well.

Looking forward over the next decade or so, a range of disruptions to global supply chains is likely. To put some structure around this changing supply chain context, I identify three ‘archetypes’ of change that will shape the functioning of global supply chain.

- Geopolitical fragmentation

Global flows are likely to be increasingly shaped by geopolitical alignment, with competing blocs emerging. The harder and more self-contained these blocs are, the higher the costs are likely to be – and the more challenging for the design of supply chains. Countries will be under increasing pressure to choose markets from which to source inputs. This has already been seen with respect to imports of energy from Russia (as well as other goods), as well as with respect to imports of technology from China (such as the constraints on Huawei). This pressure is particularly acute in high-technology or innovation goods, but will expand over time. This is not one-way; China is also looking to decouple its economy.

The centrality of China in the global economy (the second largest economy, the largest exporter) would mean that this decoupling would be highly disruptive.

⁷ McKinsey Global Institute, ‘Global flows: The ties that bind in an interconnected world’, November 2022; IMF, ‘Asia and the Growing Risk of Geoeconomic Fragmentation’, *Regional Economic Outlook for the Asia Pacific*, October 2022.

⁸ *Comprehensive and Progressive Trans-Pacific Partnership (CPTPP)*; *The Regional Comprehensive Economic Partnership (RCEP)*

- Physical supply chain disruptions

There have been several material physical shocks to supply chains over the past decade. Extensive flooding in Thailand in 2011, as well as the earthquake/tsunami at Fukushima in 2015, caused global supply chain disruption; and the eruption in 2010 of a volcano in Iceland closed European airspace. And of course, the pandemic, the Suez Canal blockage by the Ever Given in 2021, and the Russian invasion of Ukraine have been more recent material disruptions to global supply chains.

Much more of this can be expected. Estimates of the economic costs of natural disasters are on an increasing trend. Particularly in the Asia Pacific, there are elevated risks around climate change related environmental shocks (flooding, heatwaves) as well as natural disasters.

And there is growing risk around conflict and economic blockades: Taiwan is the most obvious example of this. Taiwan is a major node for the production of electronics, semiconductors, and other manufactures. If Taiwan went offline, it would cause severe disruption to the global economy – and to small advanced economies by extension. A recent analysis of the first round effect of an invasion/blockade of Taiwan estimated annual costs of \$2.5 trillion (about 1% of world GDP).⁹ Such an event would substantially disrupt global supply chains.

- Changes in global logistics

One of the drivers of intense globalisation over the past several decades has been sustained reductions in international transport costs (air and sea). And over the past decade, there have been reducing costs on strong growth in container capacity as well as an expansion in air freight (supported by international tourism).¹⁰ Looking forward, it is also likely that there will be ongoing consolidation in the shipping industry, the development of larger ships, and the likely emergence of more hub and spokes routing (particularly in sea cargo).

There will also be increased pricing of emissions, and the development of a new generation of less emissions-intensive ships. This will take significant investment. The same is true for international aviation, as governments regulate and as airlines respond to shifting consumer preferences on emissions intensity.

Taken together, it is likely that there will be increased consolidation in the logistics industry – probably impacting the shape of global servicing – as well as some emerging cost pressures.

Exposure of small advanced economies

Small economies are deeply exposed to changes in the nature and functioning of global supply chains.¹¹ Small advanced economies have high import and export shares of GDP, and are frequently deeply integrated into global supply chains. This means that national economic outcomes are strongly correlated with variation in the strength of globalisation: disrupted supply chains can impose meaningful economic costs.

In addition, small advanced economies are exposed to external idiosyncratic shocks. Small advanced economies tend to have relatively high levels of sectoral concentration in their externally-oriented

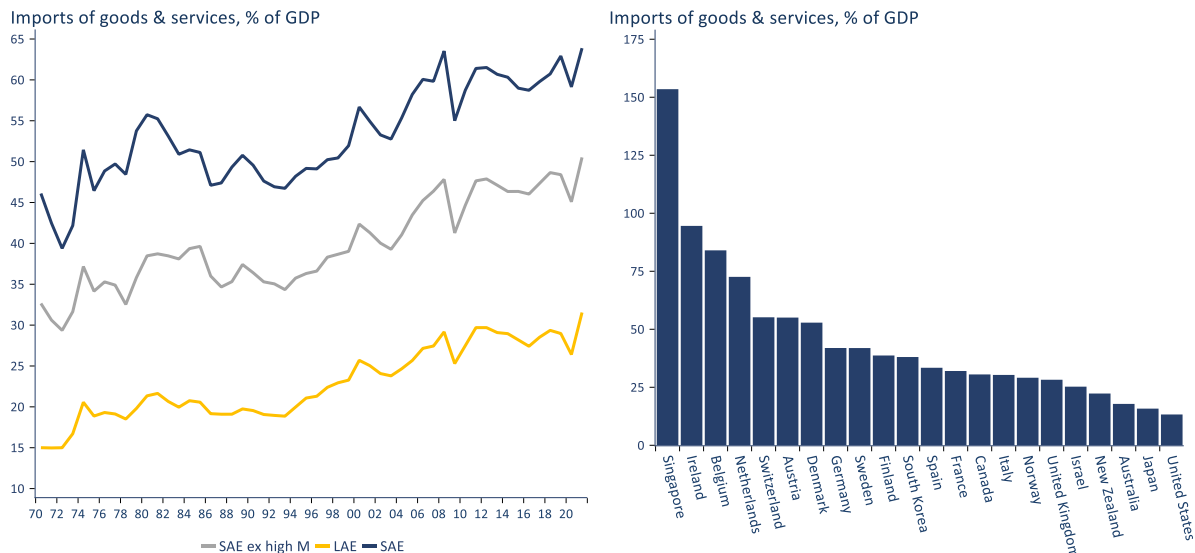
⁹ <https://www.ft.com/content/c0b815f3-fd3e-4807-8de7-6b5f72ea8ae5>

¹⁰ <https://www.stlouisfed.org/publications/regional-economist/2022/nov/international-shipping-costs-determinants-outlook?>

¹¹ OECD, 'Global Value Chains: Efficiency and Risks in the Context of COVID-19', February 2021.

sectors: a negative shock to one of these key sectors can have out-sized effects on the economy. And frequently small economies will be deeply reliant on imports of particular goods, because they will lack the domestic production capabilities for many types of goods.

Exhibit 3: Small economies are exposed have high import shares of GDP compared to larger economies; large (or remote) economies like the US, Japan, and Australia/New Zealand lag



Source: Macrobond; World Bank; Landfall Strategy Group calculations. SAE = Austria, Belgium, Denmark, Finland, Ireland, New Zealand, Netherlands, Norway, Singapore, Sweden, Switzerland. High import small economies = Ireland, Singapore. LAE = Australia, Canada, France, Germany, Italy, Japan, South Korea, Spain, UK, US.

However, despite the deep exposures of small advanced economies to global supply chain disruptions, it is striking that small advanced economies have out-performed larger advanced economies through the pandemic and the Russian invasion of Ukraine. They have been able to navigate through the supply chain disruptions, with stronger GDP growth than larger economies – supported by a range of factors, such as strong world trade growth and high quality management of the pandemic.

Indeed, some elements of the fragmenting global economy can be positive for small advanced economies. Reshoring of economic activity back to small markets, leveraging technologies such as automation, can add economic value to high wage small economies (such as in the Nordics).

However, there are some clear risks. The increasing potential for shocks to supply chains that increase costs and cause delays is a negative for small economies (particularly as small advanced economies have constrained options in terms of producing at home). Recent examples include disruptions to the supply of food into Singapore; as well as constraints on access to vaccines through the pandemic.

And small economies have material exposures to the risk archetypes described above. For example, small advanced economies are deeply exposed to the growing geopolitical rivalry between the US/West and China. For many small economies, China has become a major import source – and having to make different choices for geopolitical reasons will come at a cost. The Russian experience gives a sense of the materiality of the costs that can be incurred when decoupling from a market from which

strategically important goods are purchased. One of the big potential risks to supply chain disruption is with respect to a Chinese invasion or blockade of Taiwan.

Large economies (like the US, China, EU) will increasingly impose pressure on small economies in terms of making these choices, shaping the supply chain options that countries have available to them.

Similarly, physical disruptions to the supply chains into small economies can be costly. There are frequently relatively few domestic substitutes. And small economy imports will often be inputs into export sectors, which are the productivity growth engine of small advanced economies.

II. Comparative analysis of policy responses

This Part describes how selected advanced economies are responding to their exposures to increasing global supply chain risks. The disruption of the pandemic as well as the spillover impact of the economic sanctions on Russia have raised the importance of these issues to policy-makers as well as to firms. Many advanced economy governments have recognised their increasing national exposure to global supply chain disruptions, and are responding – over and above the responses by private firms.

As discussed above, supply chains were heavily stretched during the pandemic (costs, delays, and so on), but continued to function for the most part. However, there were areas where this was not the case. Governments (in Europe, the US, and elsewhere) imposed export bans and other restrictions on PPE, testing kits, vaccines, and so on – prioritising local populations over an open, rules-based system. The EU also mobilised to undertake joint procurement for vaccines, which enabled them to move more quickly than many others.

Small economies outside the EU (such as Israel, the UAE, and Singapore) had to scramble to strike agreements. Like-minded countries such as New Zealand and Singapore also struck various agreements to keep supply chains open in areas such as food and pharmaceuticals.

In response to these recent experiences, small advanced economy governments have been stepping up efforts around supply chain resilience. This discussion is organised around several key thematic areas in which policy change and debate is being observed. It considers approaches to securing essential goods (such as food and energy) and reducing import dependencies in key areas, the various experiences with 'strategic autonomy', and managing geopolitical risks to supply chains, as well as physical supply chain disruptions. It closes with some overall thoughts on key insights. The caveat is that much of this policy activity is work in progress, and some of the initiatives remain in development.

A core focus of this discussion will be on the responses across small advanced economies, which will frequently have similar exposures to global supply chain disruptions as New Zealand. However, there are also interesting observations of policy debates and responses across larger economies. Relevant insights will be taken from this broader group as well.

Essential goods strategies

The experience through the pandemic, reinforced by the economic impact of the Russian invasion of Ukraine, has led to several countries establishing or strengthening strategies on the security of supply of

essential goods. Countries vary in terms of which goods are essential to the functioning of economies and society, but common categories include energy, food, and pharmaceuticals/medical goods.

In Europe, for example, there are aggressive efforts to substitute away from imports of Russian oil and gas as quickly as possible (partly because of sanctions, partly because Russia is no longer a reliable supplier). There are many elements to this EU-wide strategy.

In the immediate-term, European countries have been securing alternative supplies of natural gas (from the Middle East, North Africa, and so on) and signing long-term contracts where possible (such as between Germany and Qatar). And there have been EU-determined minimum reserve levels for gas, maximum prices, and so on. National governments are also buffering firms and households from the full increase in costs, providing fiscal transfers.

The current constraints on imported energy supply are also accelerating the pace and scale of the transition to renewable energy: wind, solar, as well as green hydrogen.¹² Beyond achieving the legislated net zero targets, increased reliance on renewable energy reduces exposure to external energy price and supply shocks. The net zero transition is increasingly regarded as a form of import substitution that can bolster national economic resilience. Energy independence can also be an important form of competitive advantage, as the US is currently experiencing with its lower energy prices and greater security of supply.

Food security of supply is also an issue in some small economies that are heavily reliant on imported food. In Singapore, there is a 30% local production target for food by 2030; and the UAE has also developed a broad food security strategy.¹³ Long term partnerships are being secured with a wide range of suppliers, and technology is being supported to develop local supply (vertical farming, precision fermentation, and so on).

Beyond food and energy, there are other supply chain strategies for goods that are deemed essential (such as pharmaceuticals, military equipment, or specific inputs into key production processes). The exact nature of these strategies, and the countries that are developing them, depends on the specific exposures.

Supply chain risks are seen as being of a similar type as other risks with an economic impact that need to be managed. Elsewhere, governments are taking structured approaches to national risk and resilience (e.g. cyber, natural disasters), including where firms are the owners and operators of these assets. Investments are being made in identifying the nature of these risks, specifying minimum resilience standards, and monitoring emerging developments.

Large economies also have various measures to bolster national supply chain resilience: the long-standing strategic petroleum reserve in the US; China has large stockpiles of wheat and other staples; and so on. Recent commentary suggests that an expanding group of categories are being added to

¹² https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

¹³ <https://www.ourfoodfuture.gov.sg/30by30>; <https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/strategies-plans-and-visions/environment-and-energy/national-food-security-strategy-2051#>

listings of critical supply chains in large economies, with policy instruments including stockpiling, local production, supplier diversification, and so on.¹⁴

Another learning through the pandemic was that disruptions to ‘small’ import categories (by import value) can have out-sized impacts on the economy. One example was fuel additives (AdBlue), which are required for diesel engines. Without this, the trucking fleet comes to a halt. Several countries (including Australia and New Zealand) encountered issues with respect to imported supplies of this product.¹⁵ There have been recent calls for the European Commission to recognise AdBlue as an “essential product without which logistics chains would stop”, which would require the chemical’s EU-wide availability to be monitored and for official AdBlue reserves to be created.¹⁶

Strategic autonomy

Beyond ensuring security of supply for essential goods such as food and energy, larger economies (notably the EU, the US, and China) are looking to strategic autonomy in areas such as technology and medicines. This is partly a response to the supply chain disruption of the pandemic and the economic sanctions on Russia; partly for geopolitical purposes (strategic competition with China, to reduce exposure to geopolitical rivals); partly for industrial policy reasons (a desire to control the commanding heights of the 21st Century); as well as for domestic political reasons (to bolster domestic employment and economic activity).

In Europe, France has been leading the debate on strengthening strategic autonomy. The French Minister of Finance, for example, stated that “We should develop strategic stockpiling, geographic diversification of supply and, where appropriate, increase European production capacity, to build up our autonomy in these strategic areas”.¹⁷

Large economies are able to build domestic capability, and to require or incentivise domestic and foreign firms to locate production in their market. But for small economies, it is much less likely to be possible to build domestic production capability to engage in import substitution.

Indeed, there are no meaningful examples of strategic autonomy being pursued in small advanced economies, outside specific strategies around food and energy security. Small advanced economies simply do not have the productive capacity to aim for strategic autonomy in key areas of technology or manufacturing. Even if they have leading positions in some aspects of the value chain, it is unlikely that small economies can dominate all of the supply chain (with the partial exception of small economies like Taiwan in semiconductors or Switzerland in pharmaceuticals). The increased sophistication of production means that it is much more difficult to produce local substitutes.

Managing geopolitical risk

Small advanced economies are under increasing pressure from big powers to make choices on geopolitical alignment. This is already shaping supply chains. The sweeping economic and financial sanctions on Russia are one example; imports of energy from Russia by Western countries are reducing

¹⁴ <https://www.ft.com/content/ef90d296-627d-4ff9-9983-ff537bdb078b>

¹⁵ <https://www.abc.net.au/news/2022-07-04/adblue-fears-with-australian-manufacturing-to-cease/101197454>;
<https://www.abc.net.au/news/2022-07-08/no-adblue-shortage-forecast-government-says/101218112>;

¹⁶ <https://finance.yahoo.com/news/series-shortages-threatens-eu-supply-153539694.html>

¹⁷ www.europeanfiles.eu/industry/strengthening-the-eus-resilience-and-strategic-autonomy

sharply, and other sources of supplies will be used to substitute away from Russian exports of other categories. In the technology space, multiple countries have moved away from a reliance on Huawei to sell components needed for the 5G rollout. These decisions have been made after pressure from the US in some cases (and with consequences for bilateral relations with China).

The assessment that geopolitical rivalry and economic decoupling will intensify is leading some small economies to take precautionary measures, both in terms of diversifying export and import concentration. Rapid unwinding of existing relationships, and finding new suppliers, can take time. Some of this is being driven by firms, but increasingly government agencies are flagging this as an issue.

In Europe, there is a sense that there was sustained naivete in becoming so reliant on Russia despite geopolitical frictions – and a desire to not repeat this again. The Finnish Prime Minister recently noted that *‘In increasingly critical areas of our societies – from medical equipment to new technologies to energy – we have become far too dependent on cooperation with regimes that do not share our common values... Our dependencies are becoming our weaknesses faster and in more important areas of our societies than we would have wished. The right lesson for Europe is to build strategic autonomy in key sectors with its trusted partners’*.¹⁸

China is now routinely referred to as a strategic rival in European governments, with early stage attempts to reduce strategic exposures. Even historically liberal small economies, such as the Netherlands and the Nordics, are increasingly screening for undue exposure to China.

Physical supply chain disruptions

Many economies are also responding to the increased incidence of physical disruptions to supply chains. Through the pandemic, for example, governments around the world directed substantial financial support to airlines to prevent bankruptcy, protect employment, as well as to support international connectivity – both for people, as well as for air cargo. Share prices of airlines were well down through the pandemic, but only a few airlines went out of business.

For example, the New Zealand government provided support to Air New Zealand – as well as contracting with other airlines to ensure ongoing servicing of the New Zealand markets (both for imports and exports). And Australia supported shipping services to Australia through the pandemic.

But in some cases, not much can be done by government. For example, in Finland, Finnair’s business model of connecting Europe to Asia has been heavily weakened by the closure of Russian air space since the invasion of Ukraine. This compromises Finland’s supply chain connectivity (and the commercial position of Finnair), but there are few policy options available to Finland.

In some cases, markets have been able to respond effectively. For example, the disruption to trucking routes from Ireland to Europe through the UK ‘land bridge’ has been severely disrupted by Brexit. In response, private firms have rapidly deployed ferry capacity for trucks to sail directly to France, Belgium, and the Netherlands. This has added slightly to the costs, but is an example of markets adapting well.

Singapore is a major international air and shipping hub, and has no issues with dense physical connectivity. But the Singapore government is continuing to invest massively in expanding its ports and

¹⁸ <https://www.lowyinstitute.org/event/sold-out-address-sanna-marin-prime-minister-finland>

airport to ensure that it is as efficient as possible: if there are additional costs and frictions in global supply chains, strengthening its efficiency and capacity is one way of offsetting this.

Supply chain risk analysis

Observation across advanced economies suggests significantly more investment in analysis to understand the nature of exposures to various shocks and risks. At a firm level, there are many examples of stepped-up analysis of supply chain exposures. Governments are now beginning to invest in mapping out national supply chain exposures and areas of import dependency. The complexity and inter-dependencies across a full economy makes it challenging to specify the key exposures.

Indeed, there is a view that visibility into emerging supply chain exposures is currently limited. As mentioned above, it is sometimes relatively small import categories that turn out to be systemically important; and second and third tier exposures can supply chains can often have material exposures that are not immediately obvious.

However, some progress has been made. One recent example in the public domain (many of these exercises are not fully public) was conducted by the German Council of Economic Experts. They identified a large number of products where there was a high level of import dependency on particular countries/suppliers (notably China) – and where there is constrained ability to substitute away.¹⁹ And of course, Germany had a high (but now reducing) dependency on importing Russian energy. This analysis was the basis for proposing policy actions: to diversify energy imports and sources of critical raw materials; support diversification through strategic alliances and investment guarantees; and expand European production capacities in strategically important areas such as energy and technology.

Elsewhere, the Australian Productivity Commission has undertaken a recent study; as well as the Canadian government.²⁰

International policy leadership

Several larger economies are increasingly moving towards a more discretionary approach to international trade, away from the rules-based system. This creates risk to global supply chains.

Since the pandemic, Singapore, New Zealand, and others have been leading the international debate on the importance of keeping supply chains open.²¹ Interventions and proposals have been made at the G20, APEC, and elsewhere, and some international agreements signed to strengthen supply chain resilience.²² Small advanced economies are particularly exposed to the imposition of export bans and protectionist measures.

This is reinforced by the analysis of the multilateral institutions (IMF and others) that the response to supply chain disruptions should be more openness, flexibility, and diversification rather than barriers.

¹⁹ <https://www.sachverstaendigenrat-wirtschaft.de/en/annualreport-2022.html#>

²⁰ <https://www.pc.gov.au/inquiries/completed/supply-chains/report>; <https://www.international.gc.ca/trade-commerce/economist-economiste/analysis-analyse/id-vulnerables-canadiens-importations.aspx?lang=eng>;

²¹ <https://www.pmo.gov.sg/Newsroom/Intervention-by-PM-Lee-Hsien-Loong-on-Food-and-Energy-Security-at-the-G20-Bali-Summit>; <https://www.straitstimes.com/singapore/politics/no-economy-has-hope-of-being-self-sufficient-trade-flows-should-stay-free-and-open-pm-lee-at-apec>;

²² https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_22_7743

Countries are also looking to find a middle ground in a world of big power strategic rivalry. Singapore's Foreign Minister recently delivered a speech on the costs of this fragmentation, floating the idea of an open, 'non-aligned movement' on science, technology, and supply chains.²³

Overall insights

There are a few key insights from recent policy actions and debates across small advanced economies.

First, national supply chain resilience has moved sharply up the policy agenda in small advanced economies because of their relatively high exposures (high import shares of GDP, high sectoral concentration levels). And the range of supply chain risks being considered is broad; geopolitical risk has become a much more salient consideration for example. High levels of international economic engagement remain an economic imperative for small advanced economies, but they are adjusting the way in which they manage the associated risks.

Second, although small advanced economies are generally inclined towards market-based solutions in domestic economic policy setting and support the rules-based international system, there is a growing willingness to act in a more deliberate way in response to the growing risk profile. For example, there is a greater focus on building inventories and diversifying supply chains to manage key exposures, as well as efforts to strengthen security of supply in energy, food, and other essential goods. The centre of policy gravity is shifting as a consequence of the materiality of the exposures to global supply chain risks.

Third, context matters in the nature of the policy response. For example, there are differences in the policy responses between small and large advanced economies. Large economies can pursue strategic autonomy and independence to a much greater extent than small economies that have fewer policy options open to them in strengthening supply chain resilience; small advanced economies are not simply scaled-down versions of larger economies.

In addition, not all small economies are the same. Small economies that are EU members are less exposed because of their position in the Single Market; and because they are able to rely on EU institutional arrangements. Small economies have 'protection' that a stand-alone small economy does not. And small economies that are adjacent to large centres of economic activity (in Europe, Asia) face quite different challenges than physically remote economies (Australia, New Zealand), and so have different policy responses.

Because of these important differences in context, care should be taken in comparing policy responses across the small advanced economy group. Relative to other areas of economic policy, economic scale is only one factor that shapes policy options and responses: economic structure, the nature of the import dependences, physical geography, and the institutional context probably matter more than direct measures of economic scale. As will be discussed in Part III below, New Zealand's exposure to global supply chain risks is markedly different than other small economies.

²³ <https://www.mfa.gov.sg/Newsroom/Press-Statements-Transcripts-and-Photos/2022/11/221110nextstep>

III. Implications for New Zealand

This discussion will develop a perspective on New Zealand's exposure to global supply chain disruption risk. It is structured in two parts. The first considers the way in which the New Zealand context (geographic, economic) shapes the scale and type of its exposures to global supply chain risks, and how this compares to other (small) advanced economies.

