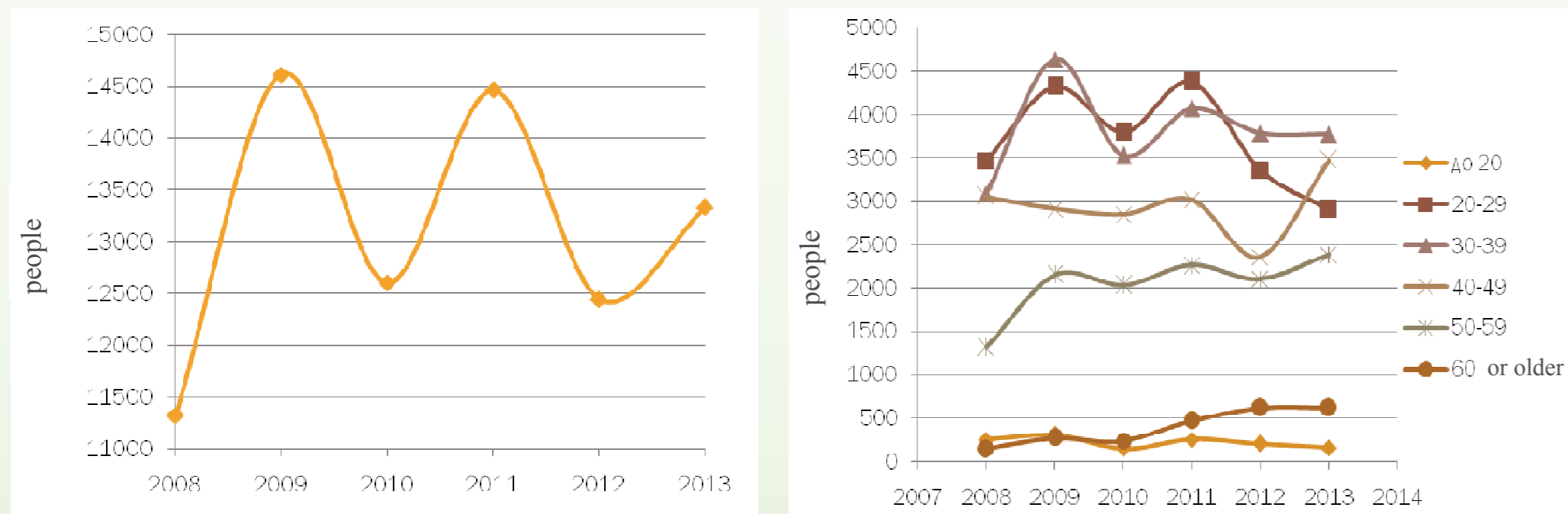


Modeling of the employed population number nonlinear dynamics: the agent-based approach

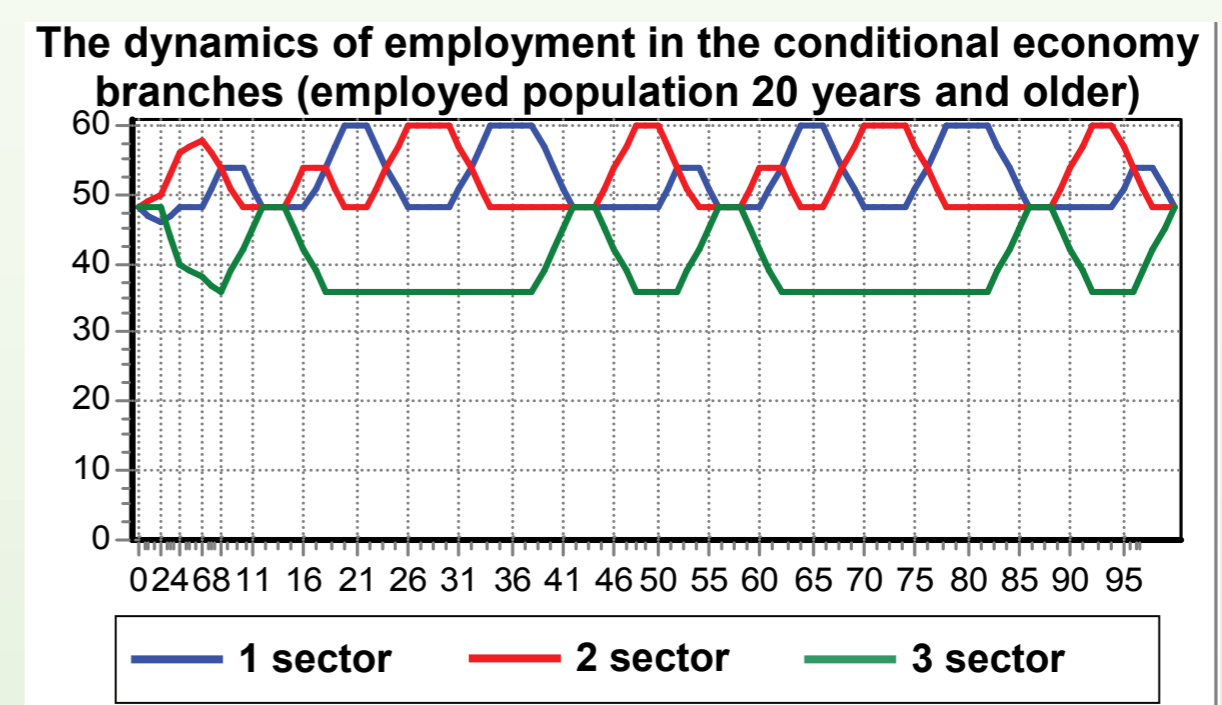
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We research the role of individual or group employment strategies employed in the formation of periodic and complex population dynamics of uneven modes employed in the context of economy sectors. An example of periodic fluctuations in numbers of employees of different ages may be fluctuations in the number of employees in the Jewish Autonomous Oblast in the government, military security, and compulsory social insurance.



