**Methodology**

1. The framework for assessing the degree to which imported products are vulnerable to disruption builds on the approach undertaken by the Australian Productivity Commission (2021) to determine supply chain vulnerabilities [1], work undertaken by Statistics Canada (2021) to determine vulnerable imports [2], and a mapping exercise undertaken by the European Commission to determine strategic dependences and capacities [3].
2. To ascertain which imported products are vulnerable to disruption, a range of filters are applied to trade data. The first filter aims to identify products that have a limited number of existing import sources. The rationale underpinning this dimension is simply that imports which are heavily reliant on specific countries for shipment are more likely to run into supply constraints due to transportation disruptions, production bottlenecks and/or unforeseen policy changes (e.g., border closures, export restrictions, natural disasters, climate change etc.).
3. In this study, the Herfindahl–Hirschman Index (HHI) is used to measure the market concentration of New Zealand imports. The HHI index ranges from 0 to 1, with values under 0.15 usually considered as diverse in economic literature; values between 0.15 to 0.25 as moderately concentrated; and values above or equal to 0.25 being regarded as high market concentration (Pavic et al., 2016; Statistics Canada, 2017). New Zealand’s imports are deemed ‘concentrated’ when imports of a product have an HHI index value above 0.25 and the dominant country of origin accounts for at least 50 per cent of the import value of a given product into New Zealand. As noted in the Australian Productivity report (2021), the threshold selection is a judgement call, and the approach they use focuses solely on the most concentrated products (where a given country accounts for at least 80 per cent of the import value of a given product). This study takes a more conservative 50 per cent threshold. However, the 'database' retains concentration metrics for all products, so different thresholds can be explored.
4. The second filter determines whether there are limited alternative suppliers that New Zealand could access in the event of a disruption. ‘Limited alternative suppliers’ are flagged when the main global exporter of a product to New Zealand also accounts for at least 50 per cent of global exports of the given product. It is inferred that the higher the concentration of global market share that the supplier has, the less able New Zealand is to substitute production with alternative sources of supply in the case of a trade disruption.
5. In order to account for the potential to substitute imports for domestic production, a third filter is used to exclude imported products for which New Zealand exported in larger quantities. This is the same approach taken by Statistics Canada (2021) to identify ‘Limited Supply Products’, and is used as a proxy for excess domestic capacity. For each HS 6-digit export, we computed the export to import ratio. If New Zealand had a negative trade balance for that product in 2019 (ValueExp/ValueImp < 1), the product is presumed to have inadequate domestic production capacity to cover international supply issues.
6. New Zealand's imports are deemed 'vulnerable' once all three filters have been applied.

**Notes on data transformation and cleaning**

1. Import data for this project was attained from two key sources:
2. Import data to determine Filter 1 (degree of import concentration from country of origin), was derived from Stats NZ NZHSC 10-digit import data (HS 17) for 2019. <https://www.stats.govt.nz/large-datasets/csv-files-for-download/overseas->merchandise-trade-datasets
3. Global trade data to determine Filter 2 (degree of global market share of our trading patterns) was derived from the BACI global trade database at the HS 6-digit level (HS 17) for 2019. <http://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=37>
4. A concordance was then mapped between the two datasets. This exercise resulted in 28,844 1:1 product to country parings, and 165 incomplete parings. The 165 absent parings are coded as N/A in the database, reflecting $64 million in annual import value. Specifically, the small number of missing values results in 165 N/A datapoints for Filter 2. Most of these products (154) had low import market concentration values (where NZ's share of import value from the location was < 50%), meaning it will have a negligible impact on the findings.
5. The BACI trade database does not report on trade from Taiwan, rather imports from the country are coded as ‘Other Asia, not elsewhere specified’ (this is consistent with the UN COMTRADE database). In order for the two databases to match, Taiwan in the NZHSC-10-digit database has been recoded to ‘Other Asia, not elsewhere specified’.
6. Products listing New Zealand as the top import source were also removed from the list of ‘concentrated’ and ‘vulnerable’ imports. This group of products includes returned goods i.e. previously exported from New Zealand but returned due to oversupply, defects, etc.
7. This analysis was limited to products with an annual import value of at least $100,000 NZD. Initially, the analysis focused on products with an annual import value of least $1 million NZD, however, after consulting with agencies it was noted that this threshold could be arbitrarily high, and potentially missed imports that were important in production but that had more modest annual import values.
8. This dataset contains concordances of imports to both Broad Economic Categories (BEC) and to the product groupings used in the National Accounts Input Output tables.