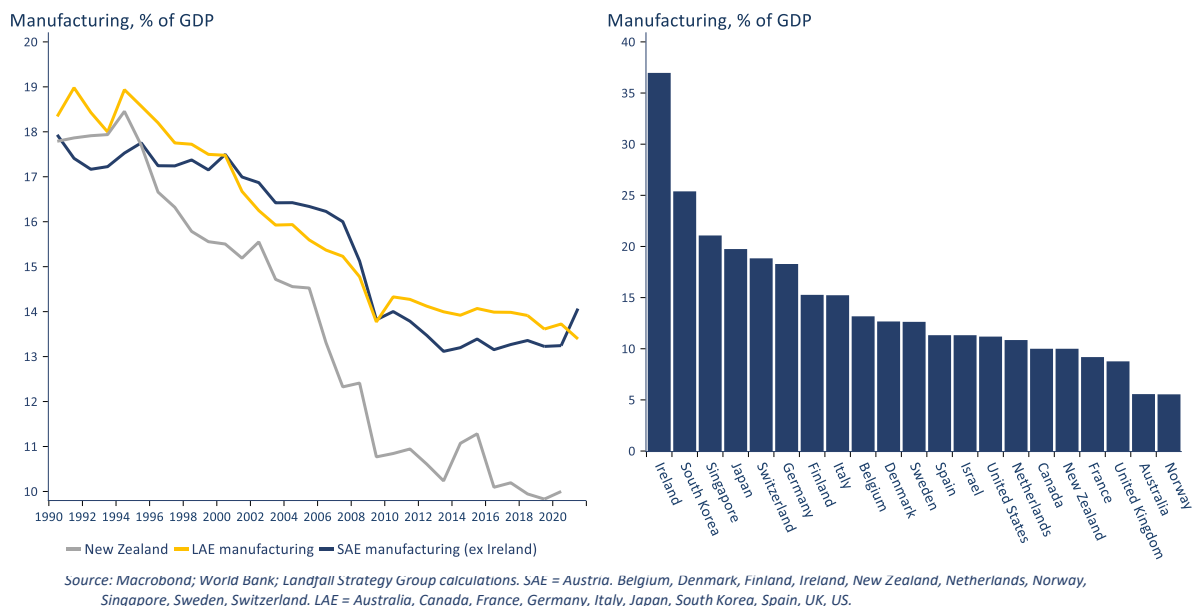
The second part draws on insights from the international policy experience, and considers the policy responses that might be appropriate in a New Zealand context.

The New Zealand context

New Zealand's imports of goods are currently 19% of GDP, similar to their pre-Covid levels. Imports of services are another ~4% of GDP (outbound tourism is an important element). This is a low imports share of GDP compared to other small advanced economies (merchandise import shares in most small economies are >40% of GDP), largely due to New Zealand's physical location and economic structure (refer Figure 3, above).

New Zealand's major imports are machinery and equipment, vehicles, and energy; as well as textiles, plastics, and iron and steel. New Zealand's small manufacturing base (~10% of GDP, compared to a small economy average of 16% of GDP – or 14% of GDP excluding Ireland) means a high reliance on imports of manufactures.

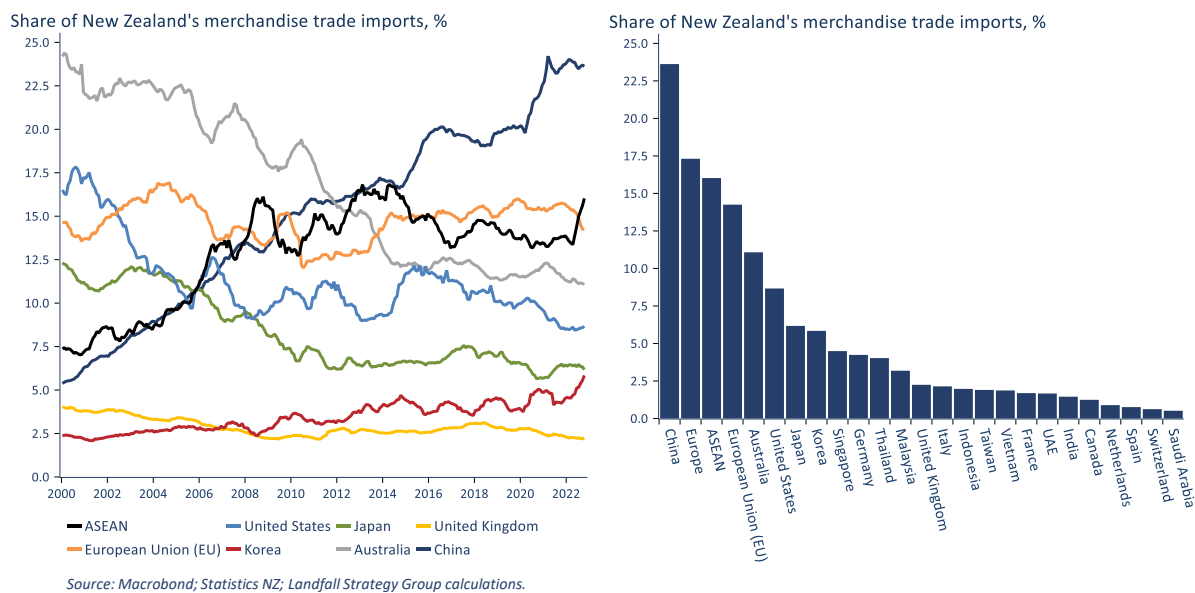
Exhibit 4: New Zealand has a substantially lower manufacturing share than most other small advanced economies; New Zealand is reliant on imports for manufactured goods



However, New Zealand has a high level of food independence, importing relatively little food compared to many other advanced economies. Intermediate goods (inputs into other production processes) account for 42% of imports; consumption goods represent about 25% of total merchandise imports. New Zealand has a very low import share of exports compared to other small advanced economies.

China has become New Zealand's major source of imports (24% of the total), followed by Europe (17%), ASEAN (16%), and Australia (11%). China has surged in importance over the past 15 years, while Australia has reduced in importance. This has likely increased New Zealand's supply chain risk exposures (more stretched, higher geopolitical risk profile) even if supply chains have become more efficient.

Exhibit 5: New Zealand's import profile has shifted towards Asia, particularly China and ASEAN – and away from Australia and the US – generally lengthening its supply chains



The major imports from China are electrical goods, machinery, vehicles, and furniture. From Australia, the major imports are machinery, chemicals, and cereals. Much of New Zealand's imports of energy now come through Singapore.

New Zealand's economic scale and geographical location shapes its exposures to global supply chain disruptions. This will influence the type of insights that can be taken from the experience and policy responses of other small advanced economies.

New Zealand's physical remoteness goes some way to explaining why New Zealand's import and export shares are much lower than other small advanced economies. New Zealand needs to import capital and consumption goods over very long distances, with probably the most stretched international supply chains of any advanced economy. There are several specific implications of these geographic realities for New Zealand's supply chain exposures.

First, as the 'last bus stop on the planet' New Zealand has relatively weak international connections. Unsurprisingly, New Zealand ranks poorly on the World Bank's measures of shipping liner connectivity as well as placing 42nd on IATA's airline connectivity index. This increases the transaction costs and timelines with respect to supply chains; and the thin connectivity creates additional risks of accumulating disruptions (a cascading or 'bullwhip' effect).

As with other island states, New Zealand is heavily reliant on international shipping for imports and exports; and it is less densely connected by air because of its location. 99% of New Zealand's trade by volume – and 78% of New Zealand's imports by value – is carried by sea freight.²⁴ This means that developments in sea freight are particularly relevant to New Zealand's supply chain resilience.

Second, geography shapes New Zealand's economic structure. New Zealand has a low manufacturing share of GDP relative to other small advanced economies. The combination of a small domestic market, the absence of proximate markets, and low levels of capital intensity in the economy, mean that there is heavily constrained ability to develop local production for many classes of manufactured goods.

New Zealand's geography also means that New Zealand has weak global value chain integration. Most of the intermediate goods that are imported will contribute to domestic production processes rather than New Zealand firms adding value to these imported goods and then exporting them. New Zealand has a very low import share of exports relative to other advanced economies. The upside is that New Zealand's exports have a more limited exposure to supply chain disruptions – although there are some key inputs (such as fertilisers).

However, one important implication with importing finished products is that New Zealand is exposed to much more of the supply chain – disruptions at any point from production to shipping will impact on New Zealand, because it is at the downstream end of the value chain. IMF analysis suggests that exposure to downstream supply chains is a more exposed place to be because there is a larger surface area of exposure to all the upstream supply chain disruptions.²⁵

And third, New Zealand's remoteness explains why it is not part of a supranational institution like the EU. Although New Zealand has signed many FTAs, and has a range of deeper economic deals with countries such as Australia and Singapore, this institutional context profoundly shapes New Zealand's risk exposures. Small economies in the EU can rely on the institutional and financial heft of the EU to procure goods and services; are adjacent to large sources of production; and can benefit from strategic autonomy policies to bolster supply chain resilience in ways that New Zealand cannot.

Overall, New Zealand is one of the more exposed small advanced economies to global supply chain disruptions because of its geographic isolation, thin international connectivity, and lack of a domestic production base. New Zealand is exposed to the breakdown of physical connectivity as well as the inability to secure particular goods due to production shortages and other supply chain disruptions. And although New Zealand has a low imports share of GDP and is relatively self sufficient in many types of food (as well as electricity), New Zealand is heavily reliant on imports from distant markets for a broad range of capital and consumption goods.

The New Zealand economy generated relatively good outcomes through the pandemic, but the disruptions to supply chains during Covid had substantial effects on the functioning of the economy and of society (from pharmaceuticals to inputs into construction and infrastructure).

New Zealand's major exposures extend beyond the largest import categories; several important sectors have high import dependency. For example, 'about 90% of New Zealand's building materials and

²⁴ Ministry of Transport, *New Zealand freight & supply chain issues paper*, 2022.

²⁵ IMF *World Economic Outlook*, April 2022

products are imported.²⁶ There are also exposures in categories such as fertilisers and fuel additives (AdBlue). And New Zealand has to face these supply chain risks in a more independent manner than many other small advanced economies (notably those in the EU).

Looking forward

The discussion above provides context to an assessment of New Zealand's exposures to emerging developments in global supply chains. To structure this discussion, consider New Zealand's exposure to the three archetypes of global supply chain risk that were identified in Part I. This will help to clarify the key vectors of exposure, and to develop hypotheses on the key risk events to think about. This may be useful for subsequent modelling work.

▪ Geopolitical risks

Growing geopolitical tensions between the US and China is likely to lead to progressive economic decoupling, with increasing pressure on countries like New Zealand to make choices on alignment. This has already been seen with respect to New Zealand's choice on restricting Huawei's participation in the 5G network, and these types of geopolitical disruptions are likely to extend over time. Friend-shoring will become an increasingly important reality of the global system, for New Zealand as for others.

Given that China is New Zealand's largest import (and export) market, the potential impact of these geopolitical dynamics on New Zealand's supply chains generates a substantial economic risk. New Zealand's imports from China are generally not in sensitive sectors, but the reliance of New Zealand on Chinese imports means that any disruption could impose significant costs. And ongoing low levels of people flows from China (international tourism, export education) could lead to reduced international connectivity.

It is also possible that future conflict (e.g. with respect to Taiwan) would lead to more aggressive economic sanctions being imposed on China, and that Western-aligned countries would be under pressure to substantially reduce imports from China. The sanctions imposed on Russia after the invasion of Ukraine provide some sense of what this might look like. But China is a much larger and more central player in the global economic system than Russia, which means much higher costs. And over time, a fragmented global system, in which an economic and trading bloc develops around China could impose even greater pressures on New Zealand's supply chains.

These risks are difficult to estimate and price. But the alternatives to sourcing from China are frequently not commercially attractive, which makes achieving diversification of supply highly challenging.

▪ Physical supply chain disruption

New Zealand's supply chains are lengthy, and run through some of the world's more challenging geographies (notably the Malacca Straits, but also the Suez Canal). Climate change and environmental shocks (storms, floods, etc) are likely to interfere with shipping and air freight to an increasing extent, including the functioning of ports and airports (e.g. rising sea levels). Asia is also exposed to risks of conflict and future pandemics.

²⁶ Ministry of Transport, *New Zealand freight & supply chain issues paper*, 2022.

For the most part these are not black swan events; these risks can be identified, even if it is difficult to assign probabilities to them. And as discussed in Part I, the risks of these shocks are increasing – and firms are responding reconfiguring their supply chains, building inventories, and so on.

And the risks are becoming more systemic (like Covid) rather than idiosyncratic (like the impact of Fukushima). Recent analysis by the Rhodium Group estimated direct economic costs of an economic blockade of Taiwan of US\$2.5 trillion a year because of Taiwan’s centrality in key global supply chains (notably semiconductors and other electronics).²⁷ An event like this (which is not a tail risk) would have significant effects on New Zealand given the geography of New Zealand’s supply chains.

Of course, New Zealand’s exposures to these risks are not unique. The challenge is that these risks interact with New Zealand’s thin air and sea connectivity; disruptions to supply chains can have disproportionate effects given the absence of redundancy in New Zealand’s international connectivity. The recent disruptions to jet fuel supply to New Zealand is another example of these risks.

- Changing geography of international logistics

There are also likely to be changes in the functioning of the international logistics industry, which will impact on New Zealand in a meaningful manner. New Zealand is exposed because of thin international connectivity: even small changes in commercial decisions by airlines and shipping companies is likely to have disproportionate effects.

In terms of airlines, passenger aircraft are the most important source of air freight; prior to the pandemic, >80% of New Zealand’s air freight went in the hold of passenger aircraft.²⁸ Reduced long haul travel because of changed consumer preferences (e.g. due to emissions intensity) or because of the changed economics of airline travel may mean less direct servicing for New Zealand. It is possible that there will be less point to point connectivity for New Zealand, with greater servicing through Australia.

Air cargo capacity has been supported by the strong growth in inbound international tourism over the past decade, notably from Asia and the Middle East (and some from the US). That collapsed through the pandemic, with government support required to ensure sufficient air cargo capacity. Looking forward, a weak recovery in international tourism is likely to constrain an important source of air cargo capacity (notably to/from China). Bespoke air cargo capacity can provide some offset, but frequency and cost may be compromised.

²⁷ <https://www.ft.com/content/c0b815f3-fd3e-4807-8de7-6b5f72ea8ae5>

²⁸ Ministry of Transport, *New Zealand freight & supply chain issues paper*, 2022.

Exhibit 6: New Zealand's air freight capacity has been heavily supported by inbound tourism, which has grown particularly strongly in the decade prior to Covid



Source: Macrobond; World Bank; Statistics NZ; Landfall Strategy Group calculations.

Major changes are also likely to continue in the shipping industry, in ways that may compromise New Zealand's connectivity. The dynamic towards much larger ships and the industry consolidation, mean that more hub and spokes arrangements are likely – with less direct servicing of New Zealand, which will increase costs and delays. New Zealand will need to continue to expand and upgrade its port capability to service these shifts (which is expensive, particularly given the fragmented nature of New Zealand's ports).

Costs are also likely to go up on shifts to reduce emissions in shipping (as well as the extension of emissions pricing), which is an emissions intensive activity. The next generation of ships will be cleaner, but this will take time. Shipping costs were held down over the past decade by over-capacity in the industry, but upward price pressure is now likely.

Overall, New Zealand benefited from an expansion in cheap market access over the past decade, but now needs to prepare for higher transaction costs associated with imports and exports (even as the post-pandemic disruptions ease). Fuel costs are increasing, shipping supply has contracted, and international tourism into New Zealand is likely to be structurally lower than the past decade.

A need for change?

The characteristics of New Zealand's supply chain risk exposure, and the nature of the policy responses in other advanced economies, provides a basis for developing some hypotheses on policy options for New Zealand.

New Zealand's current policy approach to global supply chains has worked relatively well in generating good outcomes. New Zealand is an open economy, with few import and export restrictions; and has a well-developed network of free trade agreements that cover almost all of New Zealand's imports. New Zealand also has a flexible, efficient economy, which is able to adapt and respond well to shocks.

At its core, the current approach relies on firms being able to respond appropriately to commercial incentives – and on the government being able to react/scramble effectively in response to shocks. There is some anecdotal evidence that New Zealand firms are building redundancy and diversification into their supply chains, holding higher levels of inventories, and so on, in response to elevated supply chain risks (although it is hard to assess whether this is happening at the same scale as reported in other advanced economies). And the New Zealand government has been able to respond well to shocks (including the pandemic), relying on a measure of improvisation.

But the nature and scale of the structural global supply chain dynamics means that this approach may not be sufficient. Indeed, across other advanced economies, both firms and the government are acting to strengthen their response to supply chain risks.

The emerging risk landscape creates challenges for both firm responses and for a reactive government policy posture. We are increasingly moving into a supply chain environment characterised by uncertainty and ignorance as much as by conventional risk – which makes it difficult for firms to understand and price all the relevant risks. For example, it is particularly difficult for firms to respond to geopolitical risk, and to understand whether diversification is an appropriate investment to make.

In addition, firms are not likely to price the full costs of the risks to the supply of essential goods – which have impacts throughout the economy, extending well beyond the direct exposure of the firms. It may be that society at large is more risk averse with respect to these type of risk events, and prepared to pay a higher ‘insurance premium’ to strengthen resilience against supply chain shocks.

Competitive pressures may create reluctance by firms to bear costs for a long-term event where their competitors are not doing so. Strengthening resilience may put them at a near-term competitive disadvantage, even if it is a rational choice over a longer horizon.

These issues are likely to be particularly pronounced for smaller firms, which are less likely to have the resources and capabilities to assess and manage global supply chain risks. Larger firms, with larger balance sheets and deeper capabilities, are better able to invest in supply chain resilience (diversifying exposures, building inventories, understanding the multiple layers of exposure that they have). New Zealand’s relatively small number of large firms creates challenges (other small advanced economies have much higher numbers of MNCs per capita).²⁹

The implication is that, although firms will be the primary actors responsible for managing supply chain risk exposure, there is a potential role for government in supporting firms to assess and price risk and to take additional actions to ensure resilience against supply chain shocks.

In addition, the policy focus on reacting to shocks (such as the pandemic) after they happen may not deliver good outcomes in response to some of the emerging supply chain risks. It may be necessary for the government to undertake some positioning in advance. For example, managing the risks of geopolitical tension cannot be left to the last moment: anticipatory actions are required. The European experience with energy exposures to Russia provides a recent illustration of why positioning in advance matters.

²⁹ David Skilling, ‘Frontier firms: An international small advanced economy perspective’, paper prepared for the New Zealand Productivity Commission, May 2020.

Similarly, some of the structural challenges associated with international logistics may require preparatory action as well. For example, higher transaction costs into/out of New Zealand will make New Zealand a less attractive and competitive location over time and will disadvantage externally-oriented activities. These are issues that policy-makers should be seeking to address in advance to some extent. This can't effectively be done in a reactive manner.

As discussed in Part II, other advanced economy governments are investing more in ex ante preparation. This is being done by reducing exposures to risks (diversification, inventories) and shocks, by building capabilities that support an effective response to a shock (building institutions), and by positioning the economy for a world with higher supply chain costs. New Zealand can learn from this experience.

New Zealand's policy approach to supply chain risk will be increasingly challenged in the more turbulent global economic and political environment that is emerging. With relatively limited redundancy in system, the reactive policy approach works better in fair weather conditions. New Zealand's policy settings have been adapting to these new realities, notably through the pandemic, but more is likely to be needed – as is the case across other advanced economy governments. Although specific risks are difficult to predict, there is much that can be done to position New Zealand to be resilient and prosper in a new world.

Of course, great care needs to be taken with a more deliberate, interventionist stance. Substantial costs can be incurred – and distortions created – if this is not done in a disciplined manner. Many categories of goods are not essential/systemically important - and have satisfactory alternatives. The focus needs to be on goods and physical supply chains that are essential to the functioning of the New Zealand economy – and of society more broadly. A loss of access to medicines or petrol is a problem, the delayed arrival of furniture is not.

Policy responses

Three broad classes of policy response are identified.

1. Analysis & institutions

One of the common responses across advanced economy governments is to invest in analysis to identify areas of key supply chain risk and import dependency (various examples were discussed in Part II, such as Singapore, Germany, and Australia). Such analysis is foundational to developing insights into supply chain exposures where policy action might be needed, and particularly identifying where there are vulnerabilities to the ongoing supply of essential goods.

This analysis is important for New Zealand to do as well. This should be guided by the specific risks and exposures that New Zealand faces, from geopolitical risks to specific supply chain disruption events. It is useful to undertake scenario analysis, stress testing, war-gaming exercises, and so on, to provide a sense of the location and materiality of the costs that might be involved. Although it is difficult to predict specific risks, structured scenario analysis can highlight vulnerabilities and reduce the likelihood of being completely surprised. Although specific risk prediction is challenging, there are very few genuine black swan events (the pandemic was not a black swan, for example).

The data and insights produced through this analysis will be directly useful to New Zealand firms, particularly smaller firms that are less likely to be able to undertake this analysis. For example, smaller

firms may be able to assess the first level of supply chain exposures – but struggle to assess second and third level exposures that they face (there will be many more firms involved in the second and third levels of supply chains). These indirect exposures are important for New Zealand firms given the emphasis on importing relatively finished goods, with a substantial exposure to the set of upstream disruptions. The government has an important coordinating role in collecting and distributing data and insights with respect to supply chain resilience.

Indeed, this analysis should be done in partnership with the private sector. Outside-in analysis is unlikely to identify all of the key exposures and vulnerabilities in the economy. As noted above, there may be some relatively small value items that are important across the economy (for example, fuel additives like AdBlue). Large risks may not simply relate to the biggest categories, but to smaller import categories that are critical for other functions. And there are varying extents to which work-around solutions can be identified; there may be feasible substitutes to big exposures. Public/private sector engagement is needed to identify the material economic exposures.

In addition, the government can provide insights on some of the structural supply chain dynamics (geopolitics, international logistics) to provide a sense of the changes that need to be aware of and positioning for. Many firms will struggle to properly assess these risks and monitor changes over time.

- Institutions

Beyond the analysis, a key characteristic of small advanced economies that have developed high quality approaches with respect to supply chain resilience is strong institutions – with ownership and accountability for outcomes, as well as appropriate capability. The Singapore experience is particularly instructive for New Zealand, where there is deep engagement between government agencies and business leaders – including Ministerial leadership.

Well-structured institutions can provide a platform for structured engagement, information flow, and communication between government, business, and other stakeholders on an ongoing basis. There is lots of supply chain knowledge sitting in different agencies and sectors in New Zealand, and there is value in greater coordination. The ability to coordinate analysis and action across the whole of government is important because supply chains are a broadly cross-cutting policy area, and requires an ability to make coherent policy decisions across many policy domains (and agencies).

Institutions with a clear mandate can take decisions on supply chain risk and resilience, with an ability to then implement and monitor. And these institutions provide a basis for crisis management, removing the need to develop new institutions or collaboration mechanisms on the fly.

New Zealand's policy interventions in economic/industrial policy have been compromised by the lack of scale and strategic purpose but also because of weak institutional design: lacking ownership and accountability, no decision-making rights, too much fragmentation, and so on.³⁰ It is important that in combination with investment in analysis to understand and strengthen supply chain resilience, there are sustained investments in institutions and accompanying capability to translate insight into action. This will require commitment from Ministers and senior officials.

³⁰ These institutional issues were discussed at greater length in: David Skilling, 'Frontier firms: An international small advanced economy perspective', paper prepared for the New Zealand Productivity Commission, May 2020.

2. Insurance against risk

The international experience also shows that many advanced economies are implementing policies to reduce/manage exposure to supply chain disruption risk for essential/strategically vital goods. Examples of such measures include: specifying minimum reserves/inventories; mandating and supporting the diversification of markets/suppliers; entering into long term contracts for essential/strategic goods; strengthening physical and digital connectivity (support for airlines and shipping lines, upgrading airports and ports); development of strategic partnerships/international partnerships; and so on.

The exact measures are clearly contingent on an analysis of New Zealand's key exposures, and an assessment of what private firms are likely to do. And many of these measures have an up-front cost, and need to be assessed against the estimated benefits from greater supply chain resilience.

The New Zealand government has not done much explicit supply chain risk management over the past few decades, although there are some examples of deliberate intervention. For example, its majority ownership stake in Air New Zealand was developed to protect New Zealand's connectivity; and substantial fiscal support was provided to Air New Zealand and other airlines through the pandemic.

