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A SYSTEM DYNAMIC MODEL OF HUMAN POPULATION IN UKRAINE

While the whole world is worried about overpopulation, Ukraine has been worried about population decline for several years. The start of war in the country only worsened the situation.

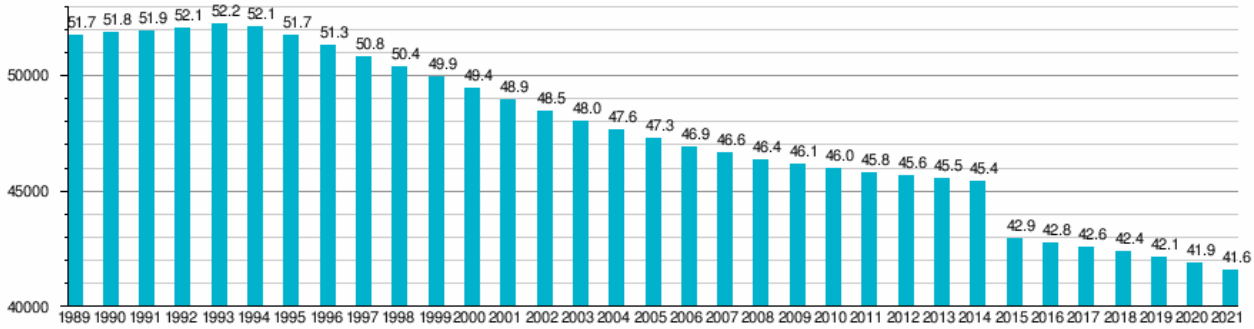

Figure 1. Changes in the population of Ukraine 1989-2021

By 2030, the population of Ukraine will decrease to 35 million people at best way and to 30 million at worst. The director of the Institute of Demography and Social Research Ella Libanova voiced this forecast. Such disappointing forecasts provoked by obvious reasons (the high level of mortality and migration). In addition, after this war, there will not be a rapid increase in the birth rate, as after the Second World War. After all, the modern way of life doesn`t involve the birth of more than two children in a family.

I decided to adapt System Dynamics Modeling of Population to the realities of Ukraine. This is presented in Figure 2.

We take data for the model for 2021. We are building a schedule of the distribution of Ukrainians by age category. As can be seen from the graph, the largest part is the adult population, from 15 to 64 years old, namely 66.78%, children 15.91%, people of retirement age 17.31%. This is presented in Figure 3.

