



FELLOWSHIP SUMMARY REPORT

Name: Hugo Ferrer Pérez

Title: Estimating the drivers of household food waste: bridging econometrics and simulation modelling

Theme 3: Transformational technologies and innovation

Home institution: Centro de Investigación y Tecnología Agroalimentaria de Aragón (CITA)

Host institution: European Commission - Joint Research Centre (Seville)

Host collaborator: Robert M'barek

Dates: from 5 September to 4 December 2022

My consent is hereby granted to OECD to post my Fellowship Summary Report on the Co-operative Research Programme's website.





1. What were the objectives of the research project? Why is the research project important?

Current estimates indicate that around a third of the total food produced for human uses is wasted or lost around the world^{1,2}. Note as well, that in the last decade we have witnessed a change of the sustainability paradigm worldwide, seeking the balance among three key pillars: the economy, the environment, and society.

Against this background, one of the major challenges is feeding the planet while maintaining food safety and quality with a growing population on the planetary boundaries. In this context, increasing production and reducing food waste and loss should go in hand. Globally, the Assembly of the United Nations adopted in 2015 a set of 17 Sustainable Development Goals as a part of the 2030 Agenda which is the roadmap to a better sustainable future for all. In fact, in SDG 12 “Responsible consumption and production”, there is target 12.3 “By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses”. This highlights that food waste is a key priority and is in the forefront of policy debate as it is associated with an inefficient use of resources (i.e., food wasted or lost implies waste and lost resources used to produce it) and implies a moral dilemma (i.e., people in hunger or starving, people in difficulties to afford food while others waste).

At European level, the commitment with the 2030 Agenda is evident if we look at the Green Deal and in particular with target 12.3 with the implementation of strategies (e.g. Farm to Fork strategy), action plans (e.g., New Circular Economy Plan) and different national strategies in which food waste is a priority area. Note as well that to illustrate the magnitude of the problem, Eurostat in 2020 estimated that there were 57 million tonnes of food uneaten, worth about 130 billion euros, and households were responsible of the 55%, roughly 70kg per inhabitant, which is like throwing a yoghurt and a half to the trash every day.

Therefore, this research focuses on the household level and aims at identifying the impact of key drivers of food waste for a sample of European Union Member States. To do so, a panel data set of food waste rates and relevant drivers has been constructed. Then, an ex-post analysis has been conducted to ascertain the drivers of food waste over time. Finally, an ex-ante computable general equilibrium simulation model is calibrated with the obtained econometric estimates (elasticities) to generate projections of future food waste rates within a status quo baseline.

2. Were the objectives of the fellowship achieved?

At the time of writing this report, all the objectives are nearly completed. The literature review was conducted previously but updated during the stay. The construction of the database including food waste rates and relevant drivers for European Member States have been fully achieved. The comparison with other available data set (e.g., OECD food waste dataset, Global Food Loss and Waste data base from World Bank, FAO statistics, Eurostat new food waste database) has been also completed. After it, the sample was constrained to European countries as it was not possible to obtain enough quality data for other OECD countries. This part took much longer than expected.

The econometric analysis using panel data techniques has been performed and elasticities obtained. Also, the spatial pattern has been also analysed but the results in all results are not concluding, so we can intuit some varying behaviour of the food waste rate clustering over time of the Member States. In sum, further attention is needed to assess whether the spillover effects are significant. For this reason, this issue remains as a future avenue of research.

¹ Food and Agriculture Organization of the United Nations (FAO). 2011. Global Food Losses and Food Waste – Extent, Causes and Prevention. Rome: UN FAO.

² Food and Agriculture Organization of the United Nations (FAO). 2015. Global Initiative on Food Loss and Waste Reduction, 8.





We are on the way to achieve the last objective, the ex-ante analysis. Once the elasticities have been obtained it is required to calibrate an ex-ante computable general equilibrium simulation model to generate projections of future food waste rates within a status quo baseline.