We made a series of numerical experiments aimed at studying the dynamics of employment in the three economy branches, provided the replacement age groups. Such a situation may occur, for example, as a result of immigration "washout" of personnel. As a result, replacement of 16-year-olds 20-year gradual consideration of the socio-economic system "appears" cohort of 16-19 years, and the number of employed three economy branches periodic oscillations are observed. The figure on the vertical axis - the number of employed people, along the horizontal axis - time axis at an interval of one year.



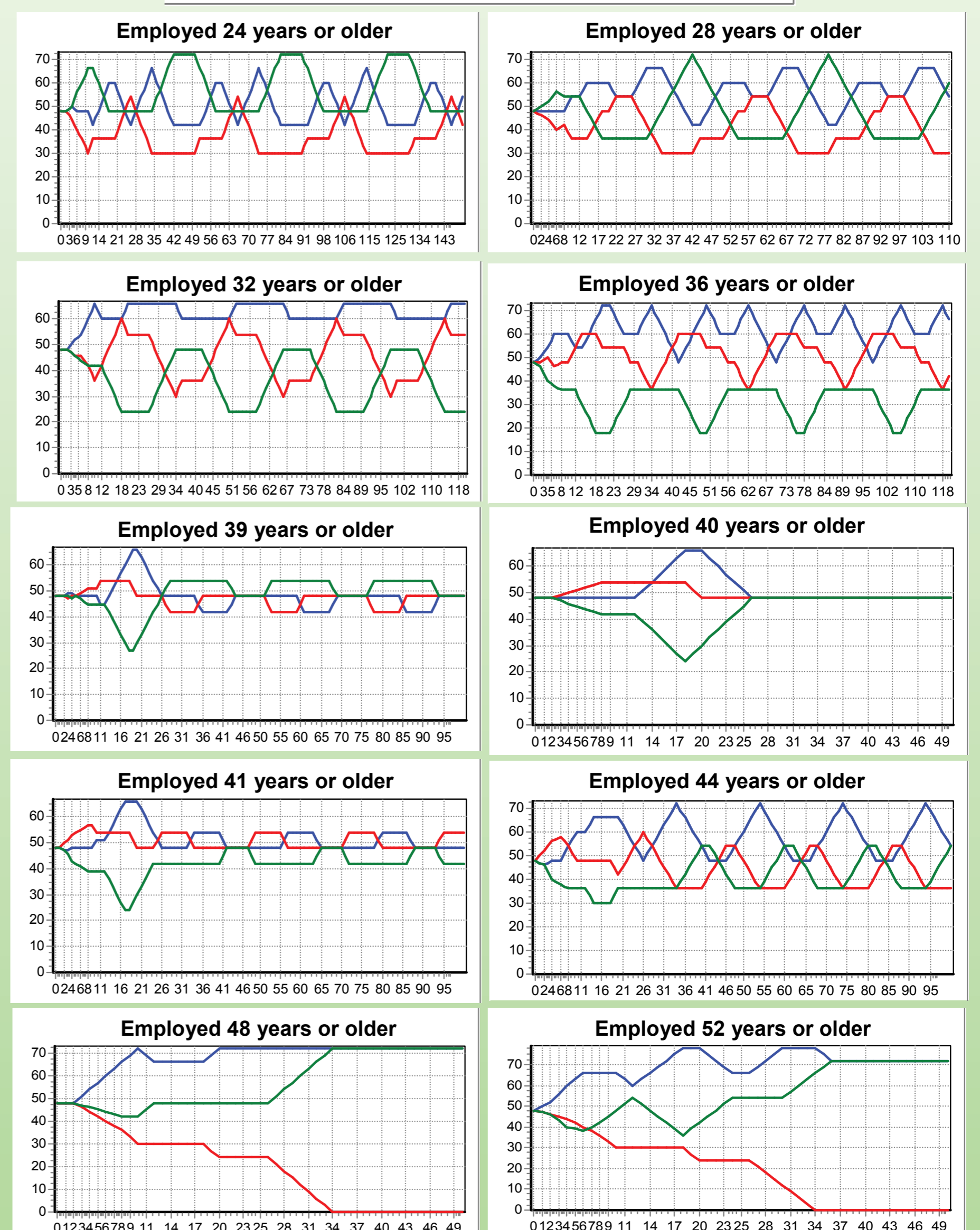
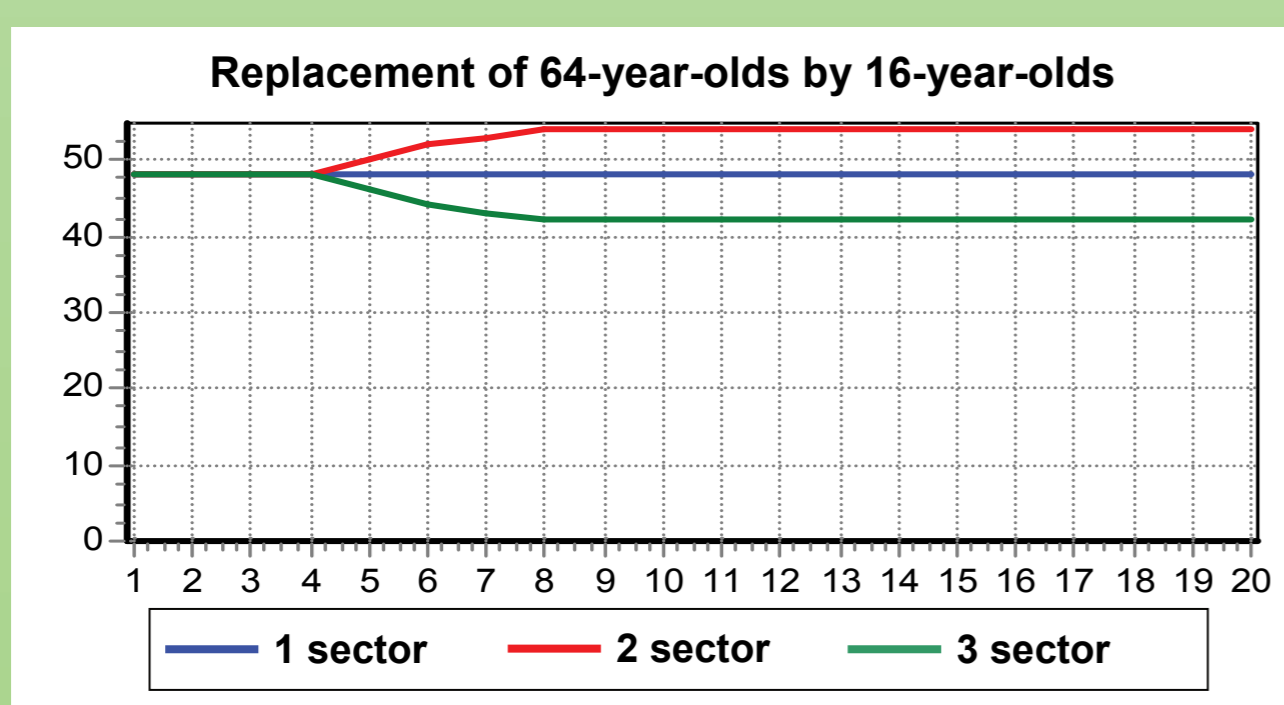
We consider the hypothetical socio-economic system with employees of different ages, which are distributed by three conventional industries and over time moving from one economy sector to another. We consider the same number of employees 16-23 years, 24-31 years, 32-39 years, 40-47 years, 48-55 years, 56-63 years, distributed in three conventional industries. Representatives of each group have a strategy of movement by industry in order to maximize one of three options: pay, prestige, or working conditions. Branches have different classes of these parameters (A - the highest grade, B - middle class, C - lower class).