But this needs to be very disciplined. Only a relatively small number of imported goods into New Zealand are likely to be essential or strategically important, and lacking options for substitution. This may include areas such as energy, medicines, fertiliser, some core parts of industrial or economic processes. New Zealand's lack of integration into global value chains, with its low import share of exports, reduces the scope and complexity of this exercise relative to some other jurisdictions.

In addition to managing the increased frequency of shocks, small economies can position themselves for structural changes in supply chains. For example, Singapore is investing heavily in upgrading the efficiency and capacity of its ports and airports in order to remain competitive. For New Zealand, already thinly connected to supply chains, identifying actions that can manage some of the risks from larger ships and industry consolidation is important (for example, the debate about the ports sector – and whether New Zealand should aim to have one megaport may be needed to improve the economics for the shipping companies to service New Zealand). Although ownership is mixed across the sector, government plays an important role in shaping strategic decisions in the ports sector (and note the current review underway).

A final lesson for New Zealand from the international small economy experience is the importance of having friends that you can collaborate with in managing risks. It may be possible to work with like-minded countries (Australia, Singapore) with aligned interests, from long-term contracting arrangements to joint physical supply chain arrangements. For example, New Zealand was able to strike mutually advantageous deals with Singapore through the pandemic. New Zealand should be looking for opportunities to 'bulk up' in ways that strengthen its reliance to supply chain shocks.

3. Economic structure

Beyond conventional initiatives that are directly aimed at supply chain resilience, governments can also consider measures that shape New Zealand's economic structure.

In larger economies, industrial policy is being used in more active ways to strengthen strategic autonomy in key areas of the economy – from semiconductors to renewables and pharmaceuticals.

Governments are becoming increasingly active to advance their strategic interests.³¹ However, New Zealand (along with many other small advanced economies) does not have this ‘self-sufficiency’ policy option available to it in a meaningful way.

Import substitution has a poor track-record in New Zealand, and is very challenging for small economies in general. New Zealand does not have the scale or capabilities to undertake at-scale manufacturing. And relocating supply chains to New Zealand is challenging given the increasingly sophisticated production processes. Although the balance is shifting for some categories of goods, with some firms reshoring activity, this is only likely to be feasible in specific areas for New Zealand – and particularly where new technology alters the economics of production.

But a supply chain resilience perspective can usefully inform some structural economic policy choices. One example is in terms of electrifying the New Zealand economy. New Zealand already has one of the highest shares of electricity generated from renewable sources (partly as a consequence of investments made in response to concerns about exposure to external energy price shocks from the 1970s). The investments in renewable electricity generation have reduced New Zealand’s exposures to external energy price shocks. And New Zealand has much more renewable energy potential to make substantial further progress towards decarbonising the economy.

Initiatives such as accelerating the transition of New Zealand’s vehicle fleet to electric vehicles and decarbonising industry through the use of green hydrogen would significantly reduce New Zealand’s exposure to the import of liquid fuels (as well as coal and other energy imports). This supply chain perspective strengthens the argument for a more rapid electrification/decarbonisation process. This is a common argument currently made across European countries (and elsewhere) to reduce exposure to Russia, but also to external shocks more broadly.

A second application is to support the deployment of new industrial technologies that support new modes of production (such as 3D printing). In general, building self-sufficiency to reduce reliance on imported goods is risky in small economies; and New Zealand’s manufacturing base has contracted substantially over the past few decades. But technology provides increasing opportunities for using production methods that are less scale intensive. This cannot be done at scale for large categories such as vehicles, but it may be possible for some high value to weight goods.

A third application is in terms of various aspects of the growth model that are encouraged. The increasing supply chain costs/risks/frictions will add to the costs of importing and exporting for New Zealand firms, reinforcing the already meaningful costs of New Zealand’s economic geography. This will further reduce New Zealand’s international engagement, particularly for firms outside the commodity space (commodity exporters are likely least exposed to supply chain changes because of long term contracts and dedicated servicing).

For example, there are also implications for New Zealand’s international tourism strategy. The broad direction of international tourism policy is to move from volume to value (fewer, higher margin tourists). This approach makes a lot of sense on many dimensions. But the implied reduction in seat capacity into New Zealand from this approach would likely mean less air freight capacity – acting as a drag on import

³¹ Elsewhere I have written about ‘the return of the state’. David Skilling, ‘War by other means: Positioning for 2023’, 9 December 2022 (<https://davidskilling.substack.com/p/war-by-other-means-positioning-for>).

and export flows. These supply chain implications should be explicitly considered in the development of an international tourism strategy.

Global supply chain dynamics also strengthen the case for New Zealand to shift its export economy to a more weightless economy in order to reduce New Zealand's exposure to external supply chains. Reducing the weight/volume of New Zealand's exports is a useful response to more costly and risky supply chains. At the extreme are weightless services that can be supplied virtually (commercial services, software, and so on). The deployment of ultra-fast broadband has been helpful in strengthening New Zealand's exports – and reducing the costs of getting to market, which was the original argument.³²

To support this part of the economy, investments in innovation, skills, and so on, become more important.³³ And investments in infrastructure to support the weightless economy are needed. New Zealand's international connectivity remains fragile, with a limited number of international cables. A disruption to these cables could be highly consequential for the New Zealand economy. It may be appropriate to consider further investment in some redundancy.

Similarly, policy measures to encourage outward direct investment by New Zealand firms (with appropriate measures for domestic value capture) would reduce exposure to increasing supply chain costs and risks. New Zealand firms could access foreign markets by producing in markets that are closer to the end consumer, reducing the reliance on New Zealand's supply chain.

These structural policy measures are an important way of strengthening the resilience of the New Zealand economy to global supply chain shocks. There are fewer examples of these types of policies being implemented in other advanced economies. But they are particularly important for New Zealand because of its economic geography.

Concluding remarks

The response to supply chain risks should be approached expansively in small advanced economies. International connectivity is an imperative for small economies, shaping the growth potential of small economies in a more powerful way than for large economies. Changing dynamics with respect to global supply chains are a first order economic issue for small economies. So in addition to orthodox measures, small economies need to respond with broader strategic measures well.

This is the case for New Zealand: the increased costs, frictions and risks associated with New Zealand's already thin supply chain connectivity generates a first order economic challenge for New Zealand. These issues need to be treated as a matter of strategic importance, affecting the nature of New Zealand's broader economic strategy as well as its conventional supply chain responses.

³² Lynda Sanderson, Garrick Wright-McNaughton, Naomitsu Yashiro, 'Does faster internet increase exports? Evidence from New Zealand', OECD Economics Department Working Paper 1730, October 2022; David Skilling & Paul Winton, 'A broadband strategy for New Zealand: Why world-class communications infrastructure matters and how we can get it', The New Zealand Institute, September 2007.

³³ David Skilling, 'Frontier firms: An international small advanced economy perspective', paper prepared for the New Zealand Productivity Commission, May 2020

About the author

Dr David Skilling is the founding Director of Landfall Strategy Group, which was established in 2011. David advises governments, companies, and financial institutions in several small countries, and writes regularly on global economic and political trends from a small country perspective. Previously, David was an Associate Principal with McKinsey & Company in Singapore, as well as being a Senior Fellow with the McKinsey Global Institute. Before joining McKinsey, David was the founding Chief Executive of the New Zealand Institute, a privately-funded, non-partisan think-tank. Until 2003, David was a Principal Advisor at the New Zealand Treasury. David has a Ph.D. in Public Policy, and a Master in Public Policy degree, from Harvard University, as well as a Master of Commerce degree in Economics from the University of Auckland.

About Landfall Strategy Group

Landfall Strategy Group is a Netherlands-based research and advisory firm that provides advice on strategic issues to governments, firms, and financial institutions, particularly in small advanced economies. We provide distinctive perspectives on emerging global trends, working with decision-makers to understand key global changes and how governments, firms, and institutions should respond and position themselves in the emerging global economic and political environment.

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An international perspective on strengthening New Zealand's supply chain resilience: supporting Exhibits

Dr David Skilling

December 2022

The intensity of globalisation has flatlined over the past decade, after several decades of strong increases; there has also been an extension in the physical distance of trade

World trade (goods & services), world FDI flows, % of world GDP

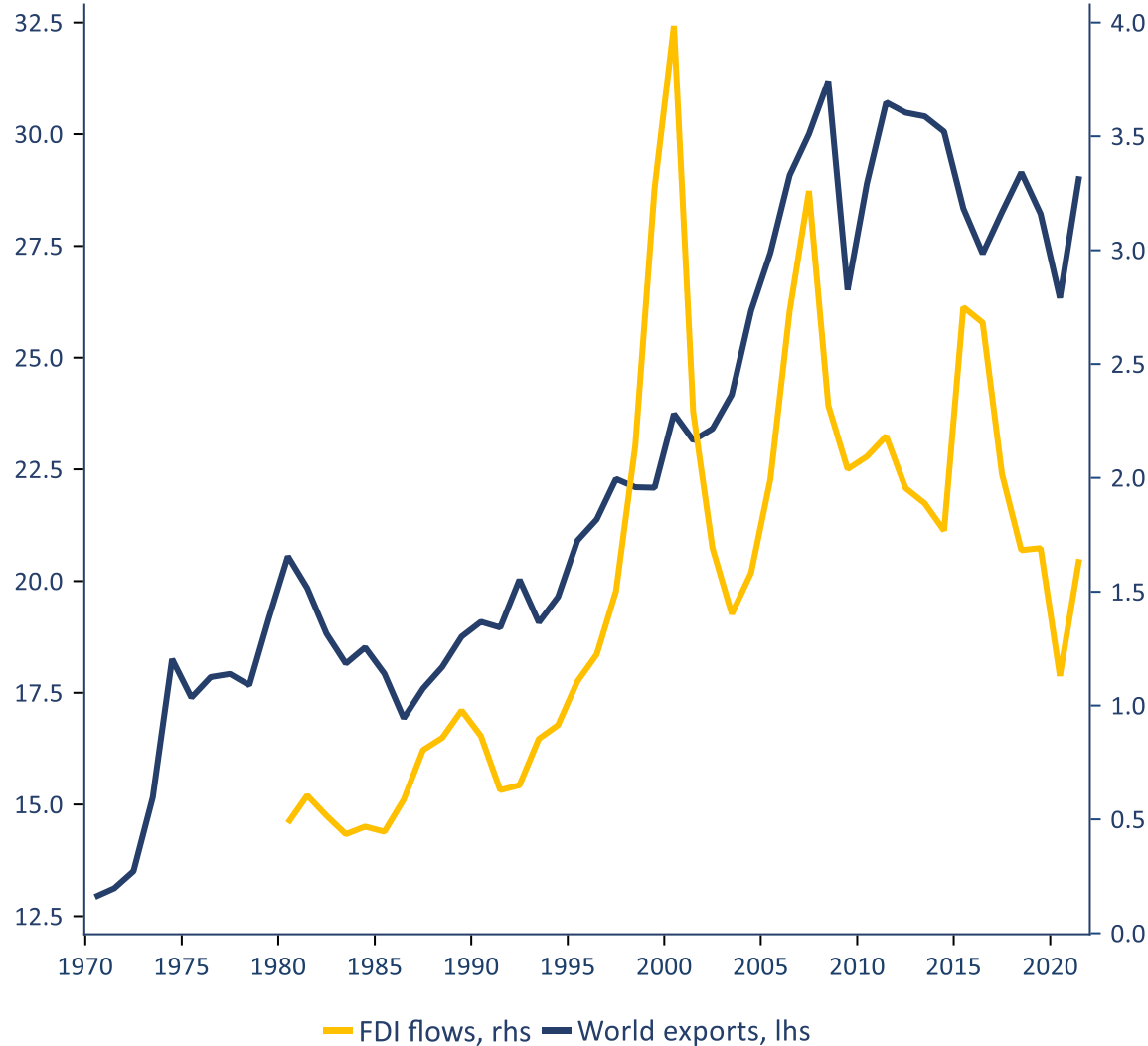
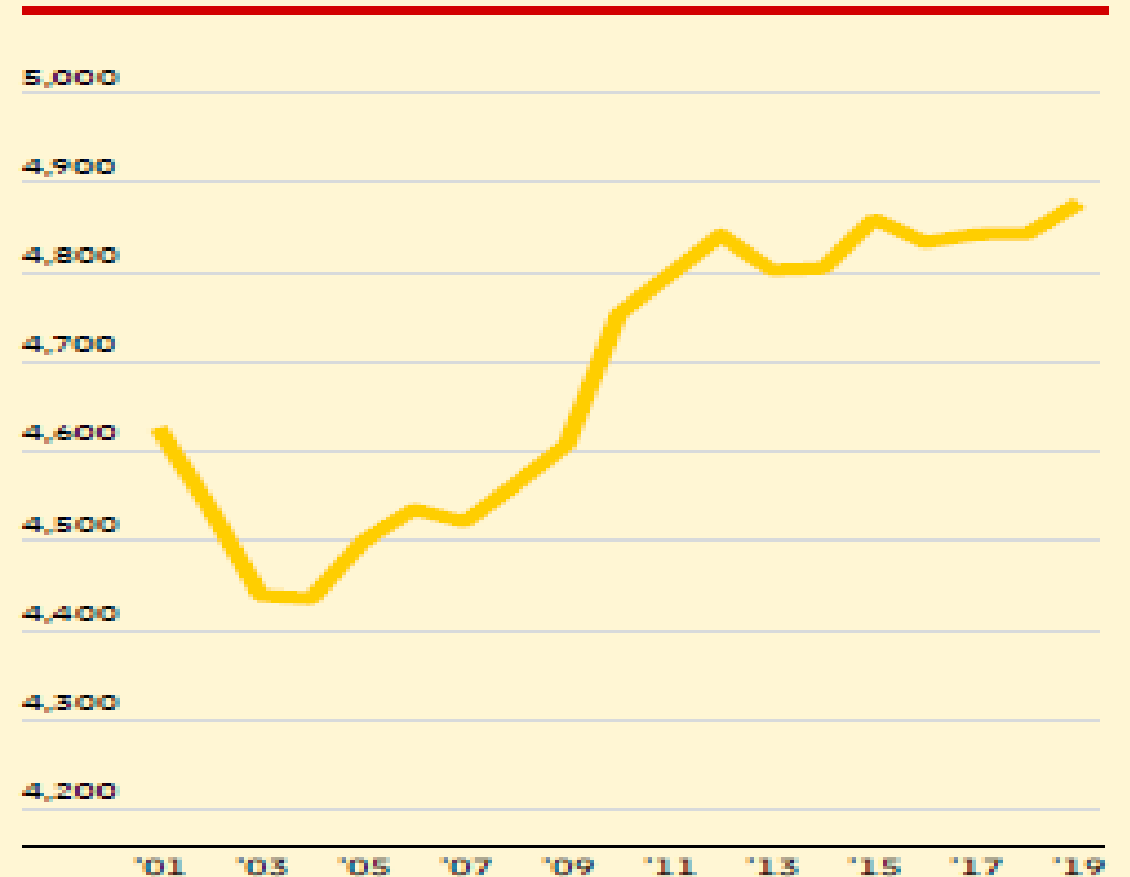


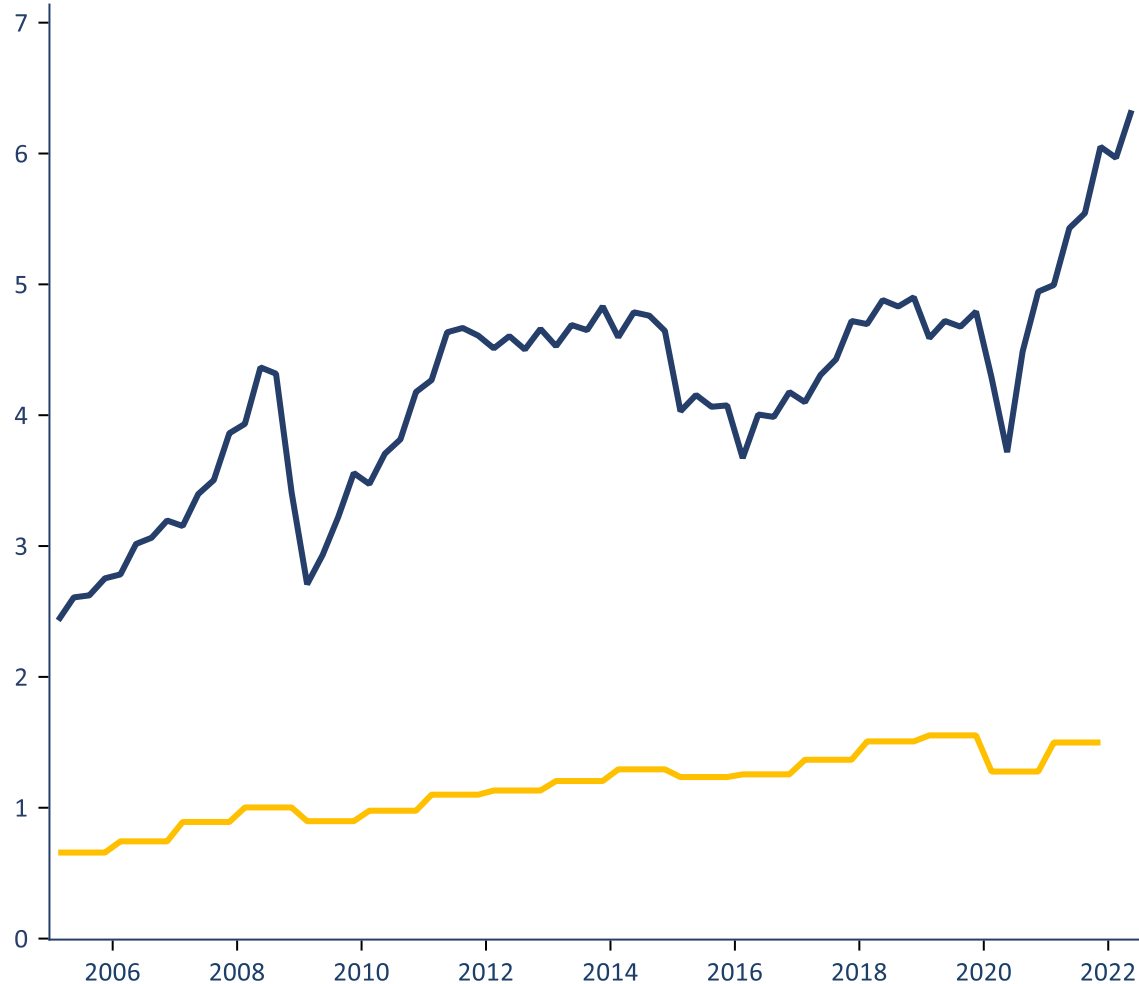
FIGURE 7: AVERAGE DISTANCE TRAVERSED BY MERCHANDISE TRADE (KILOMETERS), 2001 – 2019



The average distance traversed by merchandise trade has been fairly stable in recent years. A major shift toward more regionalized trade patterns would pull this measure downward. Data sources: IMF Direction of Trade Statistics (DOTS), UN Comtrade, CEPII GeoDist Database

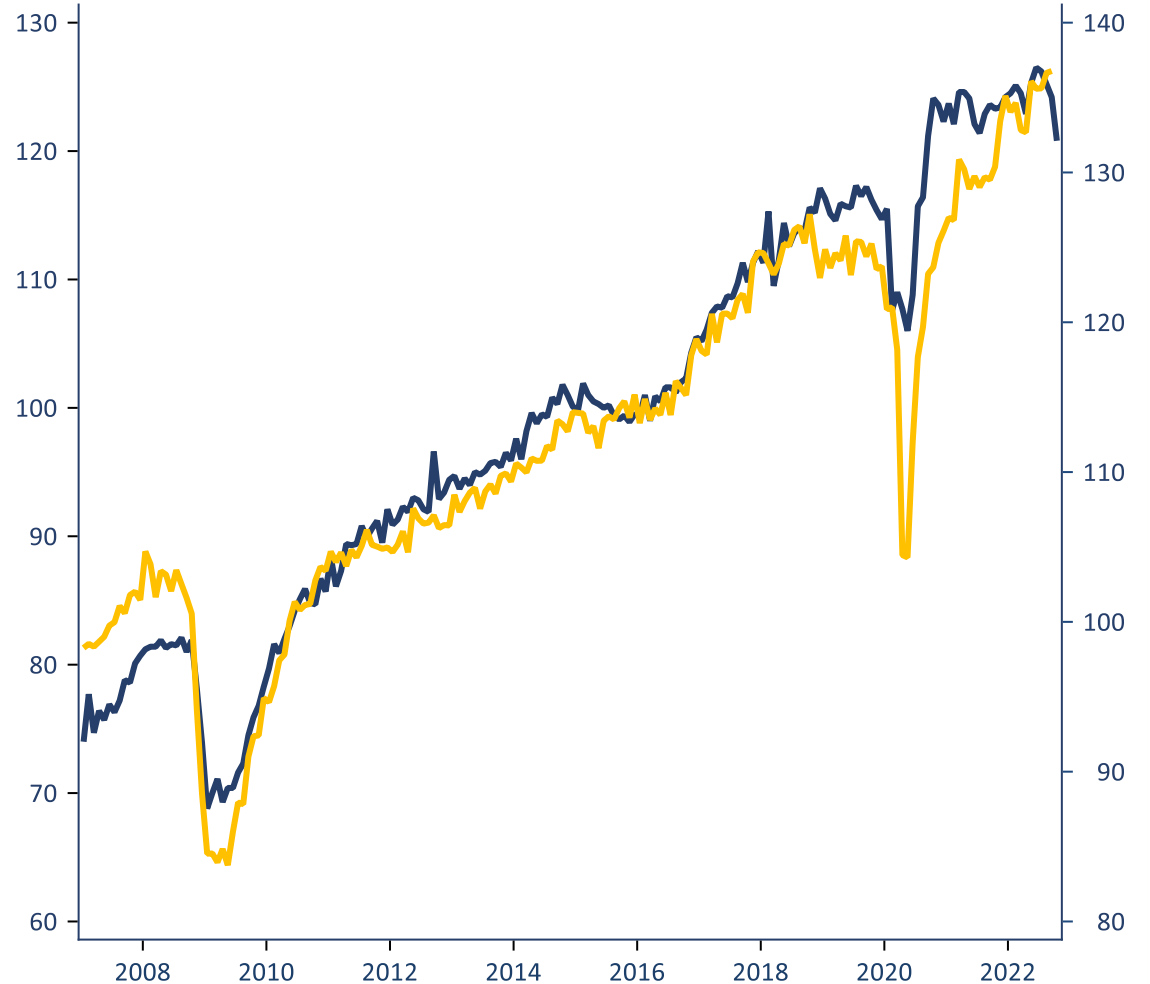
Exhibit 1: World trade in goods has been resilient through the pandemic, leading to significant increases in international container shipping movements (until recently)

World trade, value, USD



— World commercial services (value) — World merchandise trade (value)

World trade volume v Container throughput index



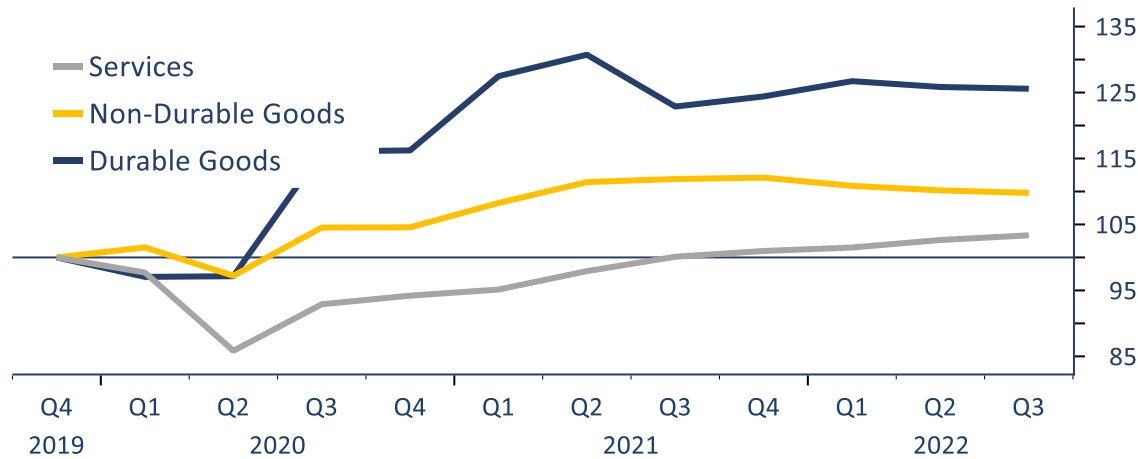
— World trade (volume, SA), rhs — RWI/ISL Container Throughput Index, SA, lhs

Source: Macrobond; WTO; CPB; RWI/ISL; Landfall Strategy Group calculations.

