# Modellbeschreibungen

## Ski resort dynamics

This model allows studying how two main entities of a ski resort are connected to and influenced by each other: The number of visitors and the slopes available to them. The reasoning behind this model is, that skiers are attracted by three factors. These are (1) the size of the ski resorts, where they prefer many slopes to ski, (2) the density of skiers on the slopes, here the preference is empty slopes and (3) good weather, aka lots of snow.
Thus a larger ski resort attracts a larger crowd. As the ski resort managers' goal is to maximize profit, they are interested to have as many visitors as possible and as little operating costs as possible (which translates to fewer slopes). Thus their tendency is to keep the slopes full – which might scare off visitors.
Another assumption is that visitors are reacting faster on changes than resort managers can. The reasoning: new slopes needs advance planning, while visitors can use the internet to quickly book their ski vacation. Thus visitors react much quicker than the managers can.
Finally you can control the external factors weather and economy. Lots of snow will attract more people, while economic crisis will have them stay at home.

## Parental Investment

How are parental resources (i.e. time and money) distributed among their children? With this simulation model it is possible to explore how this distribution is influenced by family constellations and investment strategies.
The first three scenarios focus only on the distribution of time. Starting with a very simplified scenario (in which children are born in equal intervals of four years) you can see how the number of children influences the resources available to them. Next you can try how the distance between births affects the distribution. Then, to make things more realistic, it is possible to choose how resources are allocated. This might be a totally equal distribution at every time step, that the firstborn gets the vast bulk (as was standard still a few decades ago), that older siblings help their parents and take care of their younger siblings or that resources are distributed according to the children's age-specific needs.
Finally, in the fourth scenario, money enters the stage. You can now specify the families' social setting including if there are one or two parents in the household, how high their income is and how much time they spend in work. Having time or money is of course a trade-off, thus parents earning less have to work overtime which means that they can spend less time with their kids.

## CO2 Emissions an the Economy

This model is a simplified version of a large-scale model used by an international consortium of scientist to study the effects of governmental intervention on carbon emissions.
In the present version you can specify whether the government collects carbon taxes and if so, if the money earned through them is used to finance research and development of carbon-reduction techniques.
The carbon tax is imposed proportionally to the carbon-intensity of a company's production process. Thus it forces companies to decide whether they want to produce cheap (i.e. carbon intensive) and pay high taxes or to invest in CO2-reduction technology – and pay less taxes and have a better brand image.
The model results show various economic indicators such as the normalized GDP, unemployment rate, distribution of wealth, etc.

## Prehistoric Salt Mining

This model helps archaeologist finding answers on how ancient salt mining in Hallstatt might have looked like. In order to understand how many people were needed to supply the miners with wood, it simulates the wood harvesting process. The model calculates energy-efficient routes to get to the trees and home again and produces results for the time and calories needed and to harvest and carry (an arbitrary amount of) wood.
In the first scenario a single lumberjack goes out for a random tree – with arbitrary size and location. The lumberjack chops the tree and brings it home regardless of its size –even if it would be physically impossible.
The second scenario is more realistic. It features two lumberjacks and an arbitrarily sized and positioned tree. This time the lumberjacks do not go out to harvest it if the tree would be too big for them to carry it home.
Scenario three features a population of ten lumberjacks and five trees. This time the lumberjacks organize themselves to chop and bring in the trees. The fourth scenario is works the same as the third, just with larger populations.