Impacts on individuals caused by structural changes.
A mechanical approach to economic calculations

COWIfonden has accepted to support a research project at Stanford University in the Autumn 2018 in cooperation with Professor Susan Athey who is considered by many as a candidate for the Nobel prize in economy after the award of the *John Bates Clark Medal*.

Our project is about developing an economic model that calculates the impact on individuals at a certain structural change, e.g. the effect of a job training programme, introduction of minimum wage or price increase. The traditional approach to this problem is to calculate the average effect for all individuals, e.g. the average change in unemployment when introducing minimum wage. But modern methods from mechanical learning, such as statistic, computer science, etc. allows that we can calculate these effects at individual level, e.g. the probability that individual A gets a job at job training programme 1 or the expected additional income for individual B at the introduction of minimum wage.

The model is an improvement of the mechanical learning algorithm called *random forest.* The method is based on a number of decision trees – which explains the name - that are yes or no questions. The model asks questions and based on the answers, groups of individuals with similar characteristics are made. For example at the evaluation of the unemployment benefit reform, the model asks each individual about education, unemployment period and a number of other background variables and the population is slowly divided into groups of very similar persons which makes calculations more precise.

This is notoriously difficult for traditional economic models, but none the less of valuable importance for decision makers in the public and private companies because it allows politicians, regions, municipalities, private companies and other decision makers to a large extent to target each individual and make the best decisions for that person instead of the average.

The project should also be seen as a contribution to the economic literature trying to bring economy closer to mechanical learning. As long as the amount of data explodes, the technical challenge of making economic models become more and more difficult and the acquisition of techniques from mechanical learning is essential for economic science. Professor Susan Athey is one of the world's most brilliant researchers in combining economic models with methods from mechanical learning and thus, the project also contributes to bring Denmark and Aarhus University to the front when it comes to the latest economic research.