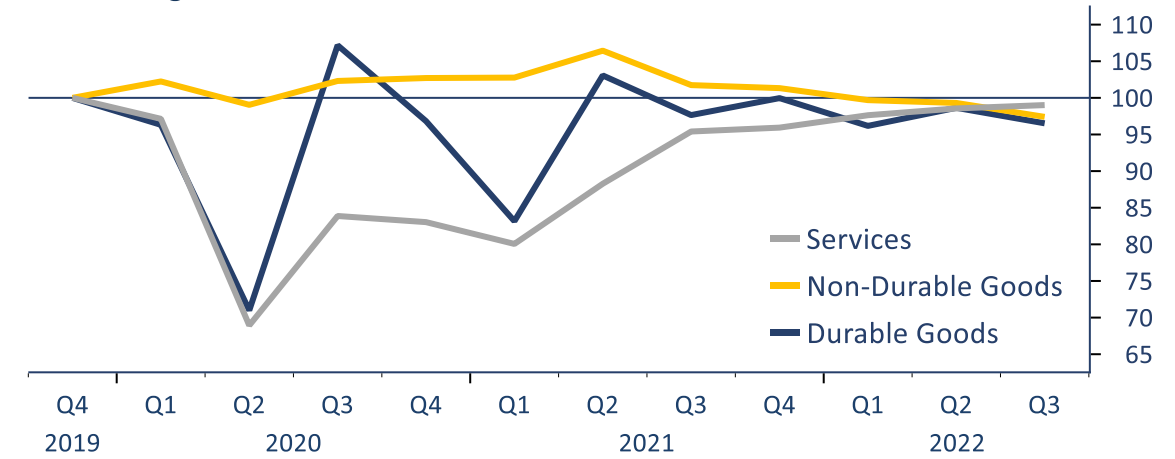
The Covid lockdown measures led to a rotation in private consumption spending from services towards goods, particularly durables, supporting growth in internationally traded volumes

Private consumption spending by type, constant prices, sa, Q4 2019 = 100, Q4 2019 – Q3 2022

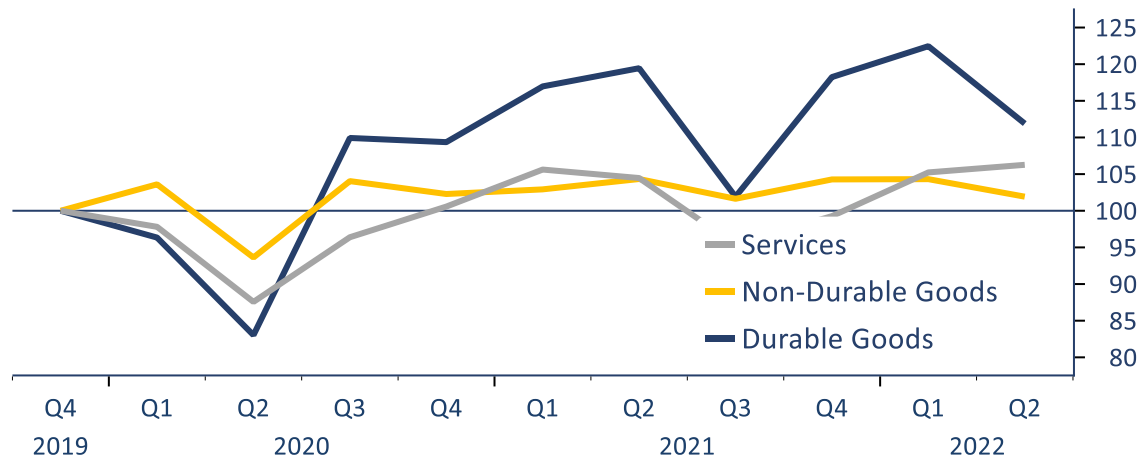
United States



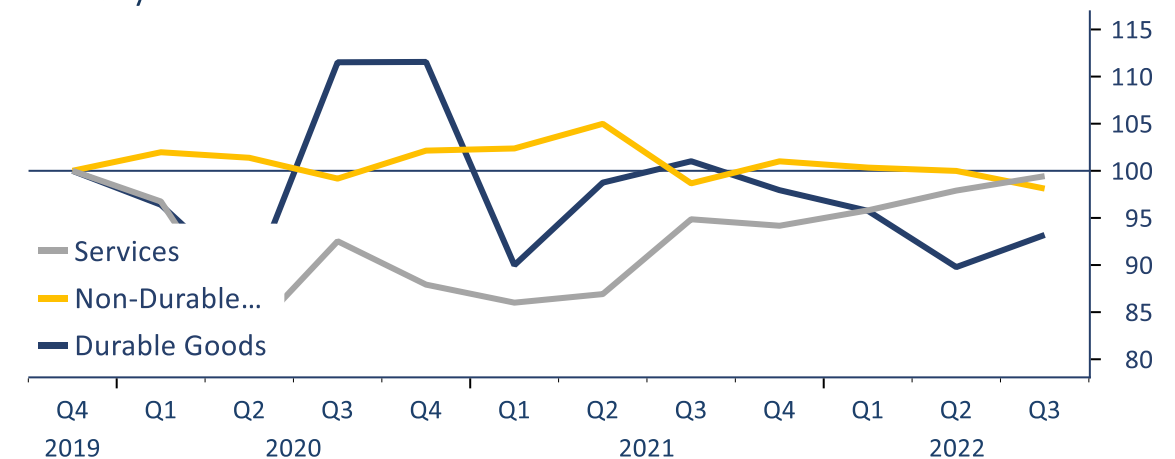
United Kingdom



New Zealand



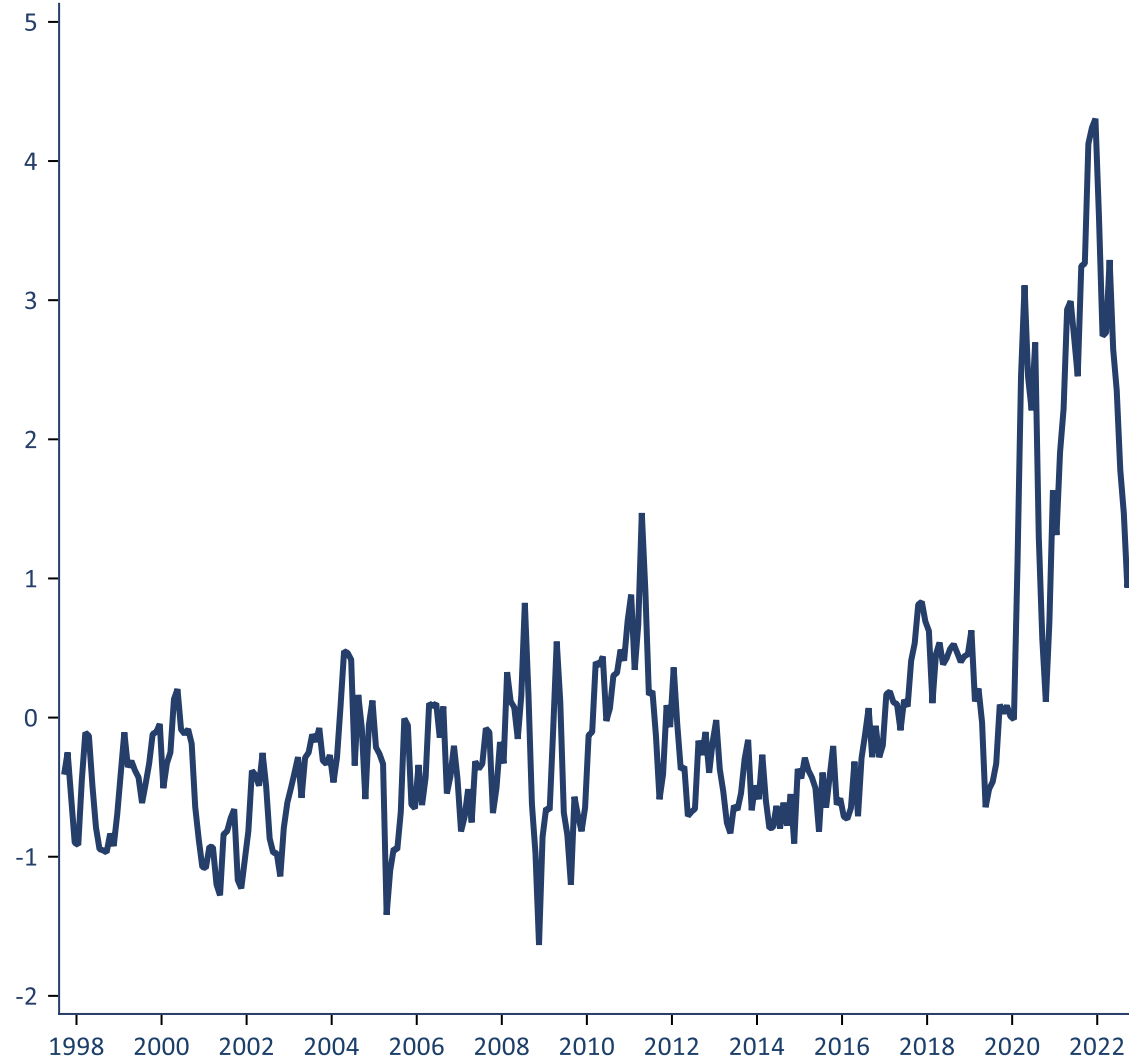
Germany



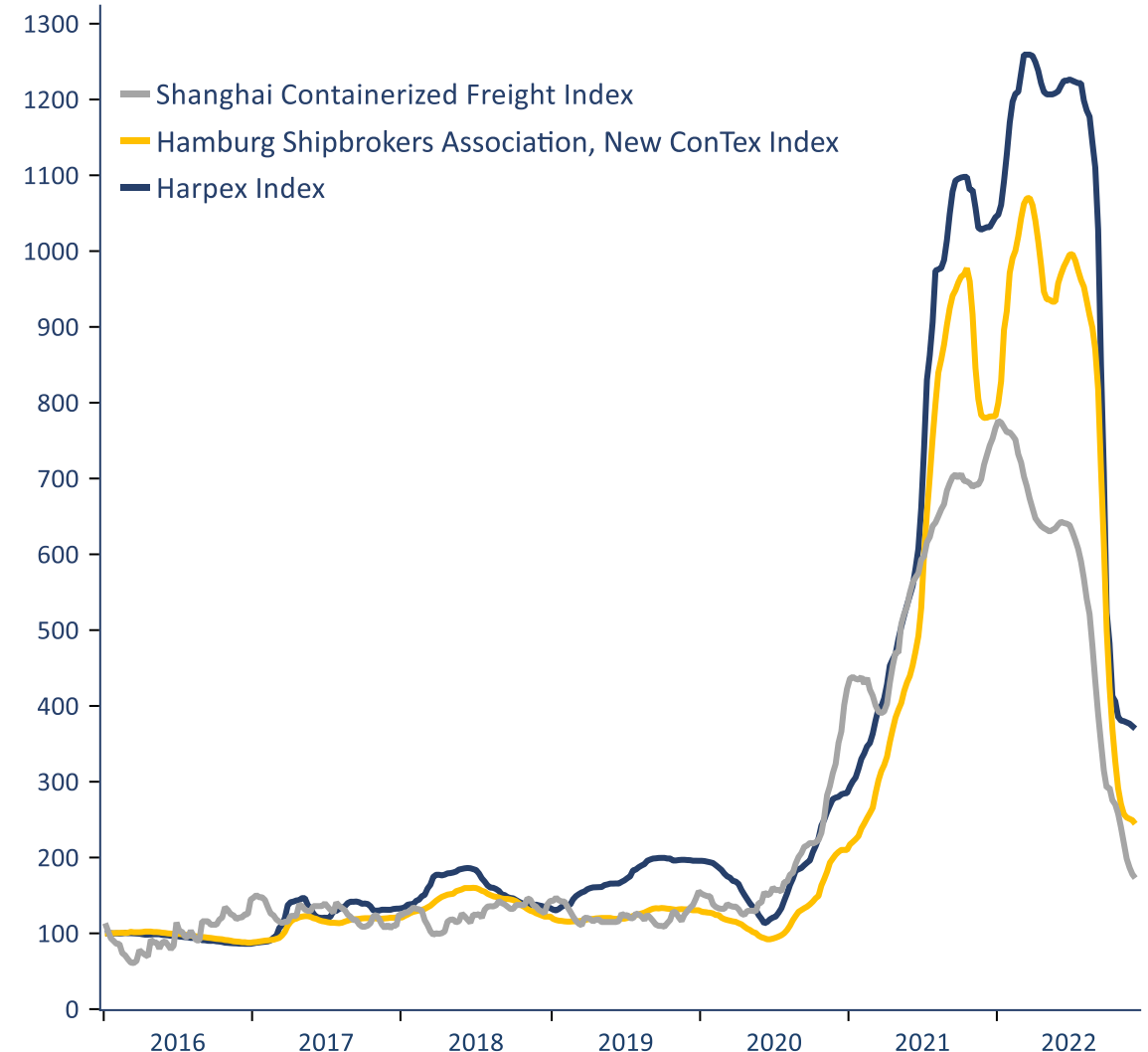
Source: Macrobond; OECD; Landfall Strategy Group calculations.

Exhibit 2: Global supply chain pressures and international container shipping prices surged through the pandemic, but have since eased (although remain elevated)

New York Federal Reserve, Global Supply Chain Pressure Index



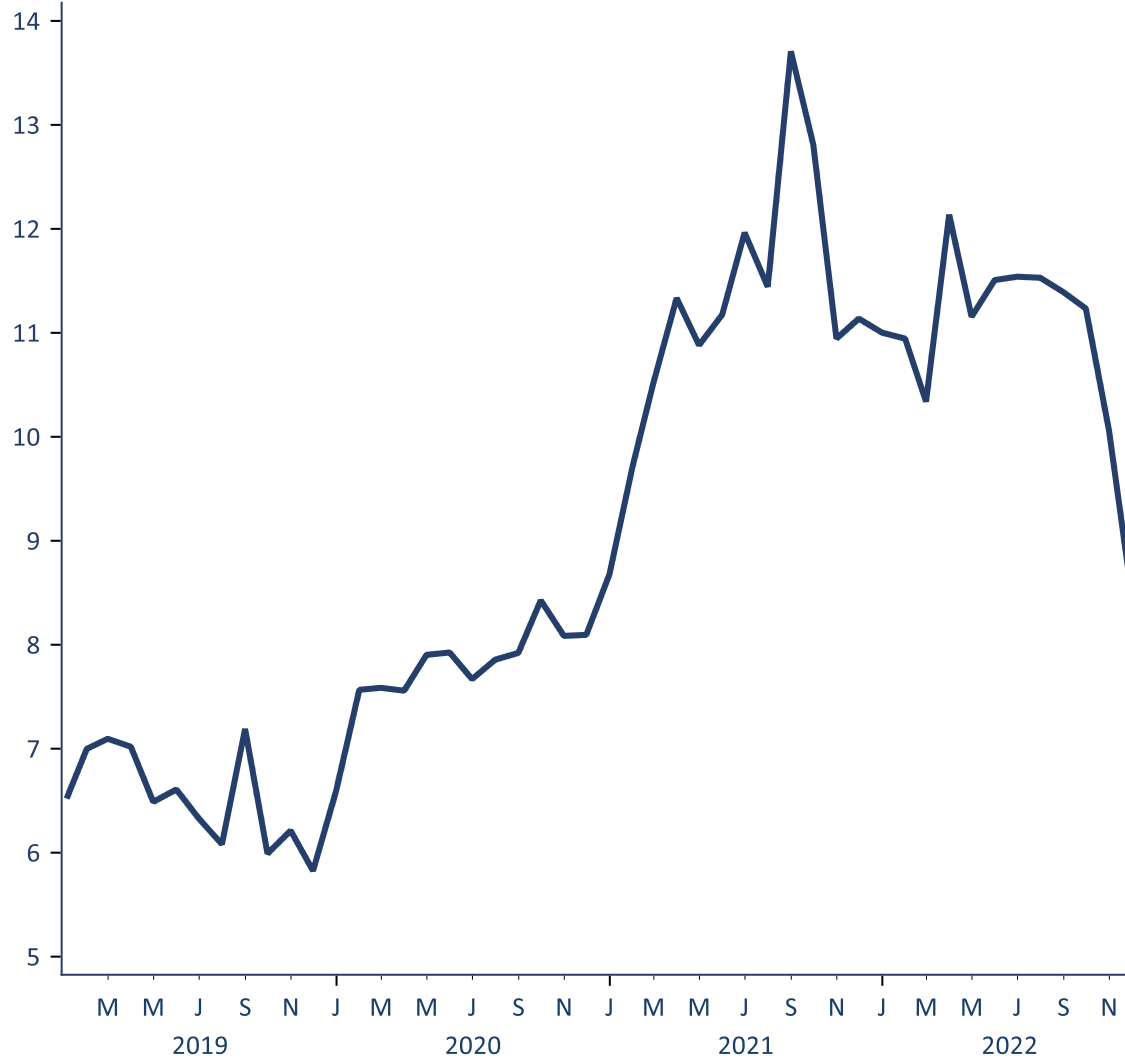
Container shipping price indexes, January 2016 = 100



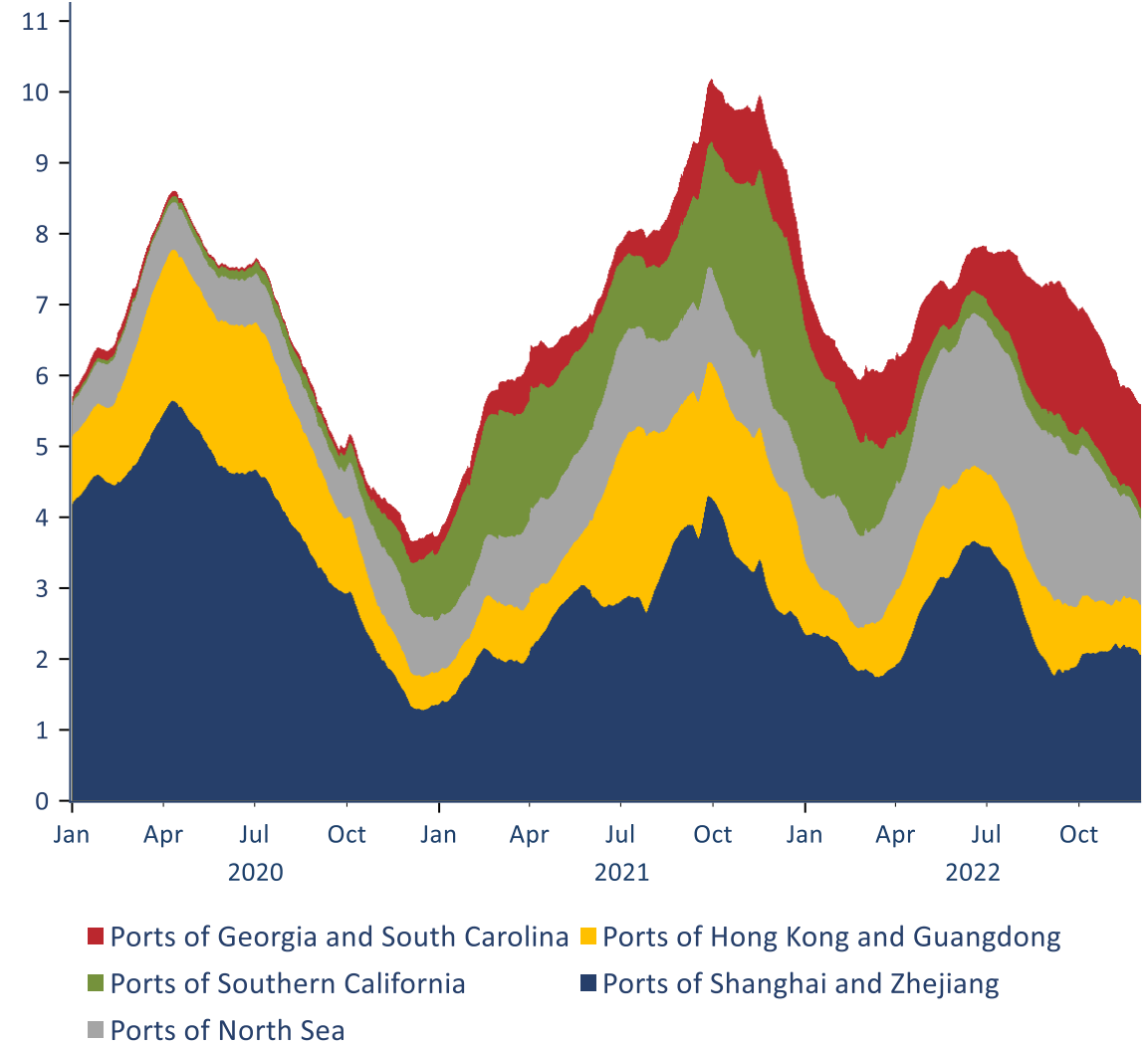
Source: Macrobond; New York Federal Reserve; Landfall Strategy Group calculations.

Shipping delays also surged through the pandemic, particularly in Asia and California, but have since reduced markedly

Proportion of goods waiting (as % of total sea trade)



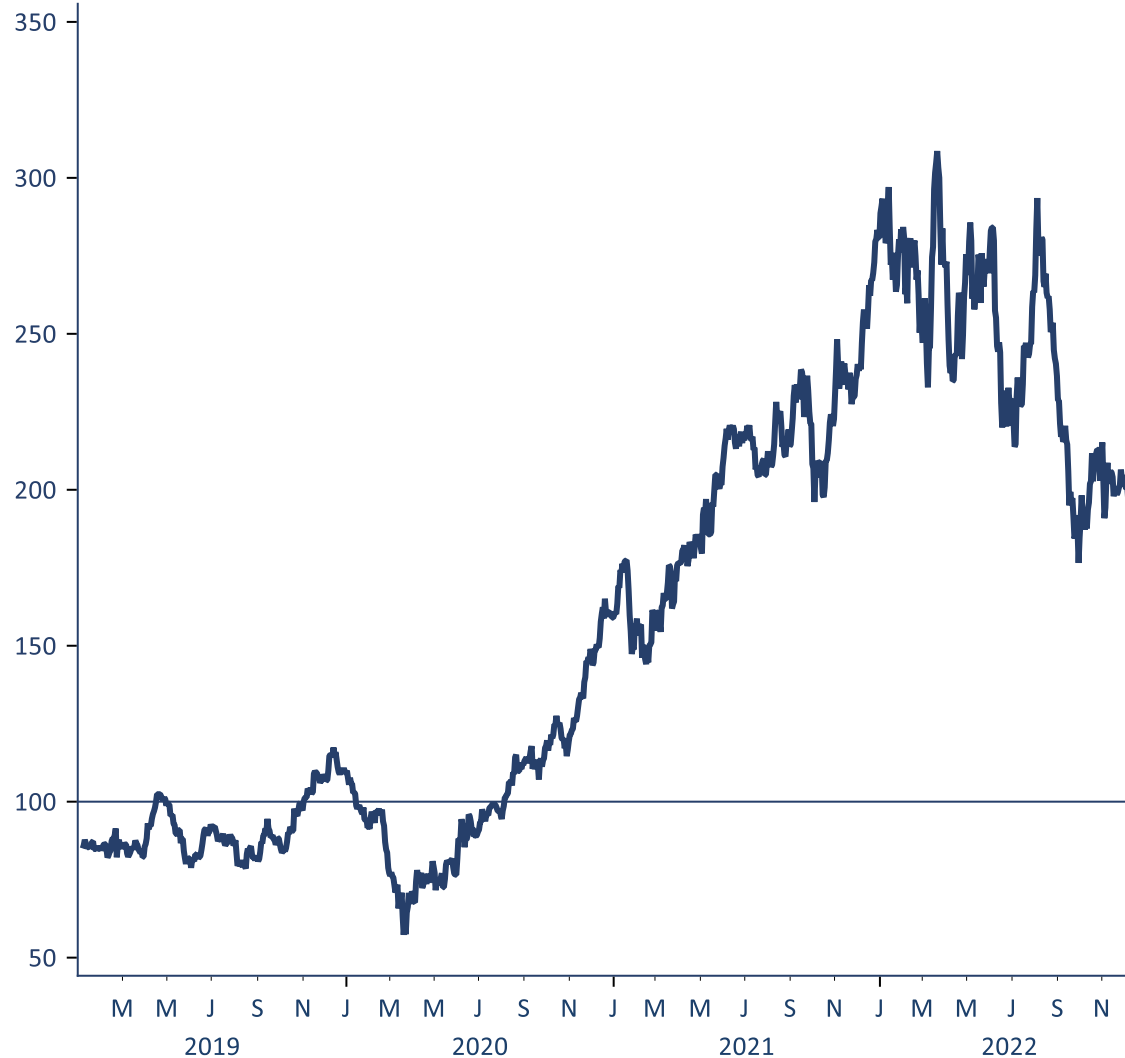
Waiting container ships, % of total global capacity



Source: Macrobond; Kiel Institute; Landfall Strategy Group calculations.

