Demographic changes in the CIS countries and national transfer accounts (NTA)

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Population of the CIS countries *

Country	1959	2022	2022 к 1959	Отношение к России (Россия=1)	
				1959	2022
Armenia	1763	2969	1,7	66,7	48,7
Azerbaijan	3698	10296	2,8	31,8	14,0
Belarus	8055	9256	1,1	14,6	15,6
Kazakhstan	9310	19503	2,1	12,6	7,4
Kyrgyzstan	2066	7038	3,4	56,9	20,5
Moldova	2884	3075**	1,1	40,7	47,0
Russia	117534	144502	1,2	1,0	1,0
Tajikistan	1980	9644**	4,9	59,4	15,0
Turkmenistan	1516	6297**	4,2	77,5	22,9
Uzbekistan	8106	35271	4,4	14,5	4,1
Total	156912	247851	1,6	0,75	0,58

- Countries with known demographic indicators

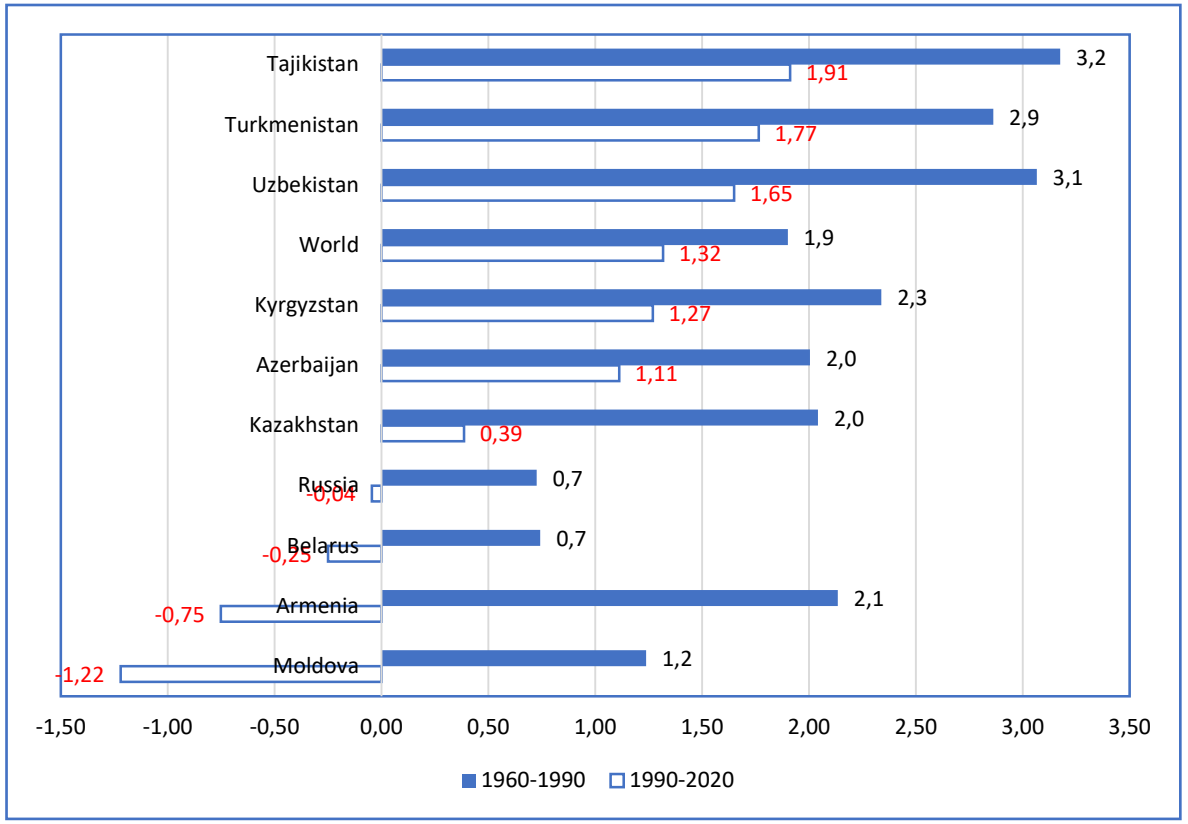
Sources: National Statistical Office, **UN Population Division (2021)