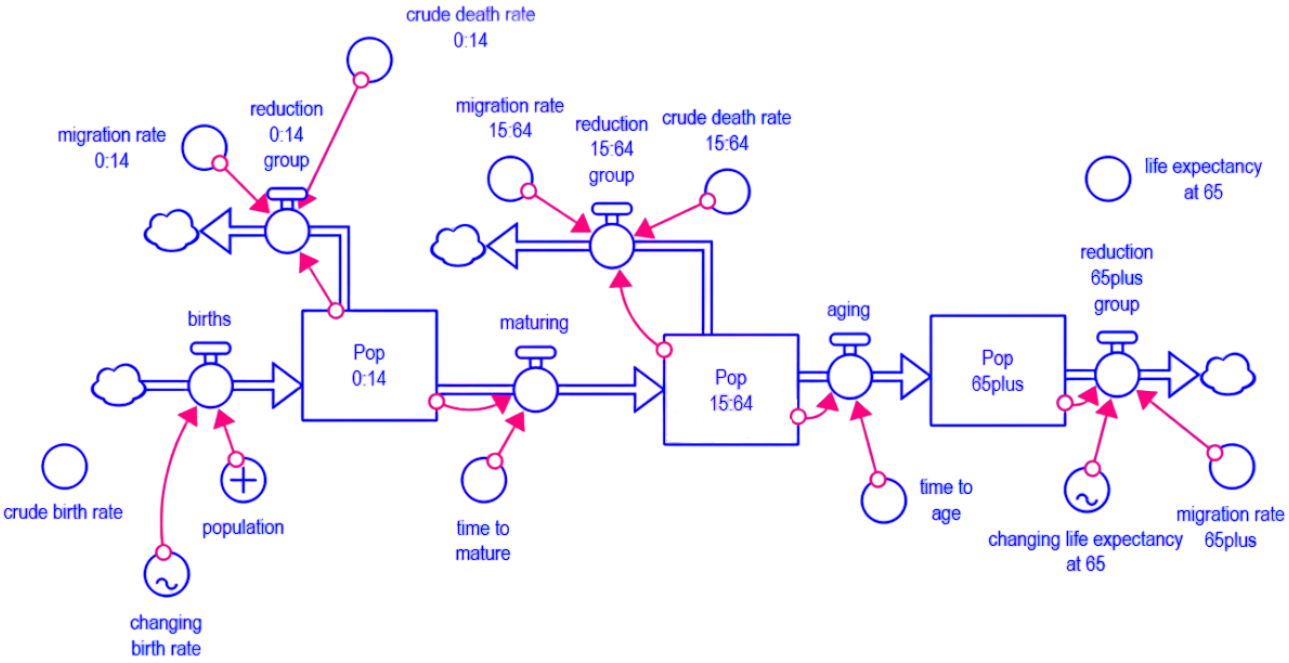

Figure 2. Population model

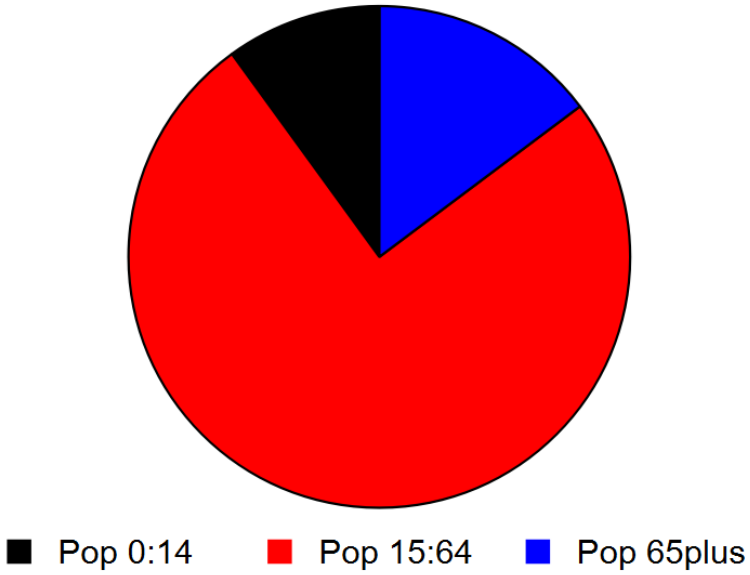

Figure 3. Age distribution

We set the year 2021 as the beginning of the countdown, the population is 41.6 million, the birth rate is 13%, the child mortality rate is 5%, and the adult mortality rate is 16.8%. Than we make a forecast for the next 10 years.

Figure 4 shows the graph of population development over these years by age categories.

