

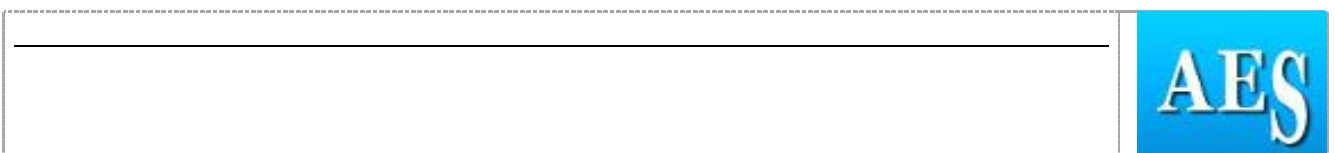
Extended Abstract

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Paper/Poster Title	Anomalous weather and supply chains
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Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	200 words max
<p>We explore the impact of anomalous weather variations in exporting countries on price adjustment in imperfectly competitive supply chains in importing countries. Recognising that the margins of imperfectly competitive firms' at different levels of the supply chains are related, our theoretical framework shows how changes in margins adjust to an upstream exogenous shock: in principle, margins need not co-move but can move in different directions in response to the same shock. To illustrate the theory, we employ high resolution satellite measurements to derive anomalous temperature and precipitation shocks in banana exporting countries. We show how exogenous weather shocks impact on retail and wholesale margins in three major banana importing countries, additionally highlighting that adjustment in imperfectly competitive supply chains depends on market conditions (state dependence). Margin adjustment to shocks is assessed using impulse response functions estimated by local projection, a method that is more flexible and tractable than impulse responses based on standard Vector Autoregression (VAR). Results highlight the limitations of treating domestic supply chain as a single stage. Specifically, we highlight important distributional impacts within supply chains which point to the role that competition plays both within and between stages.</p>	
Keywords	Price adjustment, imperfect competition, climate change, local projection
JEL Code	L7, Q54 see: www.aeaweb.org/jel/guide/jel.php?class=Q)
Introduction	100 – 250 words
<p>Recent research has focused on the impact of exogenous shocks on responses within supply chains, for example, the impact of natural disasters or trade policy changes that account for intermediates that may be used by final users in food chain. We extend this this line of research by investigating how exogenous shocks associated with anomalous weather patterns impacts on changes in the distribution of mark-ups at different stages in agricultural-food supply chains. While our empirical analysis relates to bananas, the study addresses a wider policy issue of who bears the burden of extreme weather shocks associated with climate change. The supply chain for bananas offers opportunities for this type of investigation, bananas being a natural product subject to climatic shocks, physically unchanged as it moves through the chain and brought to market by powerful firms, whether these be retail chains or multinational distributors.</p>	



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Methodology	100 – 250 words
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To provide context to the empirical results we develop a theory model of margin adjustment arising from supply shocks in exporting countries in the food chain comprising imperfectly competitive retail and wholesale sectors in importing countries. In this setting, competition at one stage impacts on competition at another; hence the adjustment of margins will be contingent on changes in margins at related stages.

Set against these theoretical results, we model the effect of exogenous weather shocks in the supply chain using data from the banana supply chains in three major importing countries (UK, US and France) where we have data for prices at different marketing stages and relevant controls. Focussing on margin adjustment within domestic supply chains allows us to circumvent the issue of export (contract) prices in supplying countries: our data for each of the supply chains relate to country-specific import prices, wholesale and retail prices.

A key innovation of the paper is the use of bespoke high resolution weather data which provide the exogenous shocks in the growing regions for the specific exporting countries that supply to each of the importing countries. Using these weather shocks, we apply a local projections approach that allows us to generate cumulative impulse response functions for each stage in each of the countries while controlling for other factors. This method is attractive as it is both more tractable and more flexible than the standard VAR, which are often used to calculate impulse response functions. To illustrate this, we investigate issues such as asymmetry and state dependence, aspects that are typically challenging in the VAR setting.

Results	100 – 250 words
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Preliminary results offer two important insights relating to the impact of exogenous shocks on supply chains. First, margins change to absorb (rather than pass-on) the impacts of exogenous weather shocks in imperfectly competitive markets and hence ameliorate the impact of weather shocks on final consumers. Second, margin adjustment is not shared equally between firms operating at different stages in the supply chain, retailers bearing the lion-share of the shocks. These results, which apply across countries, contrasts with the widely-held view of how imperfectly competitive retailers behave.

Work on asymmetry (hot vs cold; dry vs wet shocks) and state dependence (adjustment in normal and crisis periods) are still ongoing but other findings suggest that it is temperature rather than precipitation that provide the most potent shock (echoing results from agronomic research on the effects on yields); bespoke weather data provides crisper results than generic measure of climatic change such as El Nino Southern Oscillation (ENSO) data. While results are broadly similar across countries, the distribution of the adjustment in the

aggregate margin between the two sectors differs according to the relative power of each marketing stage in each importer.

Discussion and Conclusion

100 – 250 words

Results show that price spreads in some of the world's major banana importers do not remain constant in the face of temperature shocks in exporting countries but adjust in a manner that is consistent with the operation of dominant firms in the supply chain. Decomposing price margins by sector sheds light on where price adjustment is taking place in the food, something that more aggregate analysis cannot reveal. In sum, competition issues in food supply chains will play a role in determining the incidence of weather shocks on consumers as well as firms.

While the empirical analysis relates solely to bananas, results have wider applicability given the importance of large firms in almost all international value chains. Despite the increasing public policy concern, the role of powerful intermediaries in the food chain is yet to be fully acknowledged. Given the expected increase in weather variability that will occur over time, failure to account for the role of these firms in mediating the impact of climate implies that a complete assessment of climate and weather events will be incomplete.