Determinants of Demographic Development in the CIS countries

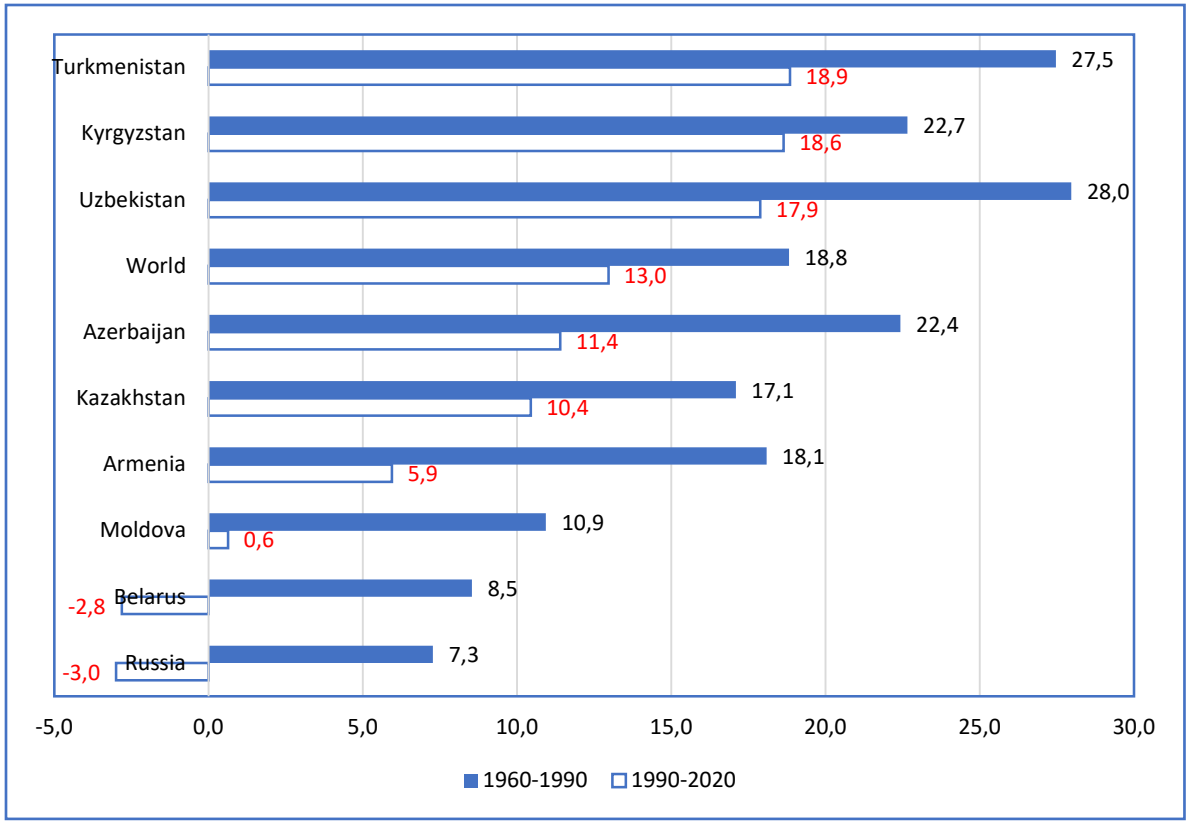
Social and economic modernization		**Demographic transition**
Political and economic crises		Demographic turbulence
Strong historical and cultural differences by ethnic and social groups		Demographic heterogeneity

Population growth and its natural component in the CIS countries

Average annual population growth rate (%)



Average annual rate of natural change (per 1000 population)



Source: UN Population Division (2021)