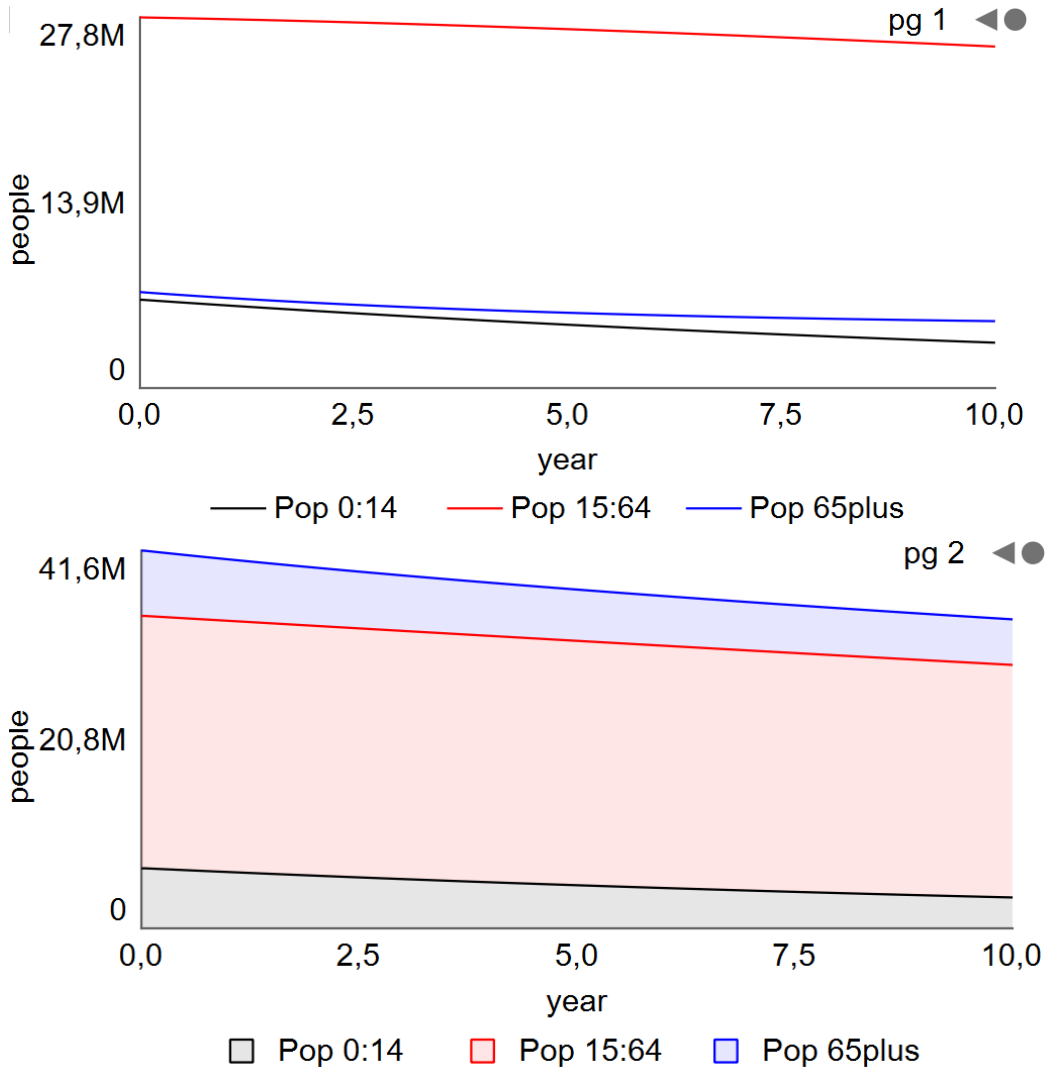

Figure 4. Simulation results by category

As we can see from the graph, analysts' forecasts have a chance of becoming true. The population of Ukraine can really fall to the mark of 34 million, if the situation doesn`t change its vector. This is presented in Figure 5.

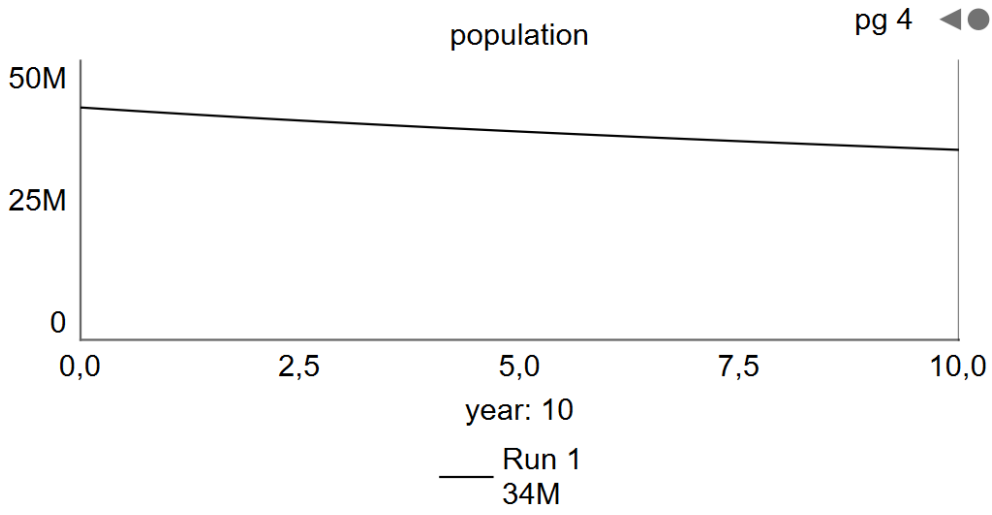

Figure 5. Simulation results

The results of the model, as well as the forecasts of analysts, are disappointing. Everything may change after the end of the war in the country. The state is already working on programs for the restoration of bombed-out cities, as well as programs for their development.

This will provide people with new housing, jobs, and most importantly, confidence in the future. Therefore, people will begin to return from abroad and the birth rate may even increase a little. Then the population level will start to grow. Of course, it will take much more than 10 years to restore everything destroyed and return to the figure of 52 million population.

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