Maersk made record profits through the crisis; other logistics companies with a presence in air freight also surged through 2020

Maersk share price, January 2020 = 100



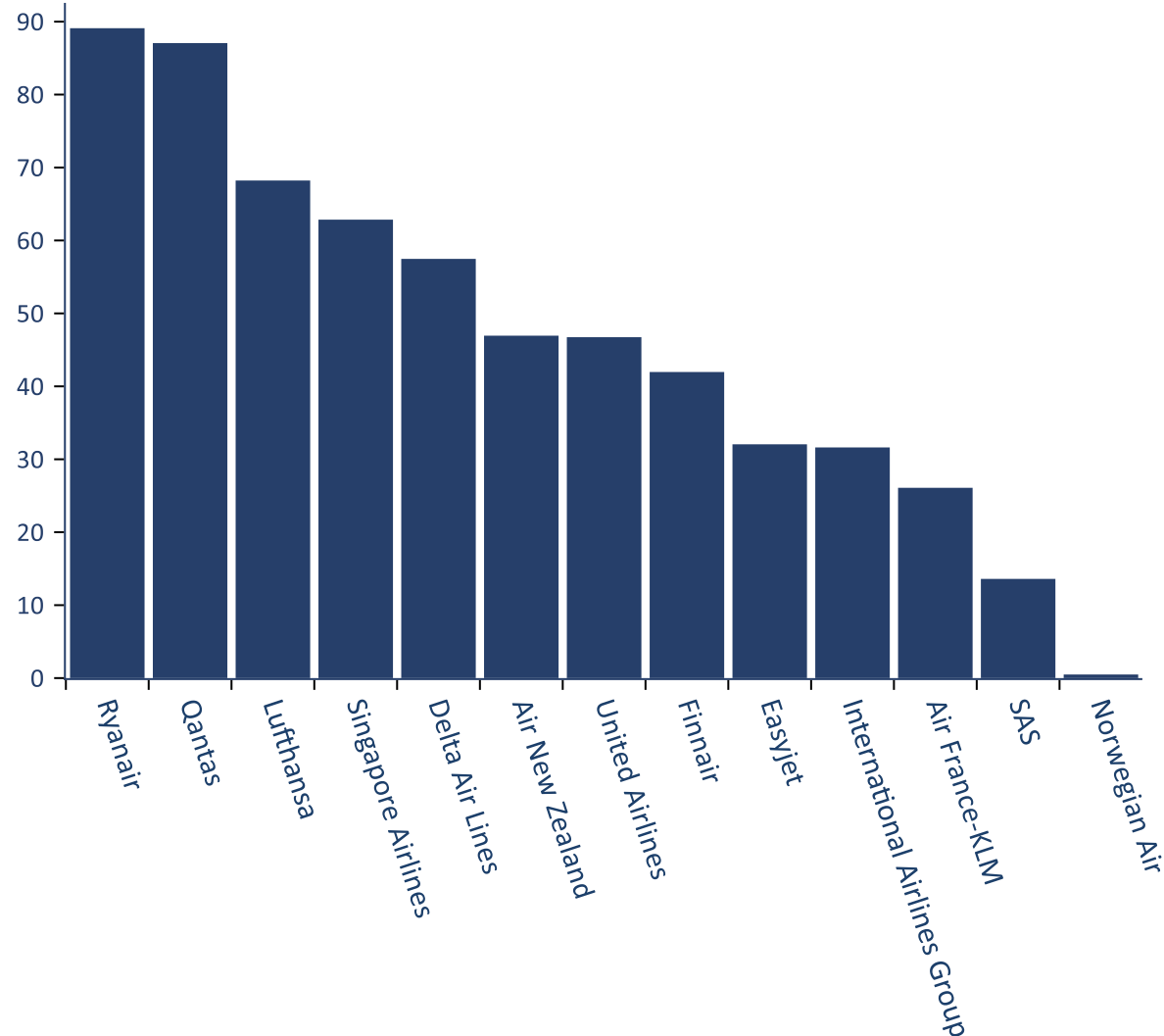
Selected logistics firms, January 2020 = 100



Source: Macrobond; Landfall Strategy Group calculations.

Airlines and tourism-exposed stocks are well below pre-Covid levels – even as passenger numbers begin to return

Airline share prices (total return), 1 January 2020 = 100



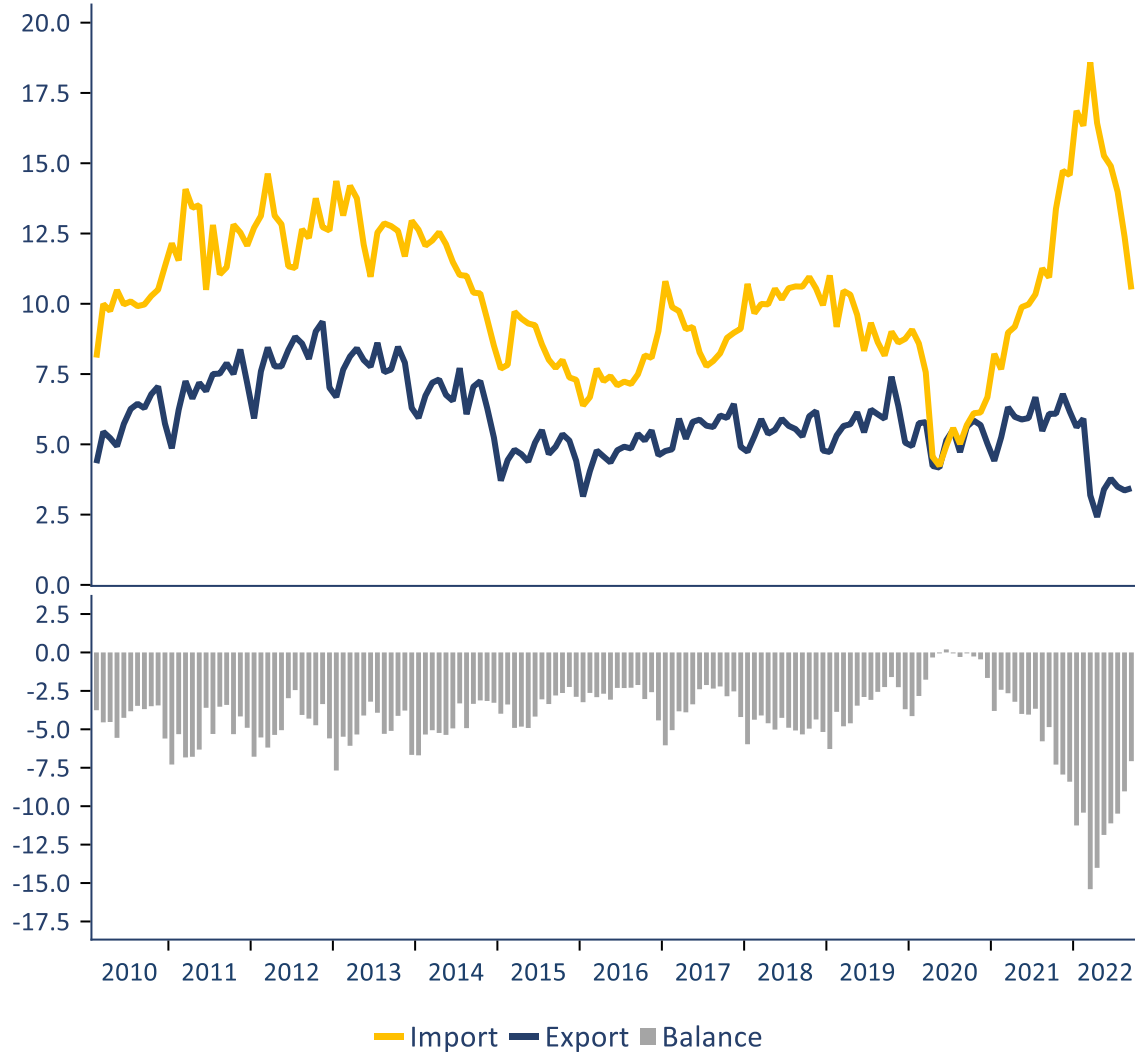
Tourism indexes, January 2020 = 100



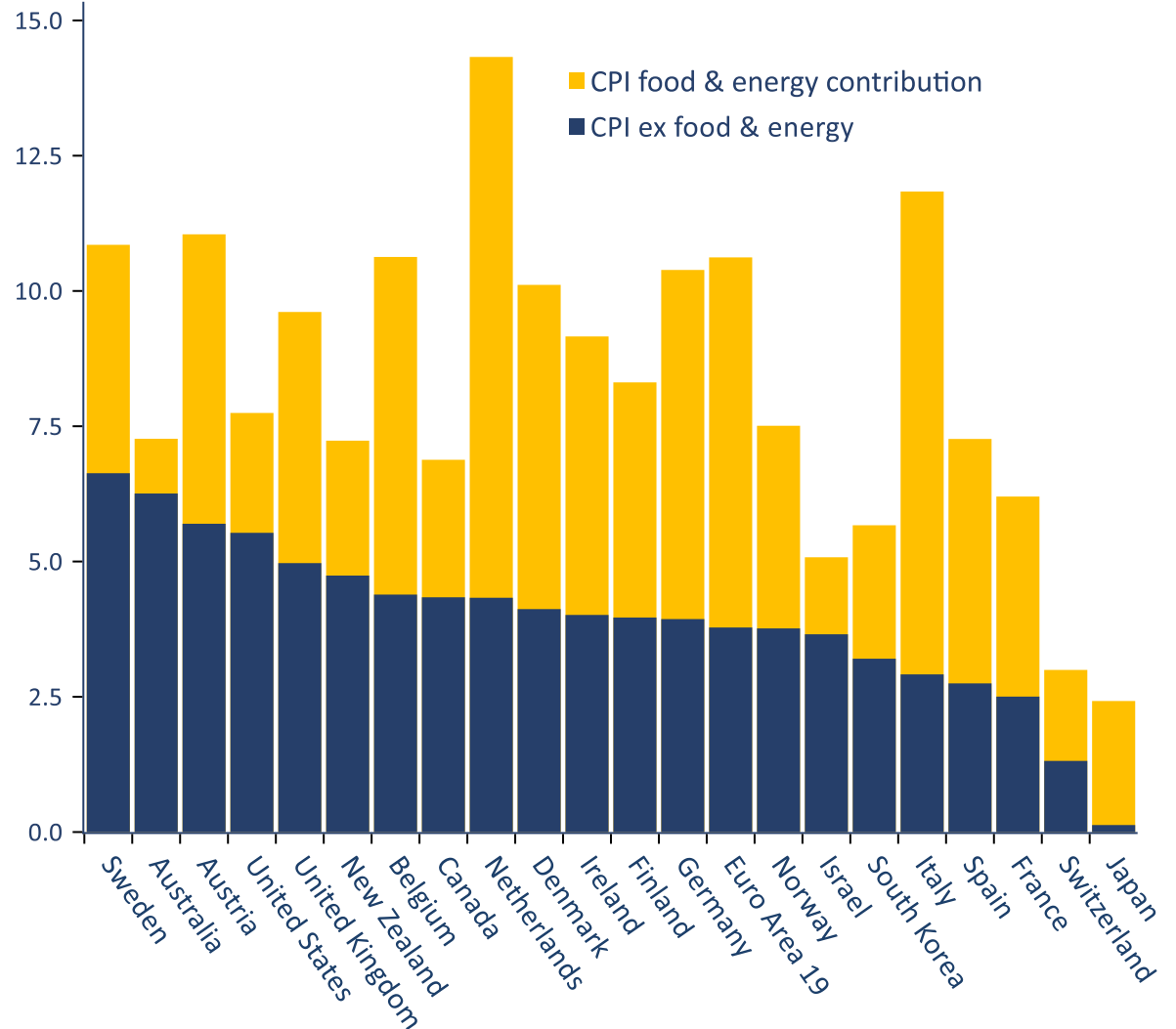
Source: Macrobond; Landfall Strategy Group calculations.

The decoupling process from Russia is underway, but comes at a cost in terms of higher inflation and weaker economic activity

Euro area imports, exports to Russia, USD billions



CPI decomposition, %



The direct and indirect impact of Russia's invasion of Ukraine has had substantial effects on supply chains for food, energy and other commodities

Food and wheat prices, January 2022 = 100



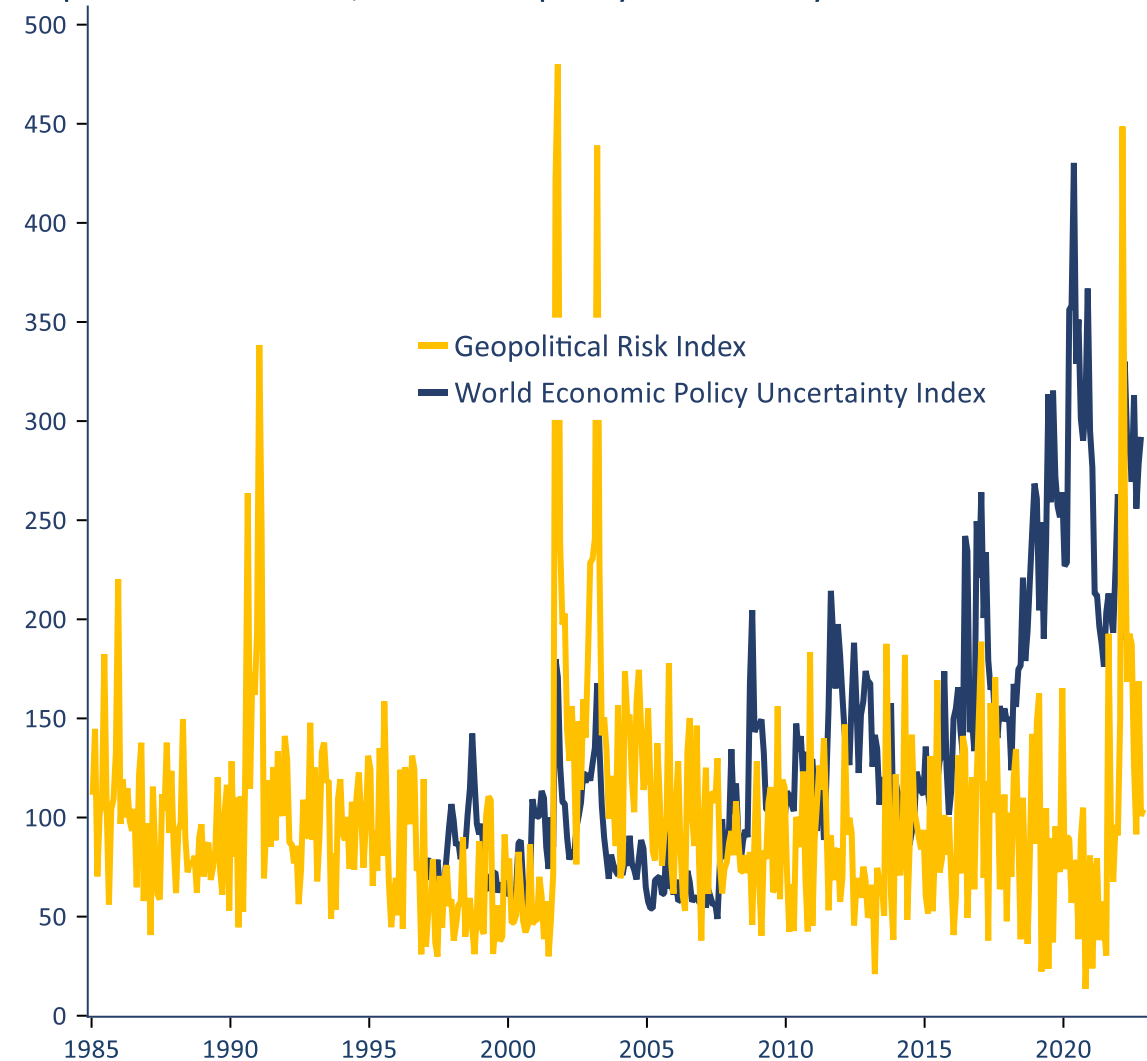
Electricity price futures, 2023 settlement, EUR/MWh



Source: Macrobond; OECD; Landfall Strategy Group calculations.

Geopolitical, economic, and environmental shocks and uncertainty are increasing – a dynamic that is likely to continue

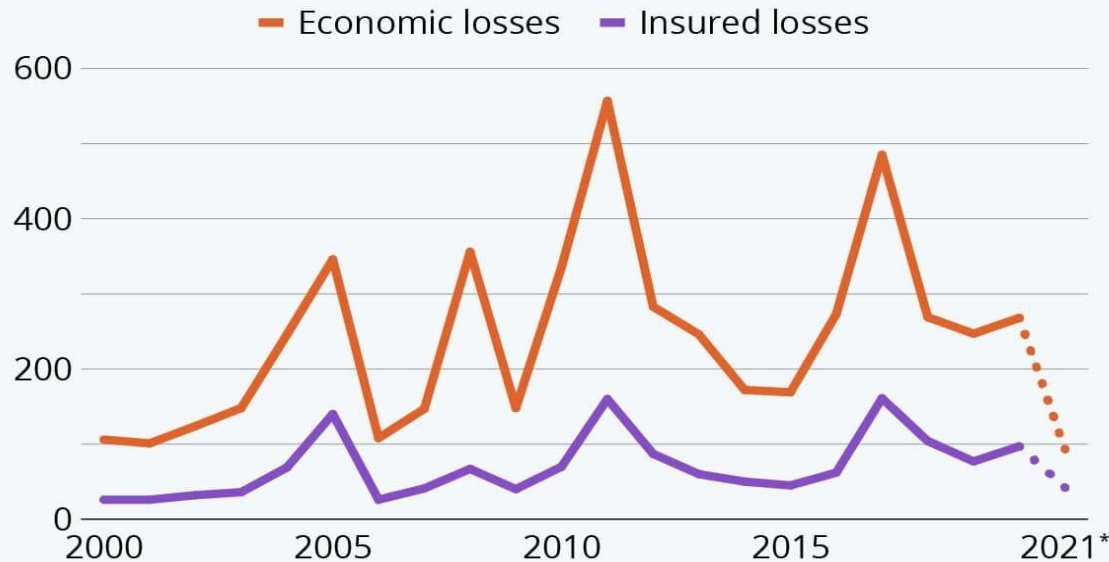
Geopolitical risk index, economic policy uncertainty index



Source: Macrobond; Landfall Strategy Group calculations.

The Cost Of 21st Century Natural Disasters

Cost of natural disaster losses worldwide from 2000 to 2021 (in billion U.S. dollars)