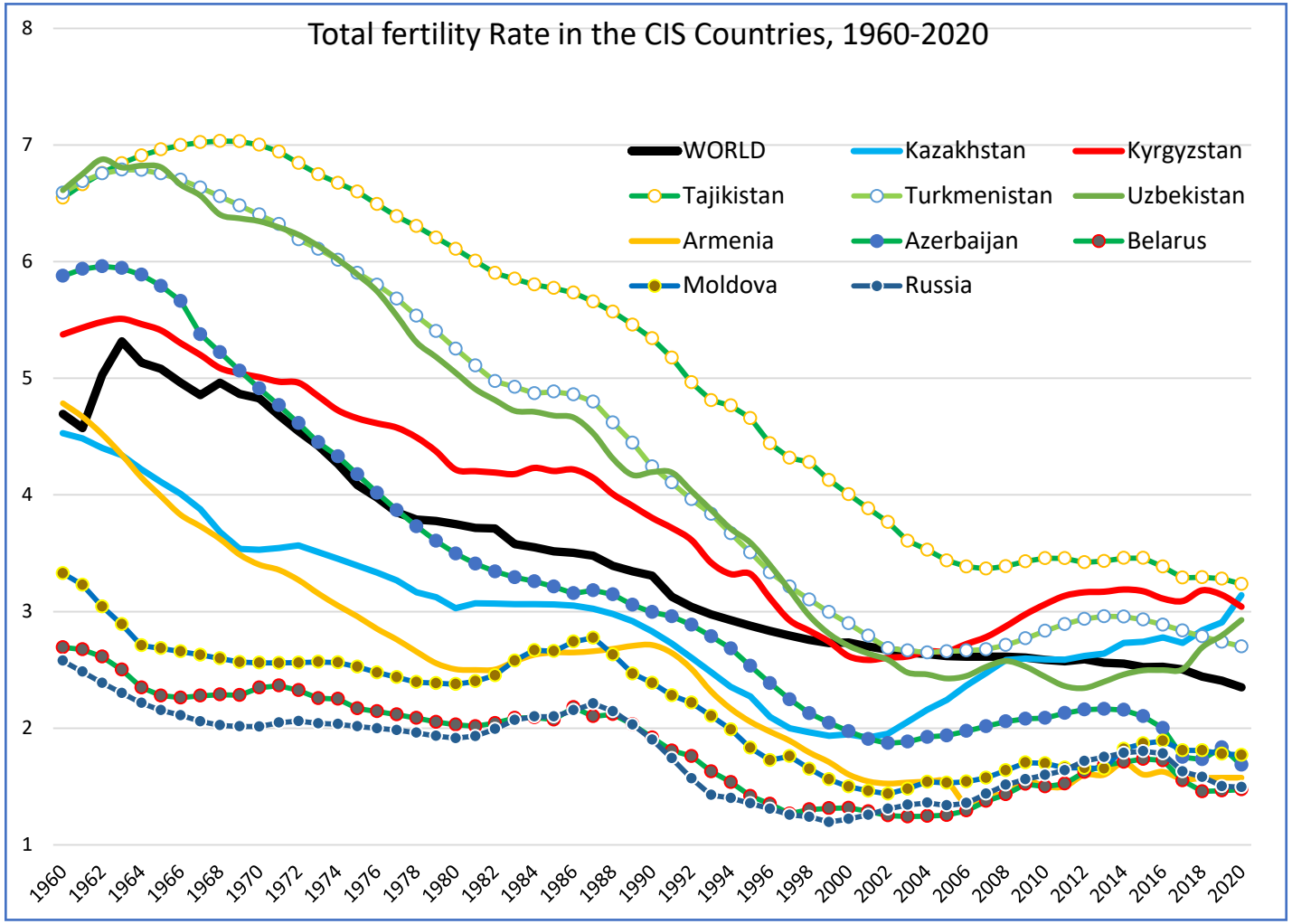
Difference in Fertility

Strong differentiation between countries: 1.5 to 3.3 births per woman in 2019.

Low birth rates in Belarus, Russia, Armenia and Moldova. Azerbaijan is approaching them.

In the countries of Central Asia, fertility is high by modern world standards. A special phenomenon is the growth of fertility in the 2000-2010s.