3. What were the major achievements of the fellowship? (up to three)

I would say that, at the scientific level, the obtaining of new econometric evidence of the key determinants of food waste rates at household levels of Member States will represent a relevant advance in the literature as this is the first time a panel data has been estimated and spatial effects have been studied. Once the simulation model is calibrated with the estimated elasticities, the food waste projections will be obtained, which will contribute to better tackle this societal challenge providing more useful information to policymakers. At personal level, this has been my first research project as lead researcher and I can tell that I am very grateful for this opportunity. I believe that my visiting stay has increased the interest in future research collaborations in the future.

4. Will there be any follow-up work?

As stated in the proposal, the research developed during the stay will continue in the following months. And this work will serve as a basis for future collaborations as in the short-term, employing further in-house expertise in modelling, different scenarios can be designed to examine the impacts of reductions in waste rates with a measurement of the economic, social, and environmental impacts. So, our future studies will offer useful sustainability insights for the food supply chain.

In addition, it is envisaged to write a scientific article in which the authors will notify the OECD CRP Secretariat and acknowledge the funding contribution of the OECD Co-operative Research Programme as suggested in the guidelines.

5. How might the results of your research project be important for helping develop regional, national or international agro-food, fisheries or forestry policies and, or practices, or be beneficial for society?

In general, the research project attempts to provide new insights into the effects of the European sustainability strategies and action plans regarding to the food system in the global bioeconomy focused on food waste and loss. More specifically, the research will help to improve simulation models by providing novel econometric estimates of food waste, which will permit to increase accuracy of simulated impact of non-quantitative policy instruments. The empirical analysis contributes to the literature filling the existent gap between ex-post and ex-ante studies on food waste. In addition, it is envisaged that this will be used in the host institution to conduct a scenario analysis with the MAGNET model to assess the impact of changes in food waste and loss reductions on the economy, which will support EU policymaking.

6. How was this research relevant to:

- *The objectives of the CRP?* I can say that the research fits into the Theme 3 in section ‘Innovations in social science, economics and education’ as the Scientific Advisory member responsible of the theme already confirmed to me. The topic developed is closely connected with Theme 2, sections “Food safety”, “Risk assessment” and “Climate risks to production” and Theme 1 “Managing natural capital” because by nature, the food waste has multiple interconnections. There are many risk factors affecting food safety and quality, which contribute to food loss and waste. Also, food production should be accounted within planetary boundaries. All these elements make that feeding the planet whilst achieving food security could be feasible.
- *The CRP research theme?* The research developed can improve the competitiveness of the food chain in the long term and in the end ensure that resources used for food production are used more efficiently. Also, from a food security perspective, expected results can be useful for closing the calorie gap between the current situations where the world is nowadays and where the world should be if an efficient use of





resources were implemented. In sum, the work proposed here can be useful in the ongoing activities of OECD focused on food waste reduction and sustainability of the food supply chain.

7. Satisfaction

- Did your fellowship conform to your expectations? Yes, it was highly satisfactory.
- Will the OECD Co-operative Research Programme fellowship increase directly or indirectly your career opportunities? Please specify. Yes, it provided me a valuable opportunity to develop a research project and collaborate with other researchers in a great environment in such a recognised institution.
- Did you encounter any practical problems? No.
- Please suggest any improvements in the Fellowship Programme. Nothing that I can think of.

8. Advertising the Co-operative Research Programme

- How did you learn about the Co-operative Research Programme? Home institution mailing list and from a couple of colleagues who encouraged me to develop a project and apply for it.
- What would you suggest to make it more “visible”? I think the CRP is advertised through the adequate channels. I have forwarded and recommended to my colleagues and will continue in the coming years to help gain more visibility.
- Are there any issues you would like to record? Finally, I would like to thank OECD for allowing the exception of undertaking the fellowship in Spain, and to Mr. Blasco for his advice in preparing my application, and, last but not least, to Mrs. Carrasco and Mrs. Elisseou for their efficiency in all of the administrative issues.