Criteria	1 sector	2 sector	3 sector
salary	A	B	C
prestige	B	C	A
working conditions	C	A	B

Strategy (movement by industry)	Age Group	The first step (industry)	The second step (branch)	The third step (branch)
1 - wage increase	32-39	3	2	1
2 - raising the prestige	24-31	2	1	3
3 - improvement of working conditions	16-23	1	3	2
4 - wage + prestige	48-55	2 or 3	1	-
5 - wage + working conditions	40-47	3 or 1	2	-
6 - prestige + work. conditions	56-63	1 or 2	3	-

We used a uniform step transition - 2 years. Computational experiments have shown qualitative identity results in different lengths of transition steps.

Replacement of workers over 63 years through a 16-year-old a certain time period leads to the stationary value of contingent employment sectors.



Thus, a uniform distribution of the number of uneven number of workers employed in conventional industries reaches steady-state values. In the case of replacement workers over 63 years of the workers over 16 years old in some cases, periodic modes dynamics in a number of cases there to achieve steady-state values may be reset to the number of employees of one or two conditional branches. Such regimes dynamics of the number of employees related to the violation of "balance" in the strategy. Excretion of different age groups from the system produces "failures" employment. If this elimination group from the system is a long-term nature, the dips acquire the character of periodic oscillations.

Key Research Findings:

Results of basic agent-based modeling show that the different strategies employed result in uneven numbers of workers in various industries; "Crowding out" ("washout") in different age groups leads to periodic regimes of population dynamics of workers in industries or in some cases to zero their number of employees one or two conditional branches.

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