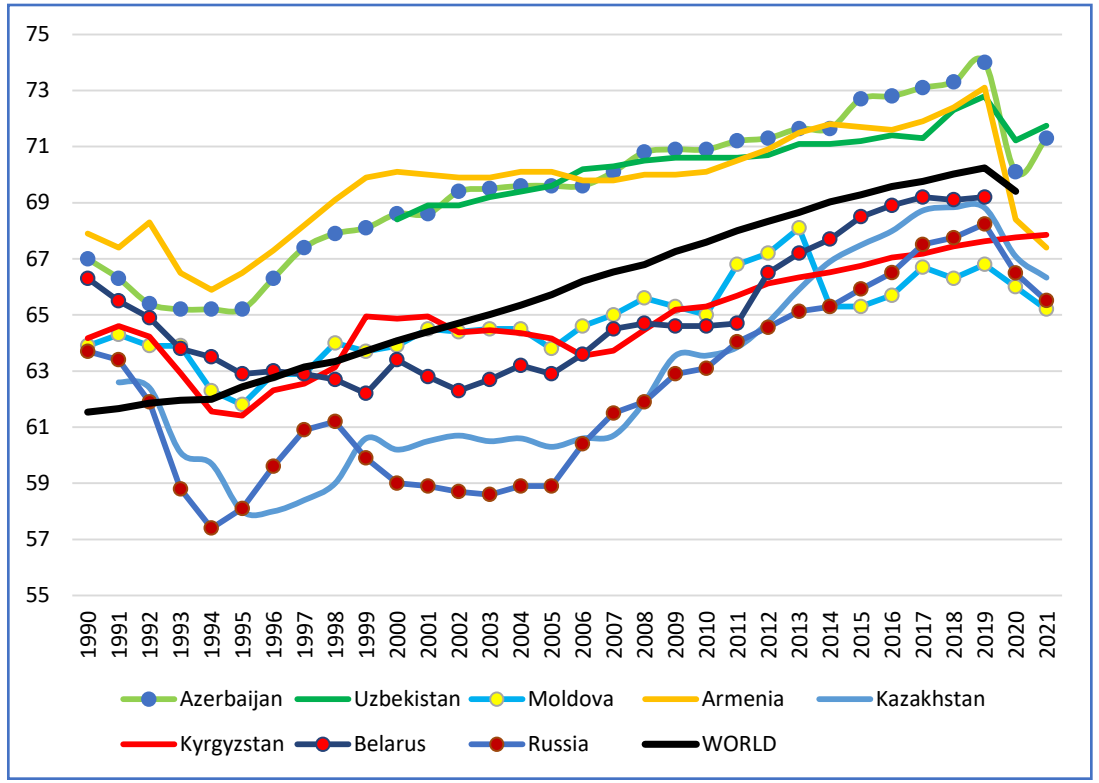
Total Fertility Rate in the CIS Countries, 1960-2020



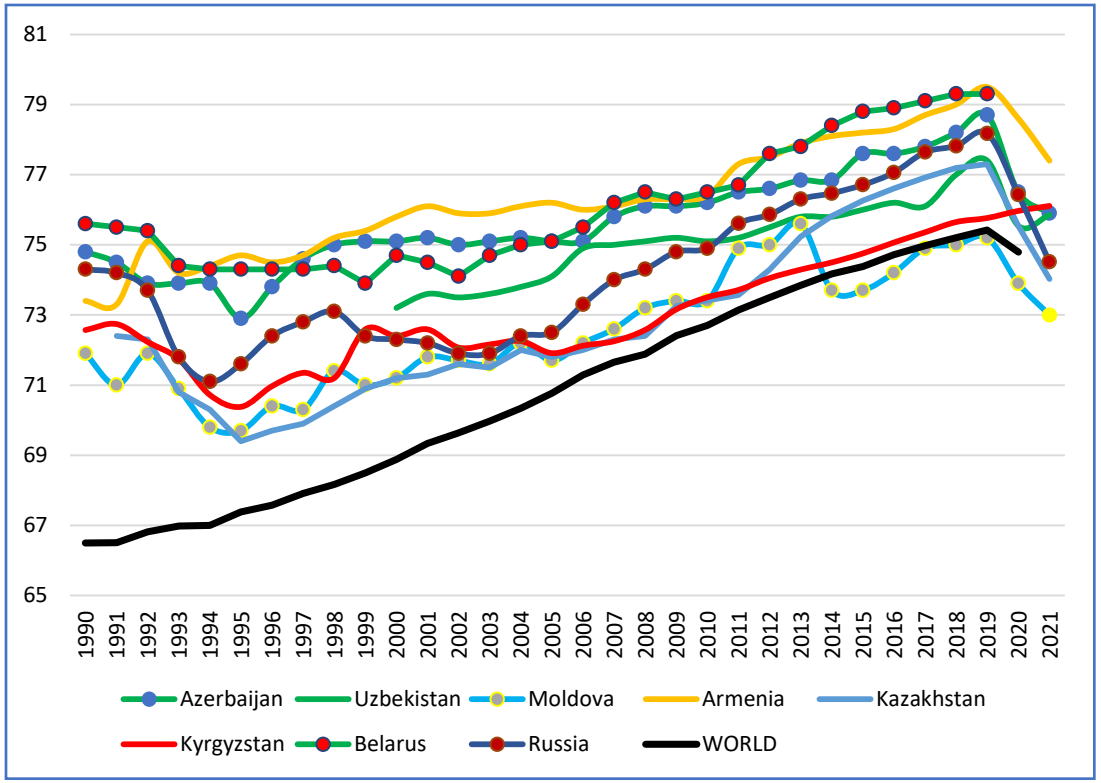
Source: UN Population Division (2021)