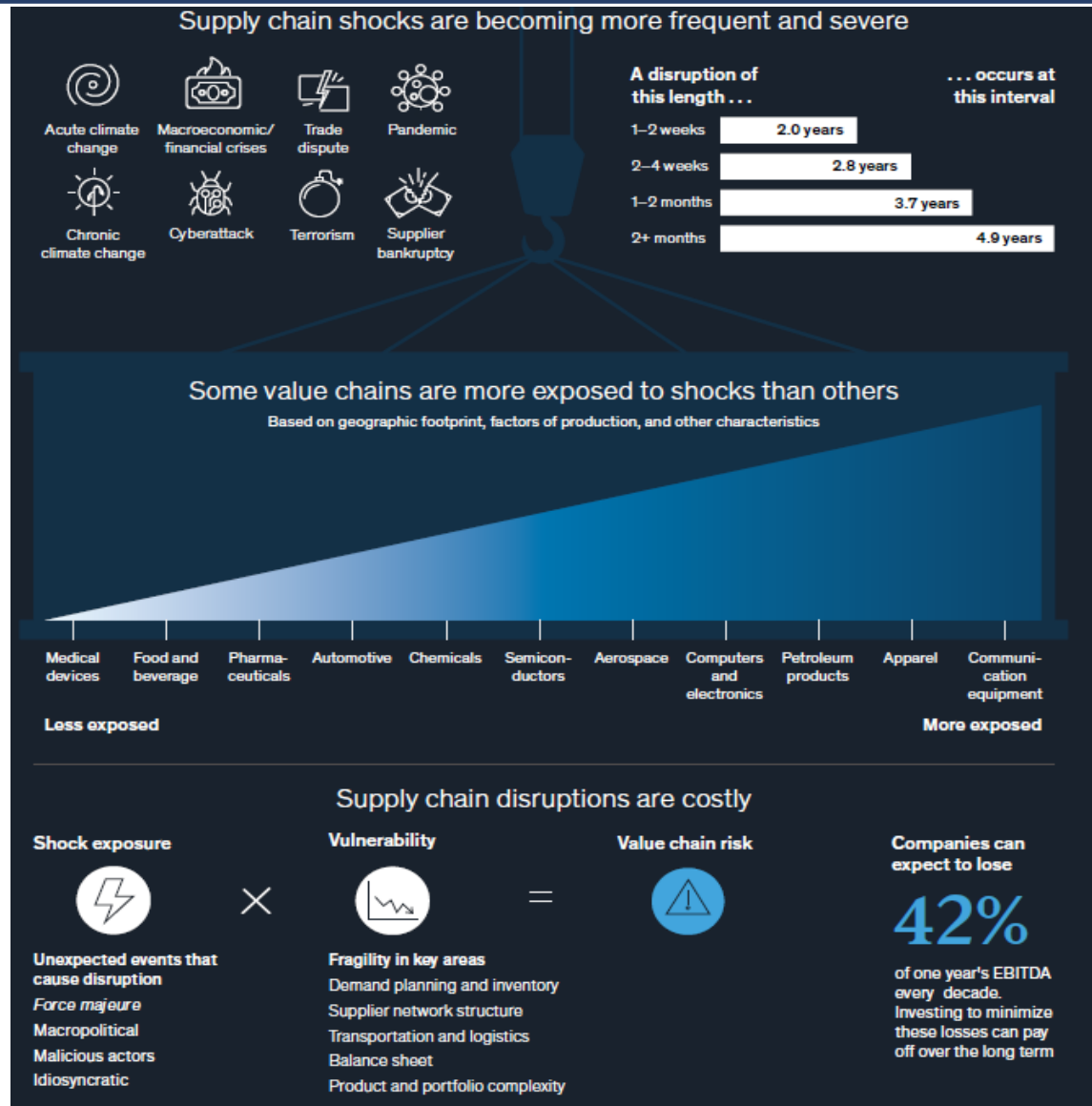


* First six months of 2021

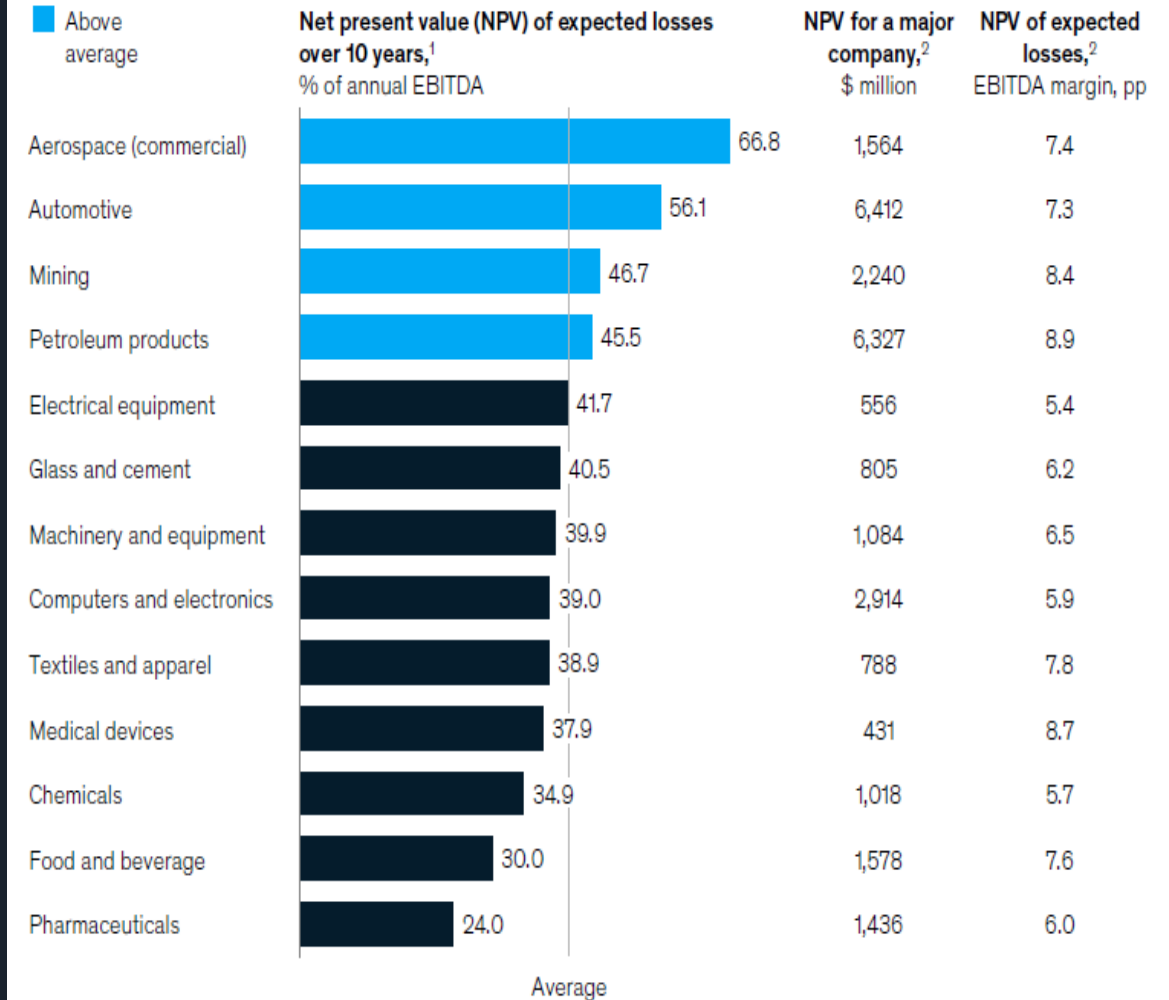
Source: Aon



Firms are exposed to global supply chain disruptions – with significant amounts of economic value at stake

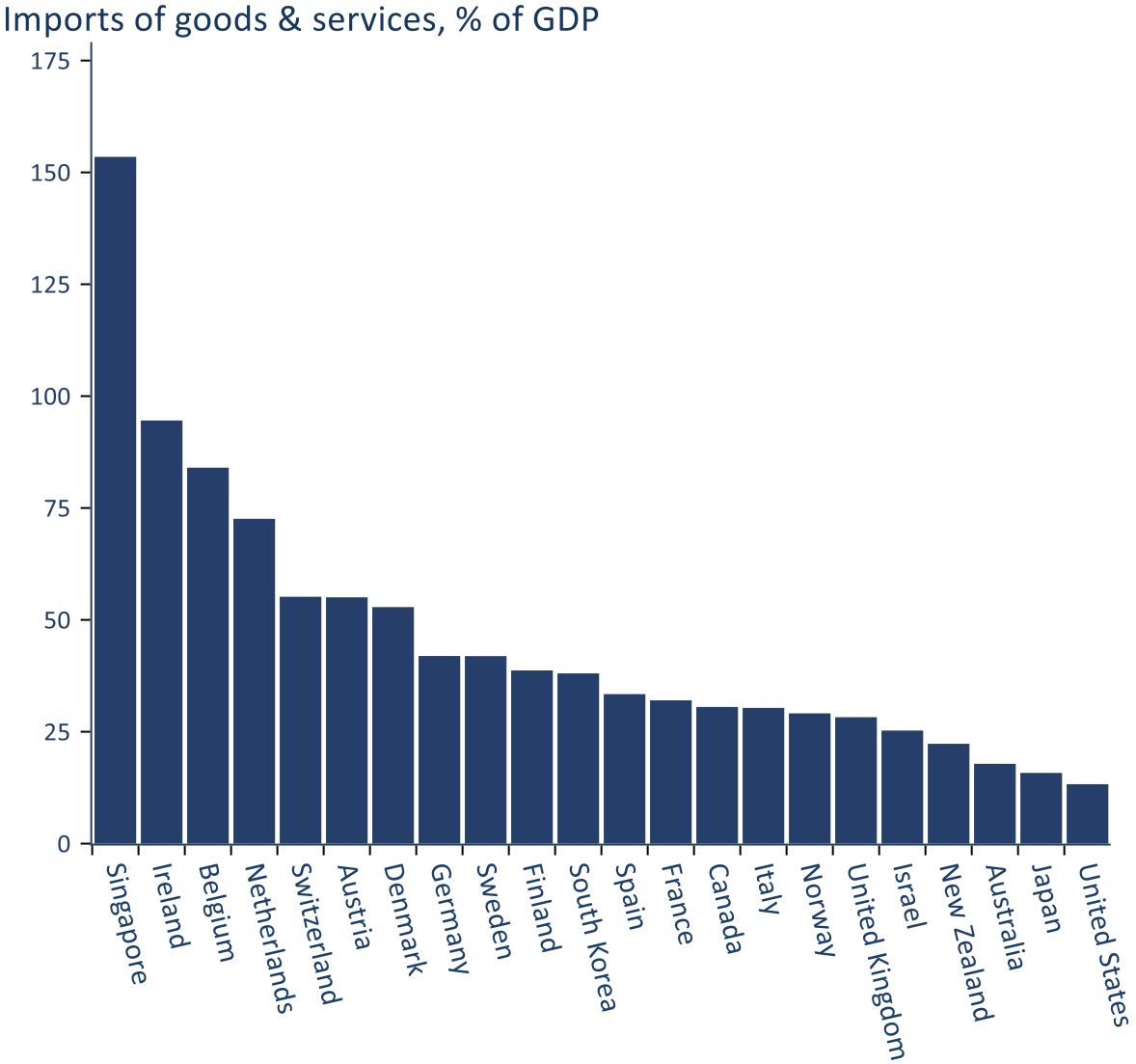
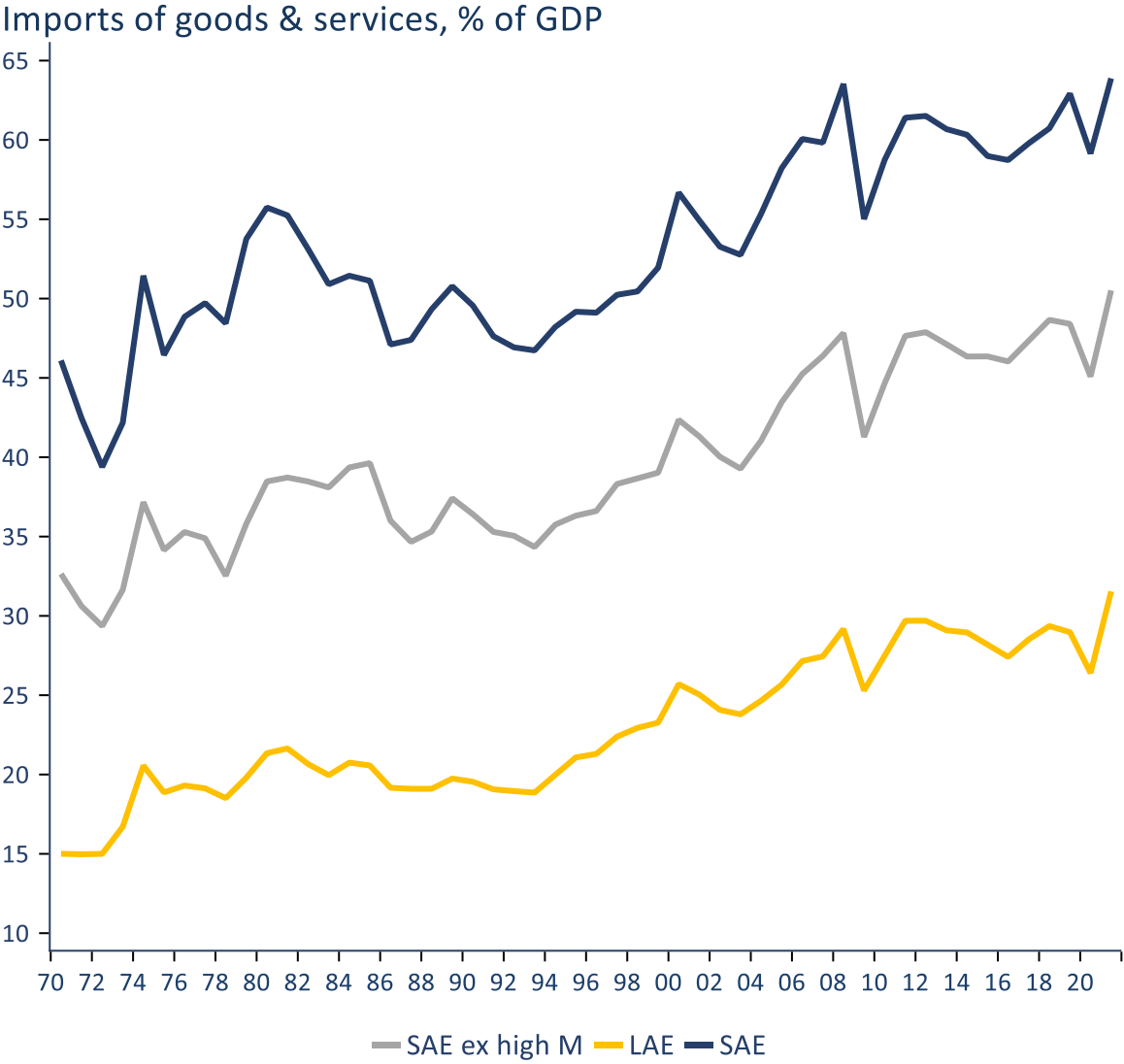


Expected losses from supply chain disruptions equal 42 percent of one year's EBITDA on average over the course of a decade.



Source: McKinsey Global Institute, 'Risk, resilience, and rebalancing in global value chains', August 2020.

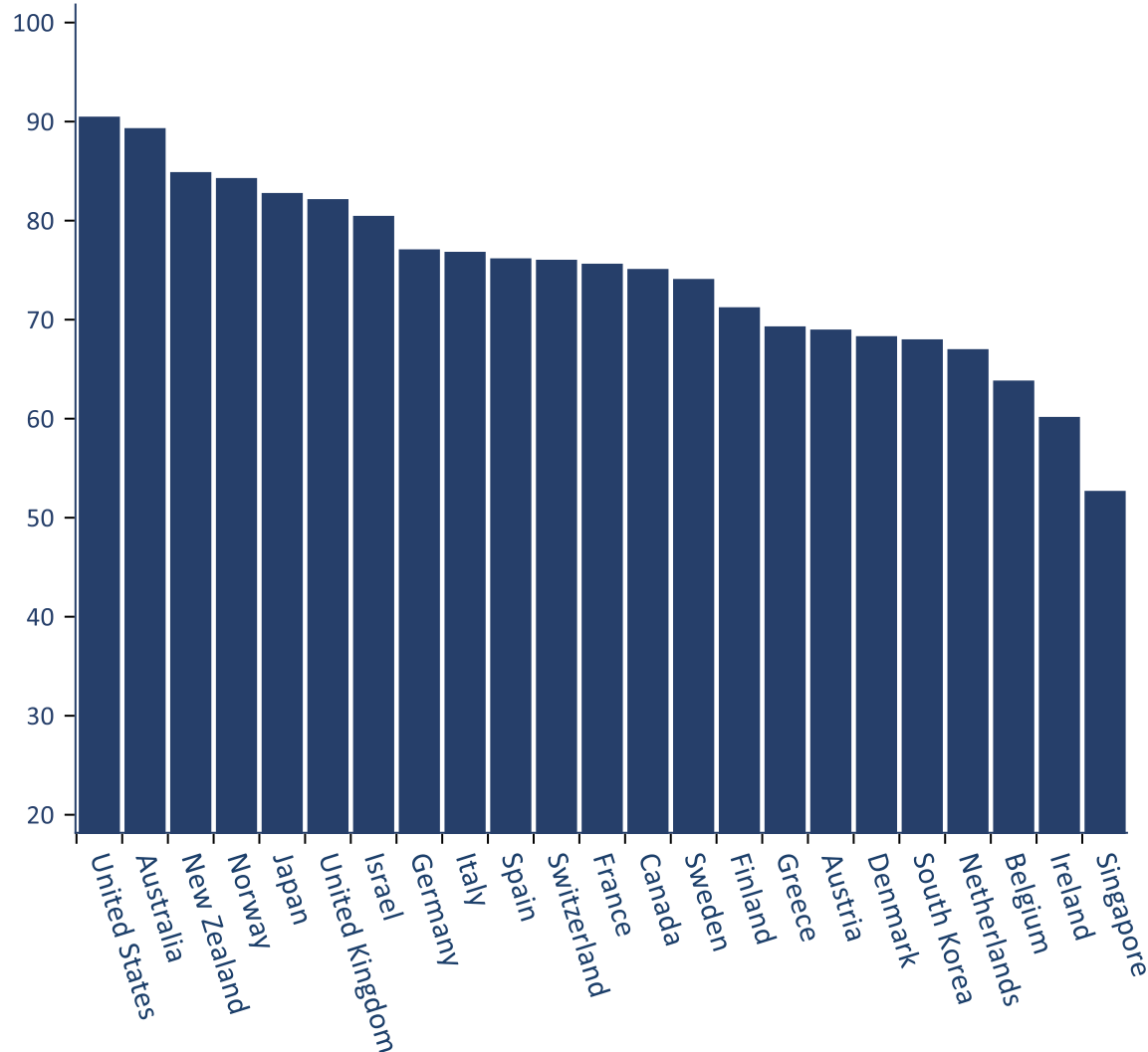
Exhibit 3: Small economies are exposed have high import shares of GDP compared to larger economies; large (or remote) economies like the US, Japan, and Australia/New Zealand lag



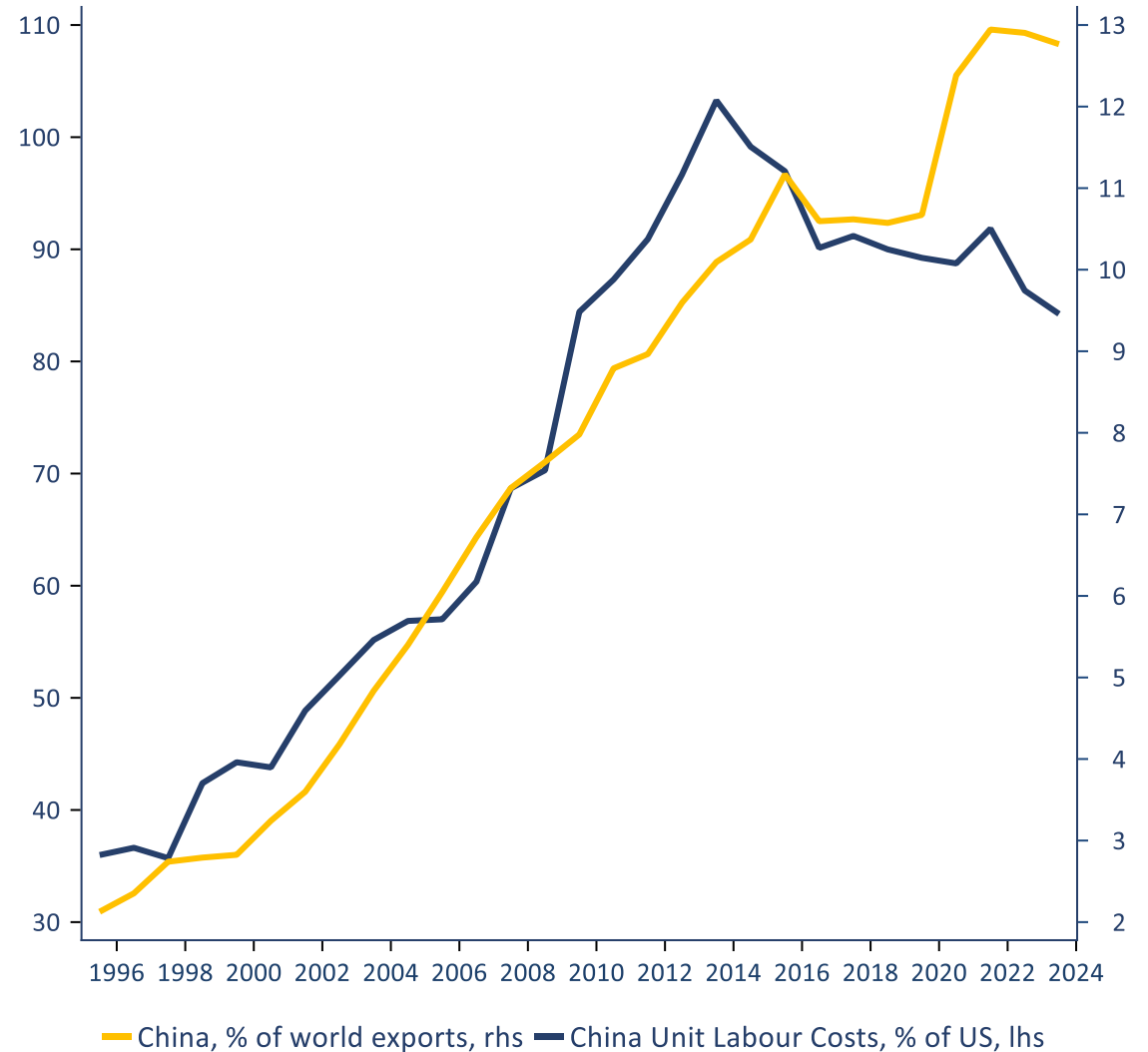
Source: Macrobond; World Bank; Landfall Strategy Group calculations. SAE = Austria. Belgium, Denmark, Finland, Ireland, New Zealand, Netherlands, Norway, Singapore, Sweden, Switzerland. High import small economies = Ireland, Singapore. LAE = Australia, Canada, France, Germany, Italy, Japan, South Korea, Spain, UK, US.

Large/remote/commodity exporting countries tend to have relatively low integration into global value chains; China's edge in terms of labour costs is eroding

Domestic value added in exports, %



China unit labour costs v share of world trade

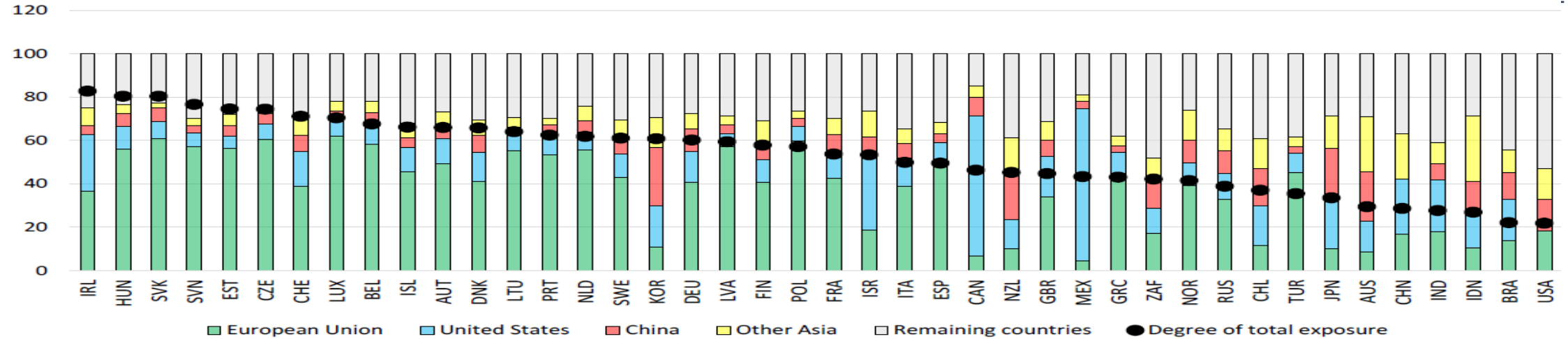


Source: Macrobond; OECD; Landfall Strategy Group calculations.

