University of Basel

Exploring Possible Futures

Video Transcript

Which model type to choose

By now, we had a look at optimisation and equilibrium models. We learned about bottom up and top down, social planners, firms, consumers, and marketing direction. An actual question at this point is 'which approach should you choose for your model'?

And the natural answer to that question is: it depends. The most important driver for your model design is your actual research question. If you are looking for a quantification of potential future developments for a specific region or country, you will more likely end up with an energy system type model than if you want to understand how different policy designs impact investment incentives.

When trying to translate your problem into a model, first figure out where your main focus is. Your interest helps you to decide if you need whether a conceptual model or if you should use a numerical modelling approach, or even both. Maybe you are more interested in the economic understanding of your problem and would like to research topics like optimal policy design or incentive structures. In this case, you should probably focus on a more conceptual modelling approach. The building blocks you learned will be helpful for a place to start.

If you want to provide quantification for potential developments, figure out the optimal level of a renewable support scheme, or simply derive a good price estimation for next year's electricity markets, you will likely need a data-intensive numerical model. The energy system logic of optimisation models will be a good place to start. Similar, you can try to differentiate by the size of your model. Are you looking at a single actor, like firms? Then again, the building blocks will be a good start. Are you more concerned about actors interaction and and market dynamics, an equilibrium setting could be a valid approach.

And if you are thinking about large energy systems with plenty of details that you need to account for, again, an optimisation with lots of side constraints could be a good solution. Luckily, many questions can be tackled with different model approaches and still produce the same results.

Whether you use an equilibrium model to simulate the perfect competitive energy market or an optimisation model maximising total welfare, if both have the same underlying data, they should also produce the same outcome. Often, both model types can be transferred into each other and are thereby equally fitted for your model. Only when you have more than one value you would like to optimise but can't simply add them up into a single object, you are bound to equilibrium approaches-- well, at least most of the time.