Life Expectancy at birth

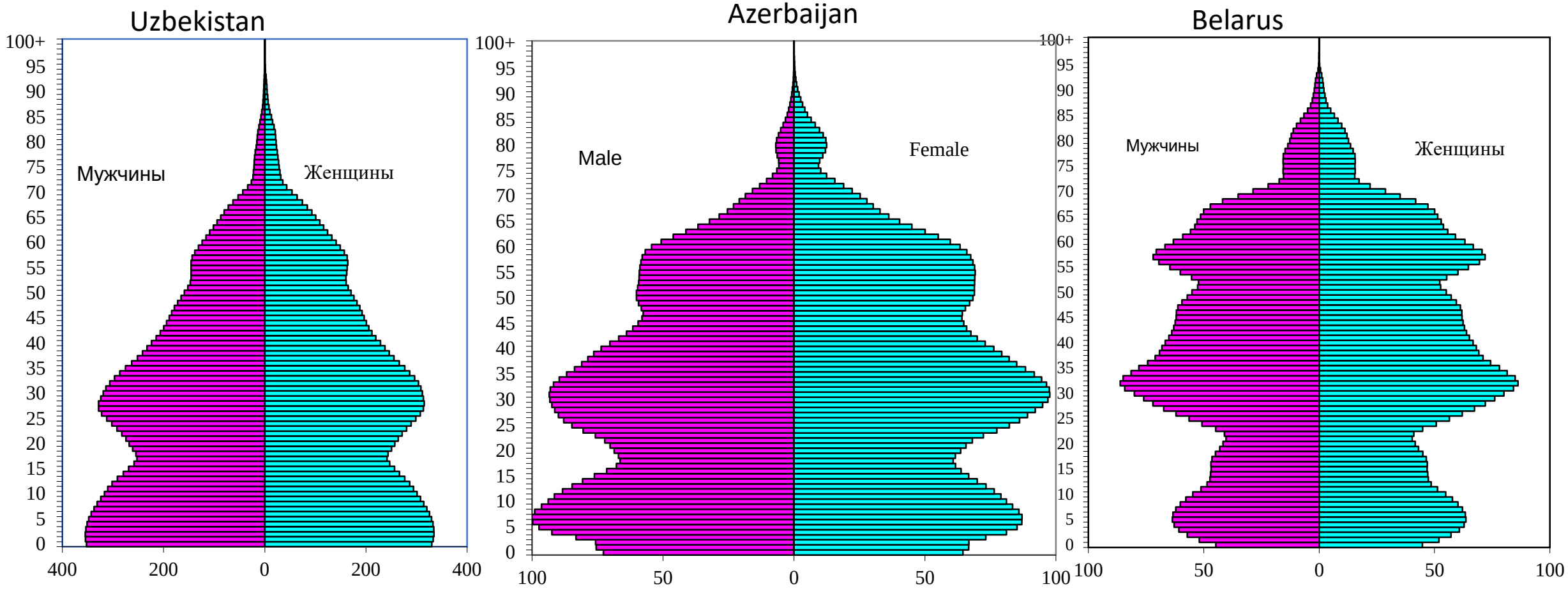
Men - lagging behind the world average



Women - there are reserves for reducing mortality



Age pyramids of Uzbekistan, Azerbaijan, and Belarus, 2020 (thousand people). They Reflect the history, current reproduction differences between the countries and tell us about their future



As a result of the decrease in fertility and mortality, the age composition of the population is changing dramatically

«Window of opportunities»

- In the early stages of the demographic transition, fertility decreases. New generations are numerically inferior to their predecessors. As a result, the share of working-age people in the population is increasing. The share of the elderly remains low.
- As a result of lower birth rates resources are released for investments in physical and human capital. Thus, the age structure is optimized and an opportunity is created for the economy to receive an additional gain or **first demographic dividend.**

Population aging

- At the end of the demographic transition, multiple generations reach older ages. The share of the elderly in the total population increases, first as a result of declining fertility (bottom type aging), then as a result of declining mortality at older ages (top type aging).