The OECD estimate that small economies are more exposed to supply chain shocks, because of the high level of integration

Panel A: Demand shock

Domestic value added in foreign demand in percent of total domestic value added



Panel B: Supply shock

Foreign value added in domestic production as percentage of total foreign value added

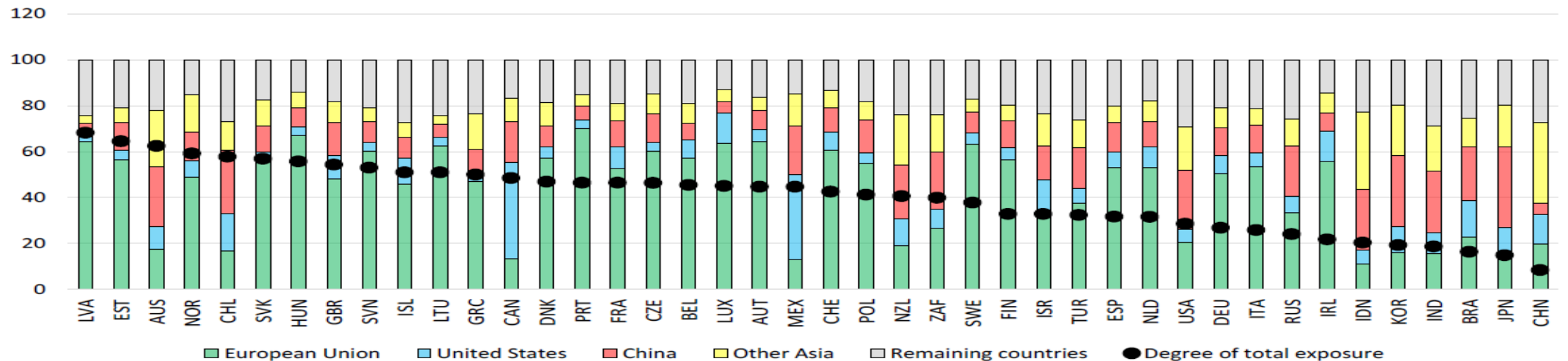
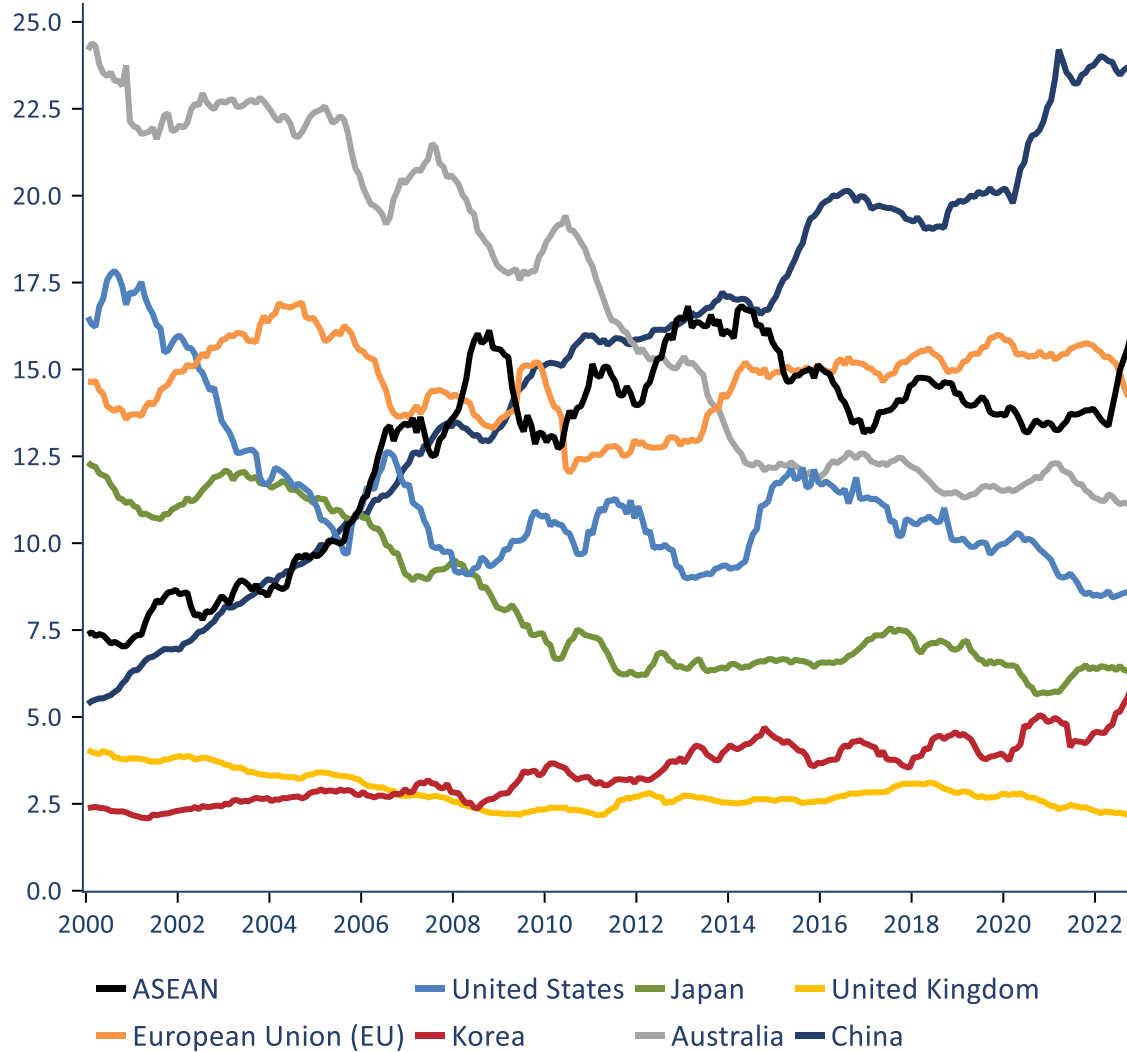
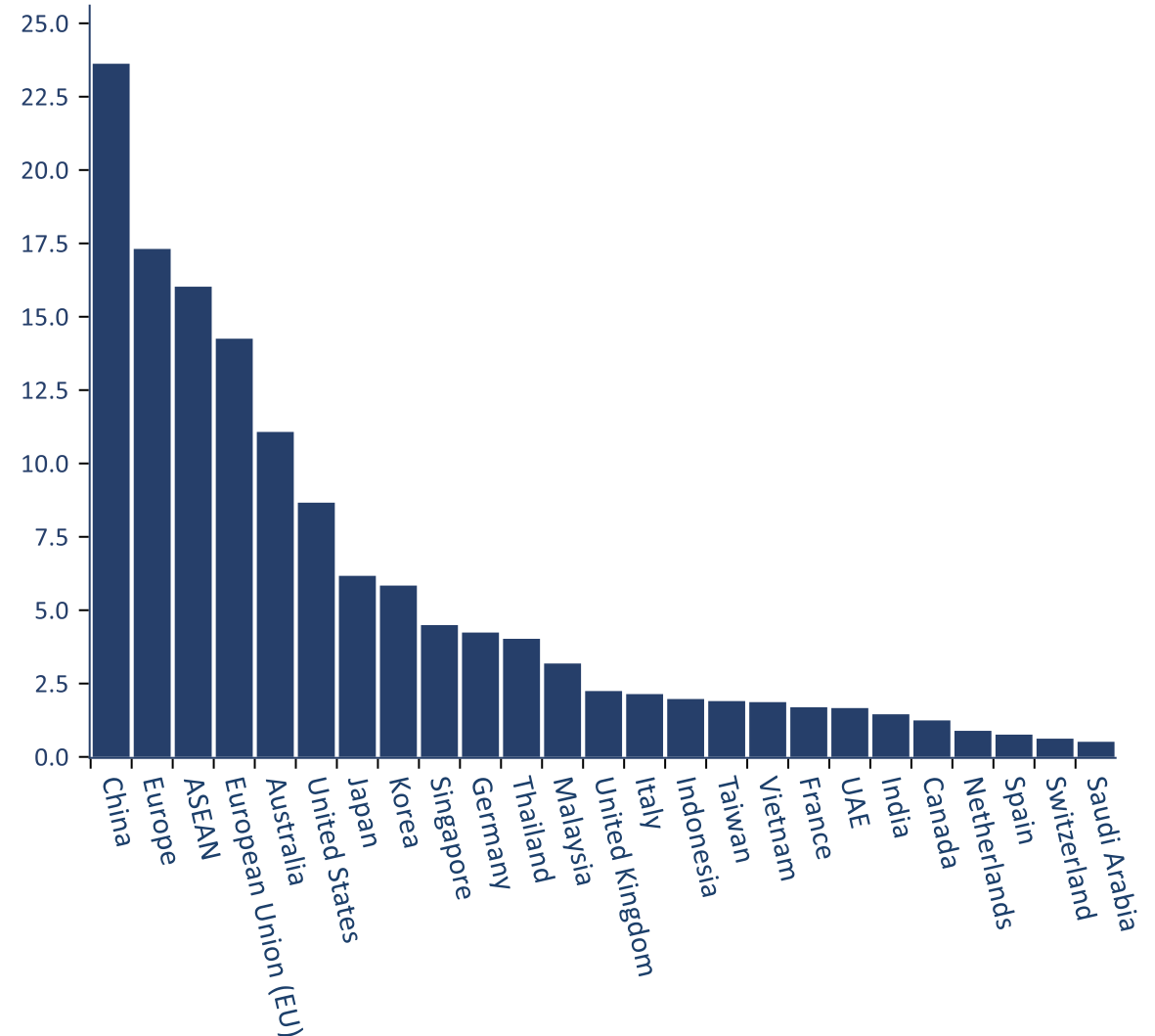


Exhibit 5: New Zealand's import profile has shifted towards Asia, particularly China and ASEAN – and away from Australia and the US – generally lengthening its supply chains

Share of New Zealand's merchandise trade imports, %



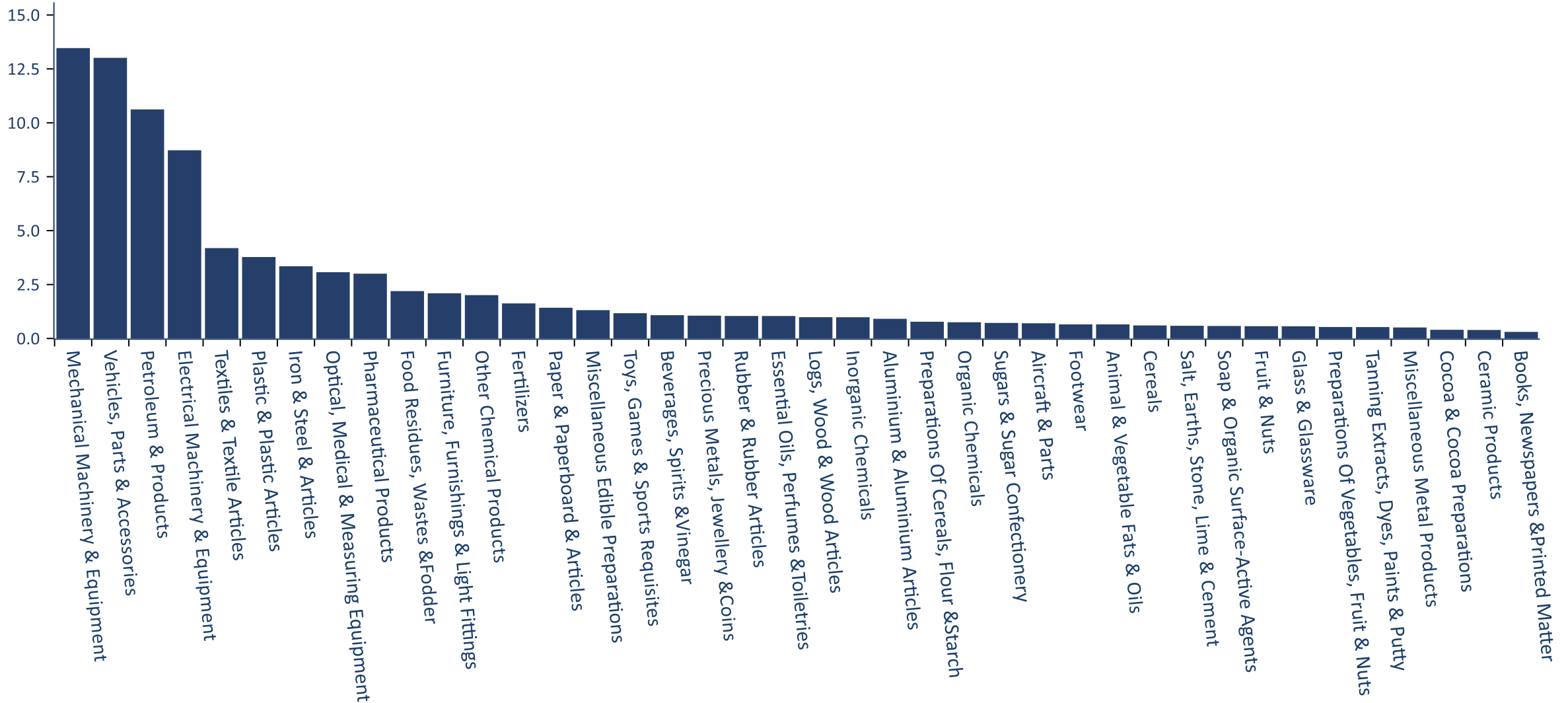
Share of New Zealand's merchandise trade imports, %



Source: Macrobond; Statistics NZ; Landfall Strategy Group calculations.

New Zealand's import profile is heavy on machinery and equipment, vehicles, energy, & textiles: the top 5 categories take up ~50% of merchandise imports

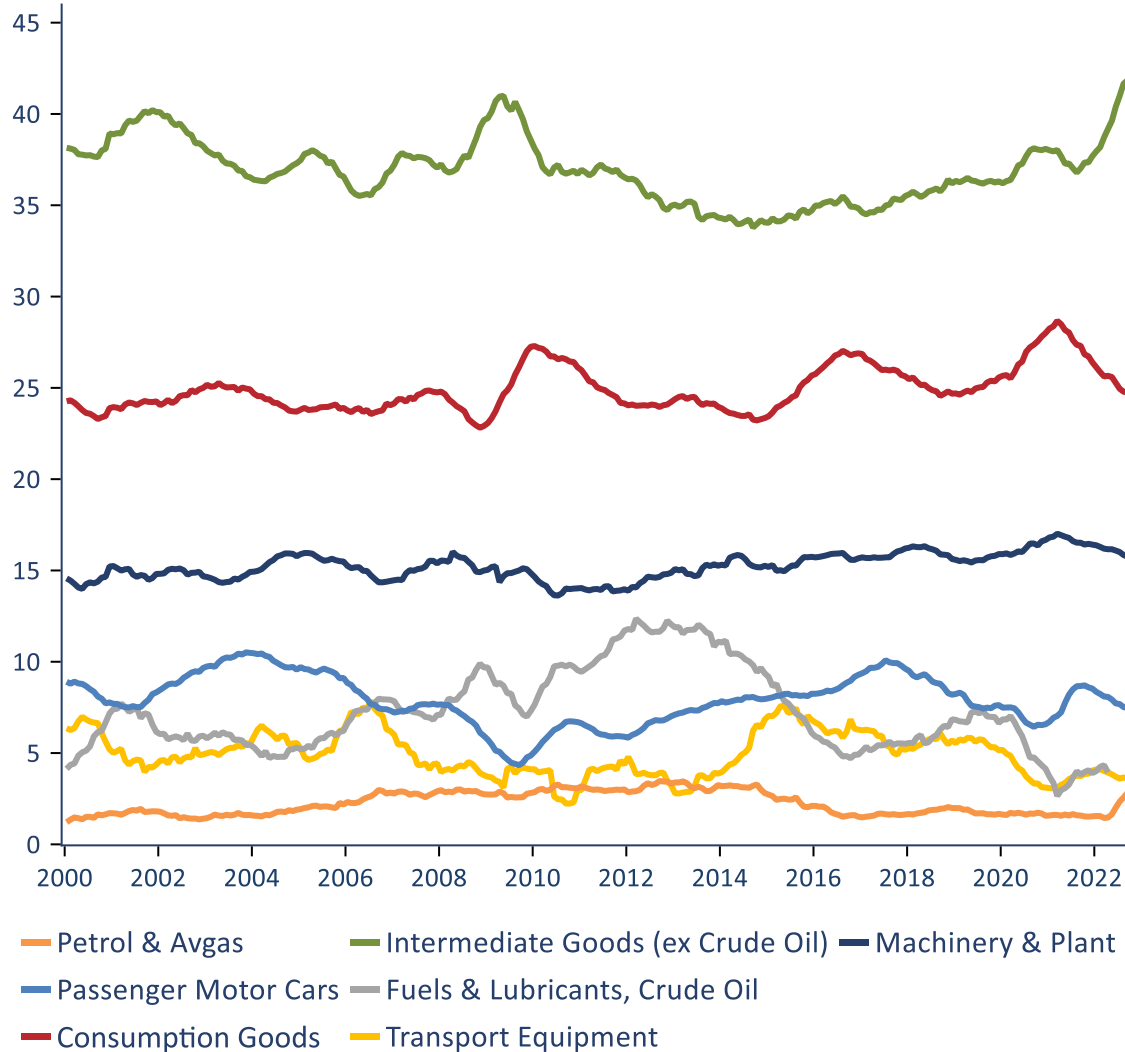
Share of imports by category, % of total



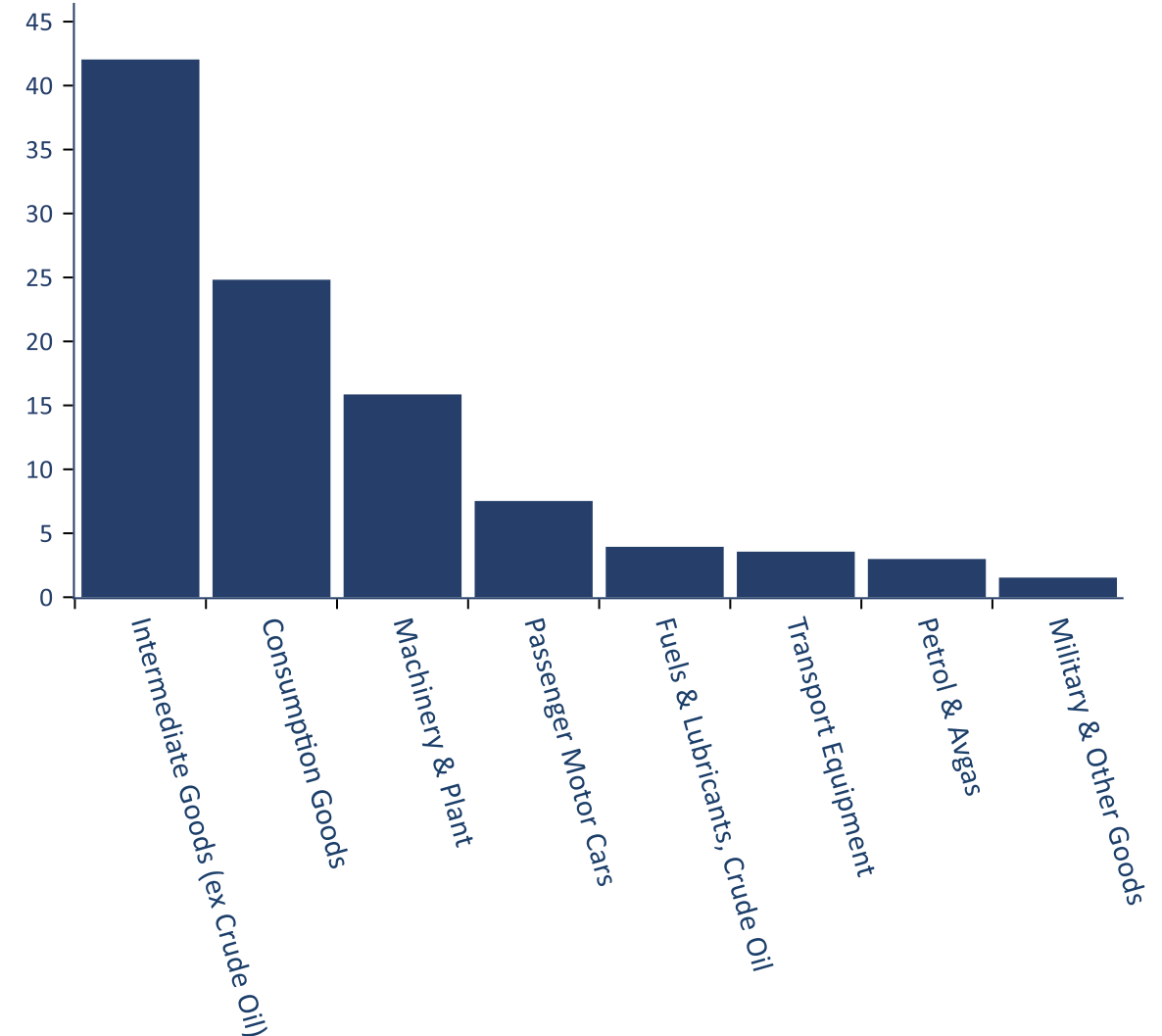
Source: Macrobond; Statistics NZ; Landfall Strategy Group calculations.

~25% of New Zealand's merchandise imports are final consumption goods, ~40% are intermediate goods

Imports, by broad economic category, % of total

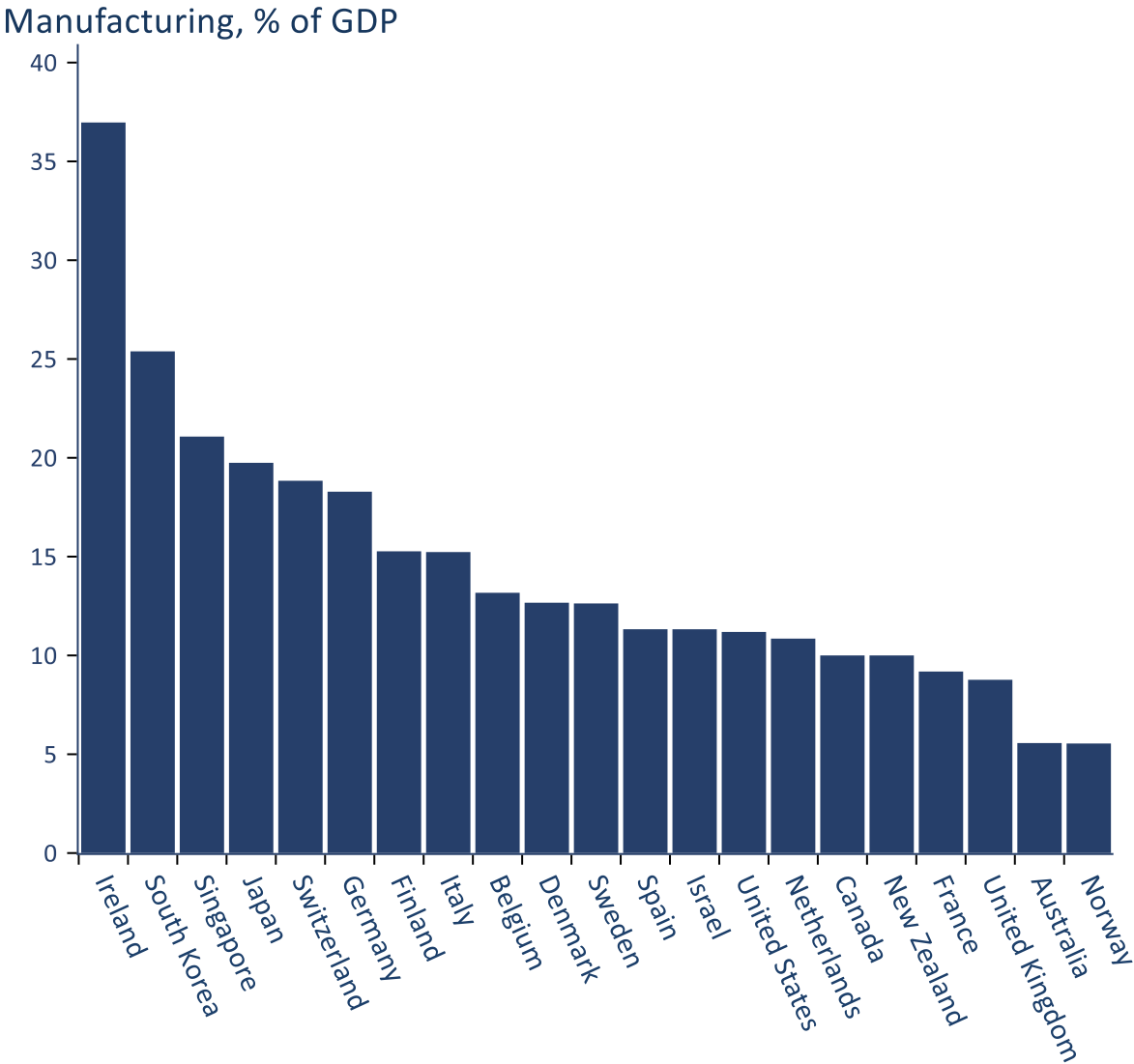
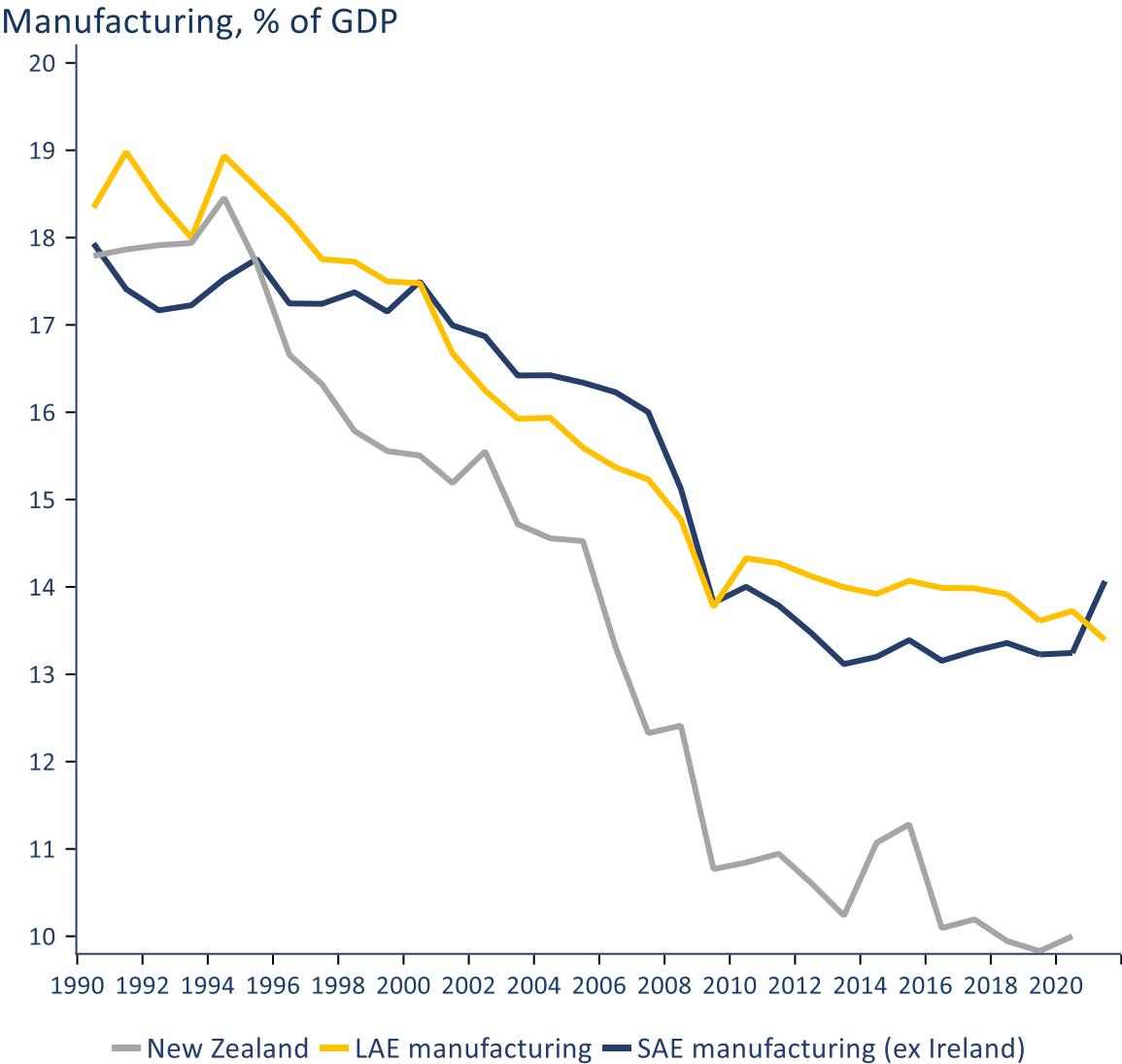


Imports, by broad economic category, % of total



Source: Macrobond; Statistics NZ; Landfall Strategy Group calculations.

