Introduction

To date, there has been almost no research on the impact of droughts on financial stability globally. Here in New Zealand, this issue is of utmost importance for a number of reasons:
- there has been a rapid growth of farm debts, specifically in the dairy sector (270% in twenty years - RBNZ).
- NZ has experienced two very costly droughts in recent years (2008 and 2013).
- Therefore, the relationship between droughts, farms’ balance sheets, and banks is important to understand. This research project addresses this gap, by contributing to a farm-level analysis of the impact of droughts, using the NZ Pasture Growth Index (NZPGI) which accounts for sunlight, temperature and rainfall.

Literature

Studies have found negative impacts of drought on agricultural production and business indicators (Edwards, Gray, and Hunter, 2009; Lawes and Kingwell, 2011).

Others have concluded a positive impact of drought on farms’ profitability (Kingwell and Xayavong, 2016; Pourzand, Noy, & Saglam, 2020).

It is shown that debts can help to smooth income between financially good and difficult years (Greig, Nuthall, & Old, 2019; Ma, Renwick, & Zhou, 2020).

Data & Methodology

Financial (StatsNZ) data:
Annual Longitudinal Business Data (LBD) farm-level Agricultural Production Survey (APS) and Census (APC) from 2002-2018
Annual IRD farm-level tax data (debt measures from the IR10 form)
Geographic location of farms by meshblock ID

Environmental (NIWA) data:
Daily NZPGI dataset at 11,491 virtual climate station network (VCSN) grids (~5km apart) covering the whole of New Zealand from 1972-2020
Geographical location of each VCSN raster grid identified by coordinate point

Econometric Modelling

\[ \text{Debt}_{it} = \alpha + \delta_1 D_{it} + \delta_2 D_{it-1} + \delta_3 D_{it-2} + c_{it} + u_{it} \]

where:
- Debt denotes the debt measures (real short term, long term and total debts)
- \( D \) denotes a binary variable indicating drought
- \( CD \) denotes a consecutive drought condition and subscripts denote farm \( i \) at time \( t \) (annual)

Analysis

Results

Drought conditions by region for agricultural land in 2020

Dairy

Sheep/beef

Additional Information

Disclaimer - The researchers (Shabana Kamal) take full responsibility for the paper. The Statistics NZ will not be held accountable for any errors or inaccurate findings within the paper or presentation, and acknowledge that access to data is in accordance with the Statistics Act 1975.

Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the authors, not Statistics NZ.

Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the BDL. Further detail on this can be found in the Privacy Impact Assessment for the Integrated Data Infrastructure available on privacy.govt.nz.

The results are based in part on data supplied by Inland Revenue to Statistics NZ under the Tax Administration Act 1994. This tax data must be used only for statistical purposes, and no individual information may be published or disclosed in any other form, or provided to Inland Revenue for administrative or regulatory purposes. Any person who has had access to the micro data has certified that they have been shown how to use it, and have an understanding section 58 of the Tax Administration Act 1994, which relates to secrecy. Any discussion of data limitations or weaknesses is in the context of using the BDL for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.

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Impact of Droughts on Farm Debts
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Three graphs present the number of drought-affected VCSN grids within each study area, land type, per region. These range from 0–50 grids for dairy and 0–50 for sheep and beef.