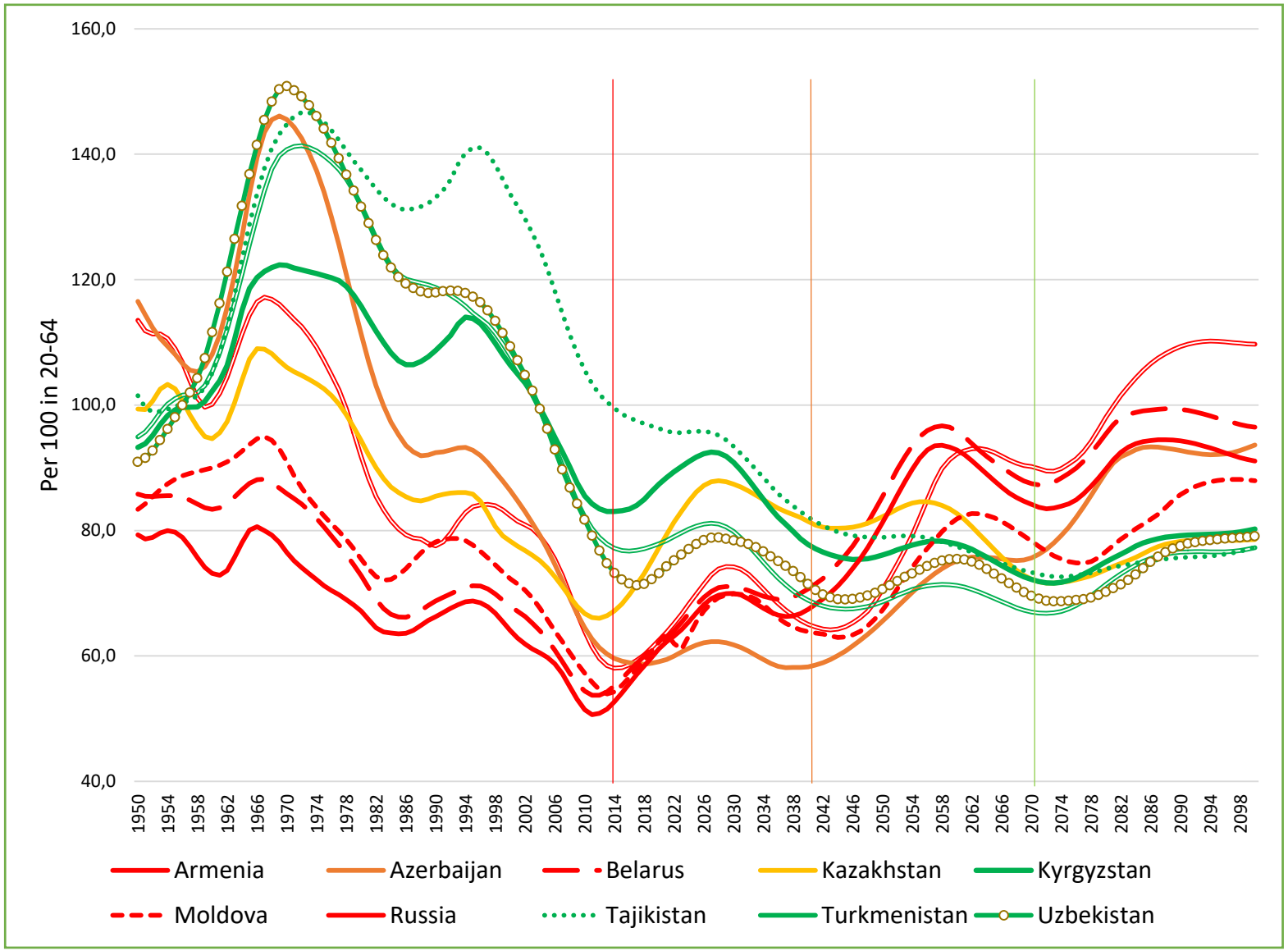
Population aging may lead to more capital per worker. Aging labor force might be less productive or less innovative. However, in future, if the aging of the population is accompanied by the accumulation of wealth by older generations, then the standard of living (consumption) of the population may increase (**the second demographic dividend).**