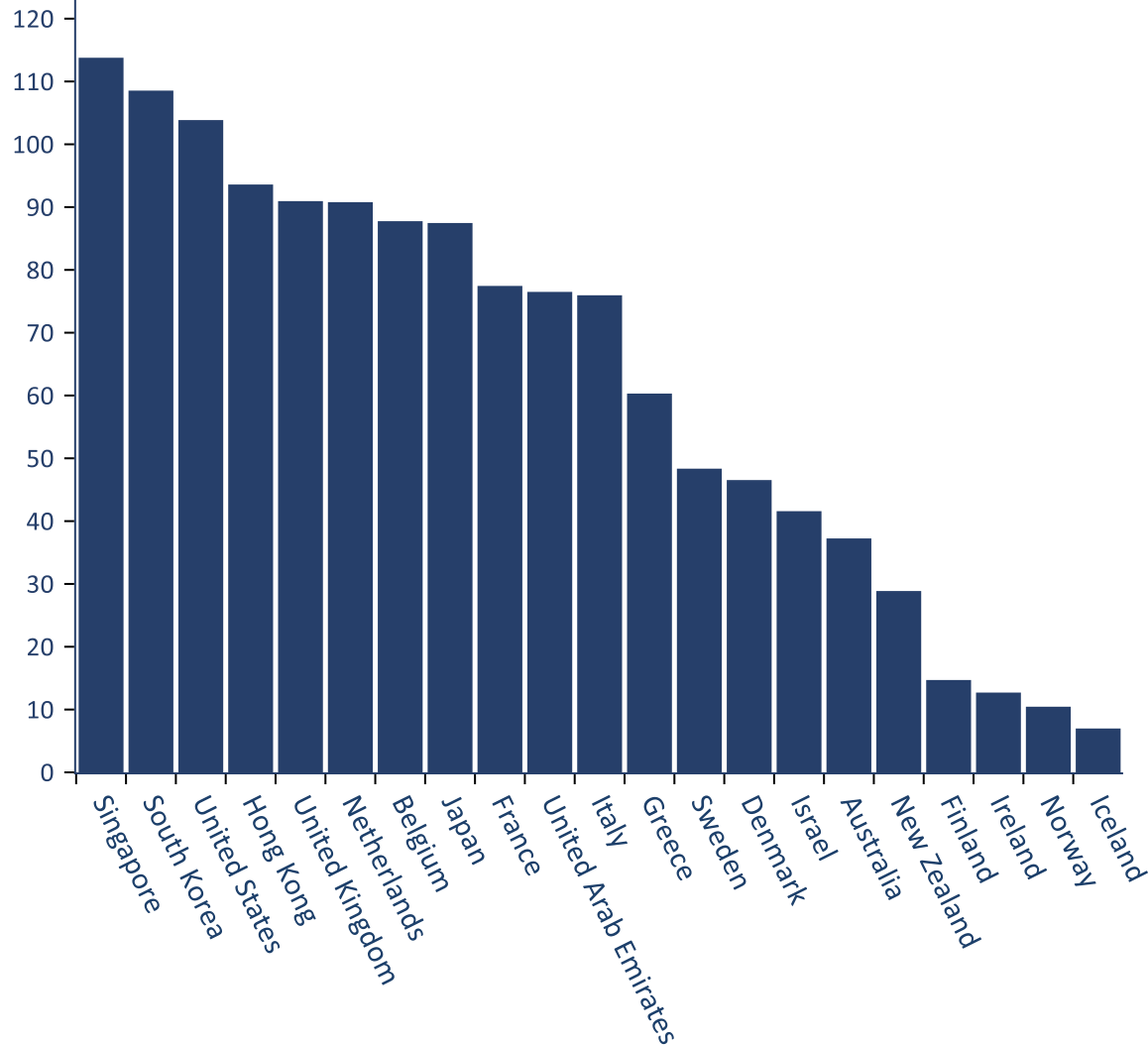
Exhibit 4: New Zealand has a substantially lower manufacturing share than most other small advanced economies; New Zealand is reliant on imports for manufactured goods



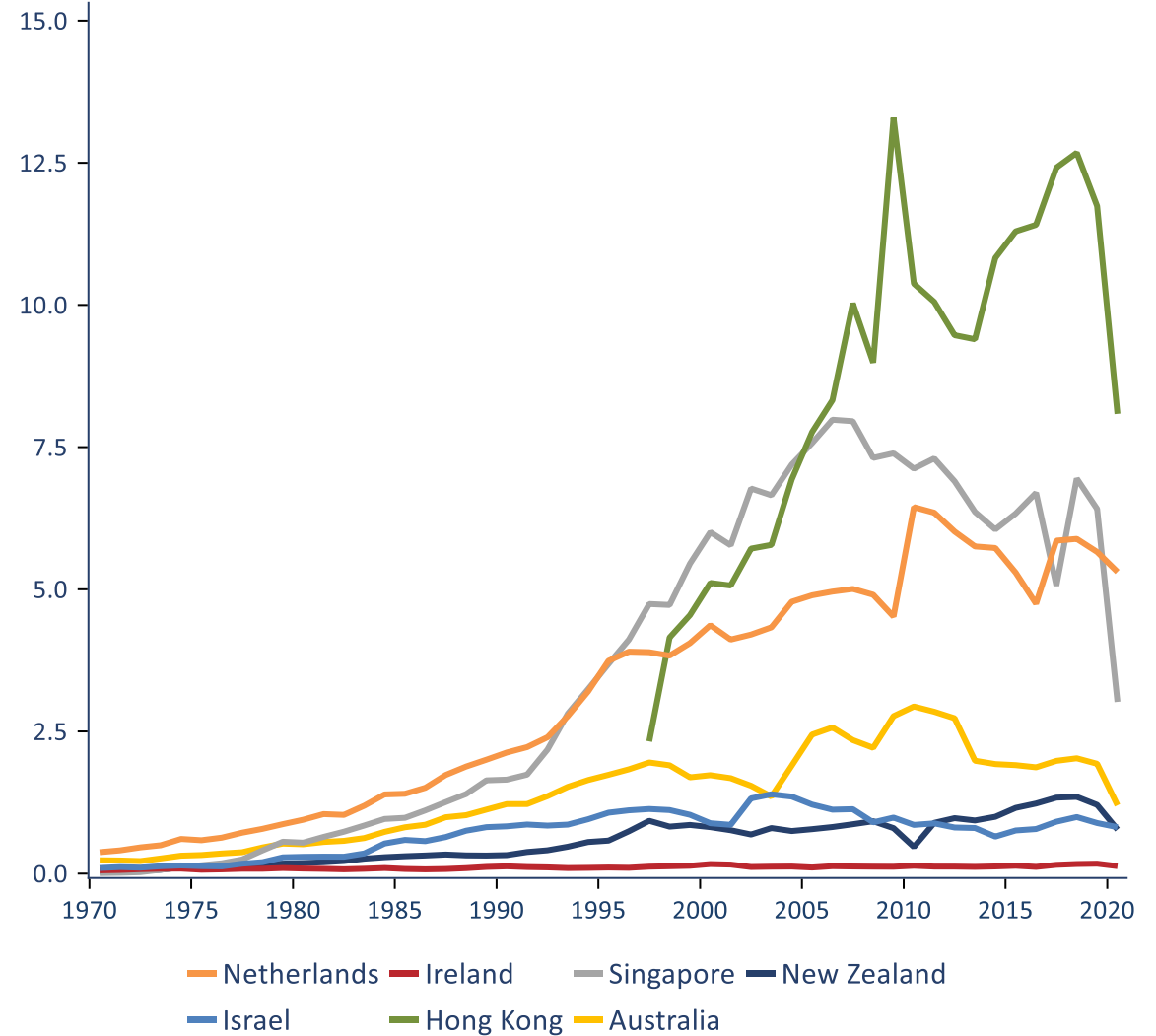
Source: Macrobond; World Bank; Landfall Strategy Group calculations. SAE = Austria. Belgium, Denmark, Finland, Ireland, New Zealand, Netherlands, Norway, Singapore, Sweden, Switzerland. LAE = Australia, Canada, France, Germany, Italy, Japan, South Korea, Spain, UK, US.

New Zealand's container shipping and air connectivity is relatively weak, a function of its market size and physical location

Liner shipping connectivity index



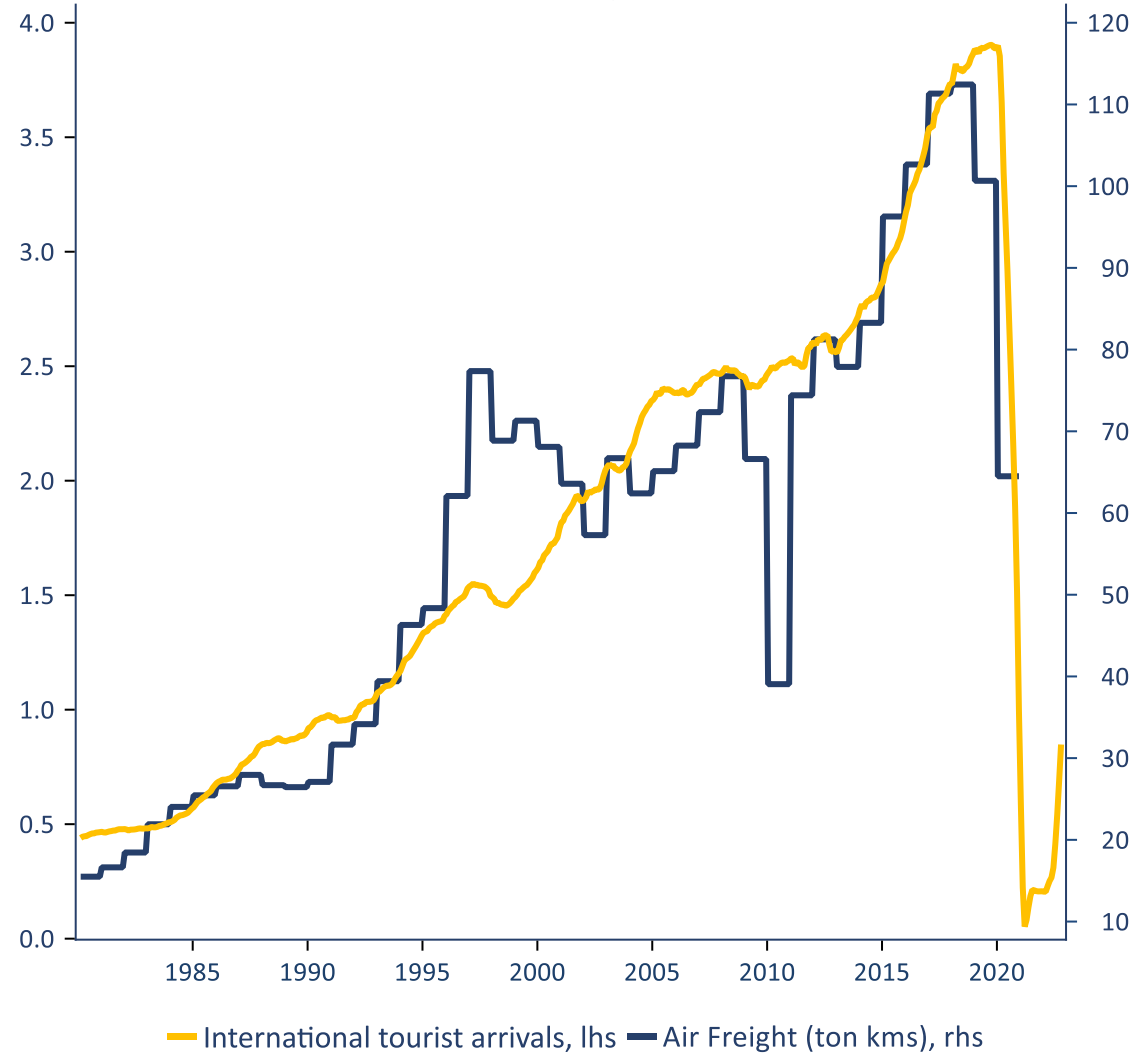
Air freight (ton kms)



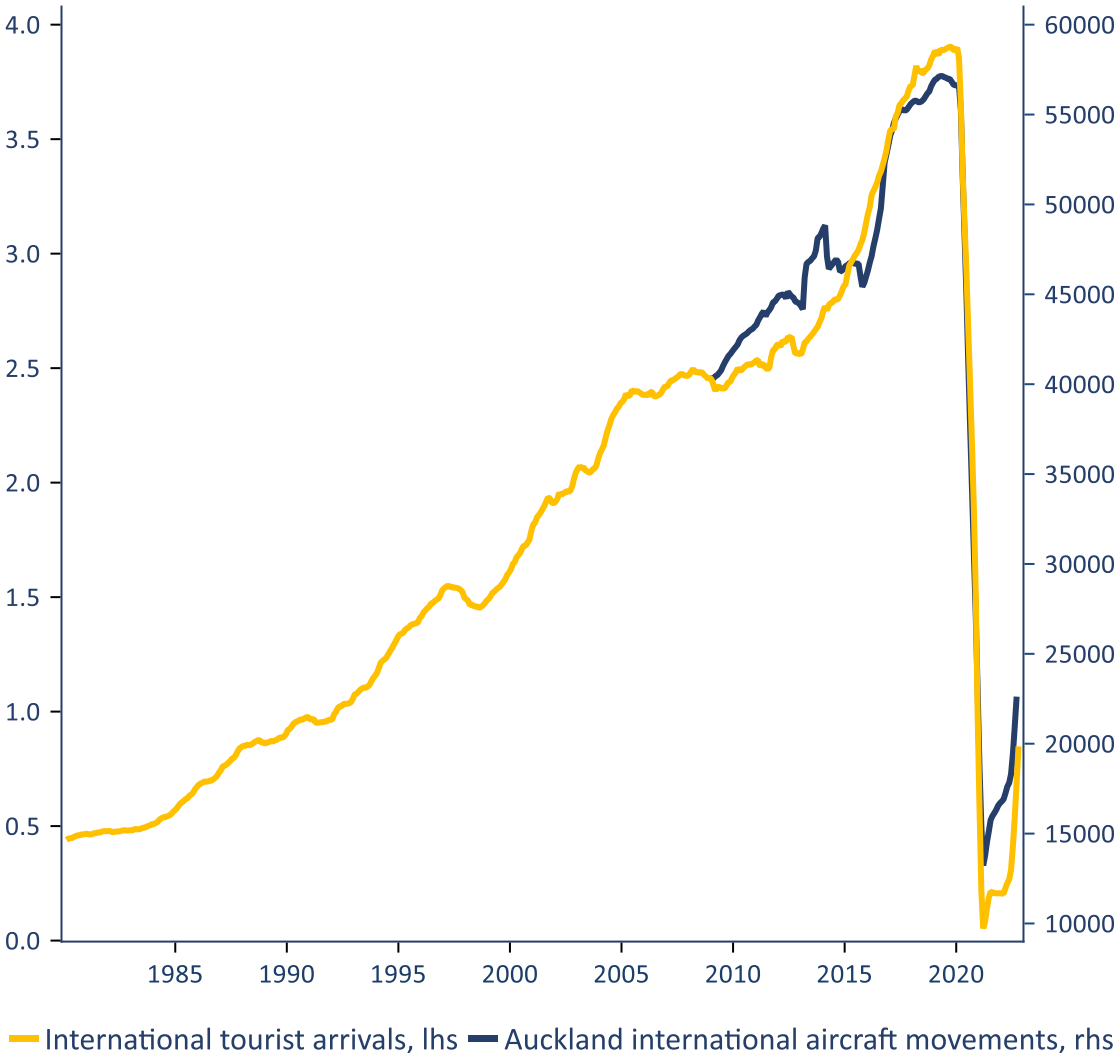
Source: Macrobond; World Bank; Landfall Strategy Group calculations.

Exhibit 6: New Zealand's air freight capacity has been heavily supported by inbound tourism, which has grown particularly strongly in the decade prior to Covid

International tourism arrivals v air freight (ton kms)



International tourism arrivals v international aircraft movements



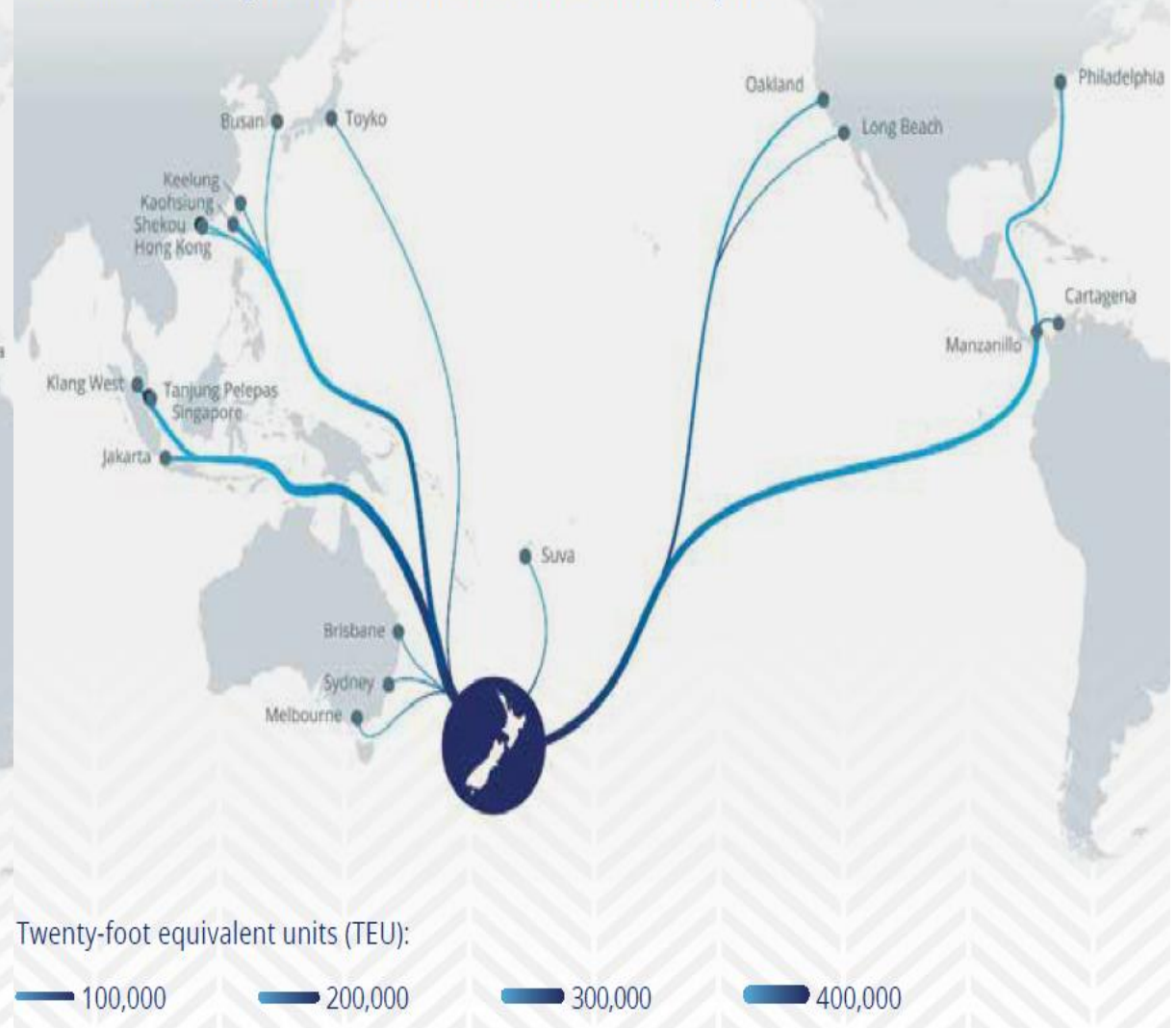
Source: Macrobond; World Bank; Statistics NZ; Landfall Strategy Group calculations.

New Zealand's import shipping links are heavily exposed to Singapore & Malaysia; as well as Hong Kong/Taiwan/China

New Zealand import flow from the last international port



New Zealand export flow to the next international port



Source: Ministry of Transport.

Landfall Strategy Group

Landfall Strategy Group is a research and advisory firm that provides insight and advice on understanding and responding to global economic, policy and geopolitical issues. We serve governments, firms, and financial institutions around the world, from Australia and New Zealand to Asia, the Middle East, and Europe.

We prepare briefings and presentations on global economic and political issues; undertake in-depth analysis of priority issues; and work with our clients to develop effective responses. We aim to help our clients navigate a changing world, providing them with a sustained performance edge.

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