Total Dependency Ratio ({[0-19]+[65+]}/[20-64]) in the CIS Countries according to the UN Estimation (2021)

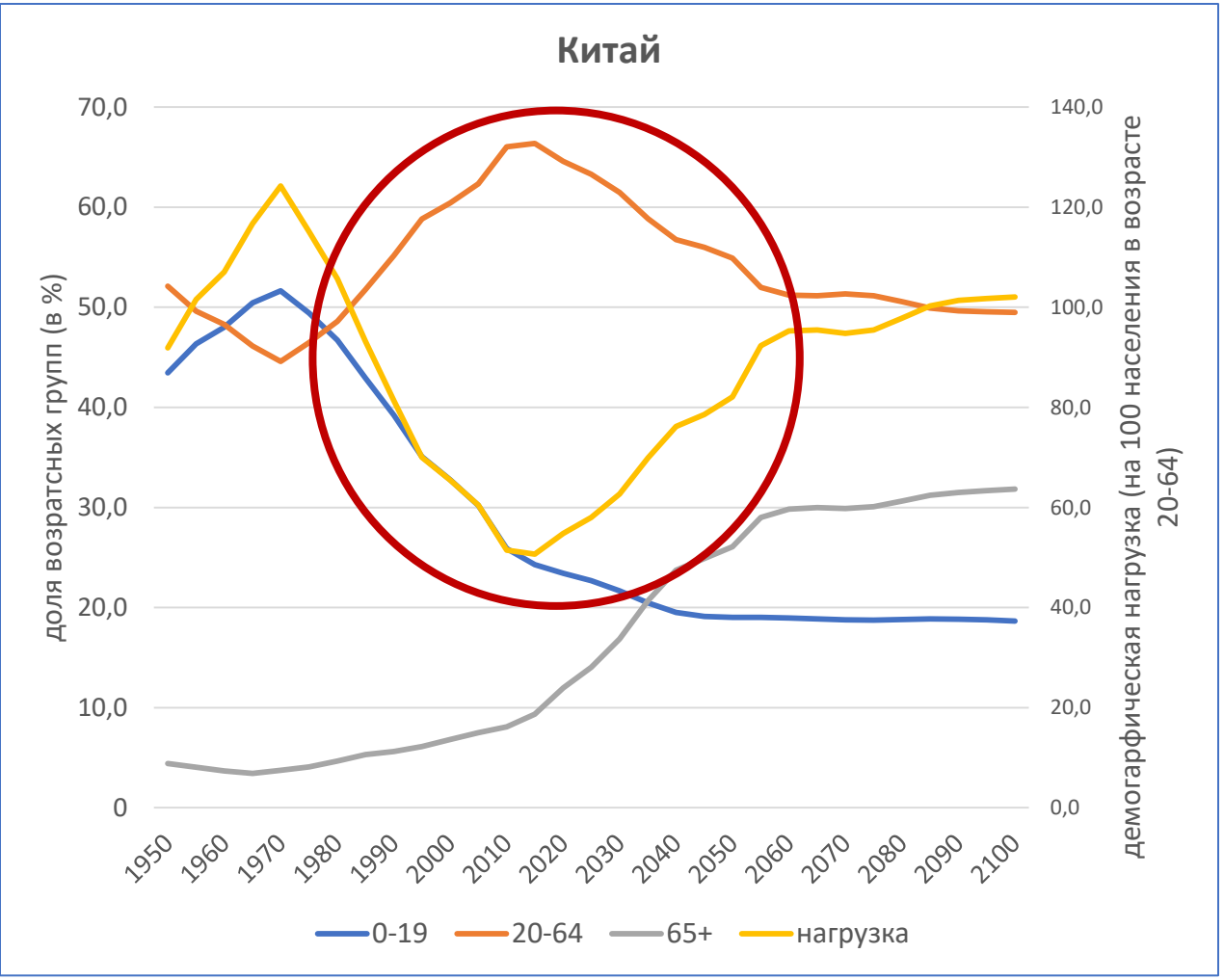
In Armenia, Belarus, Moldova, Russia, the window of opportunities has closed by 2015.
In Azerbaijan, the demographic window will be closed in 2030s.

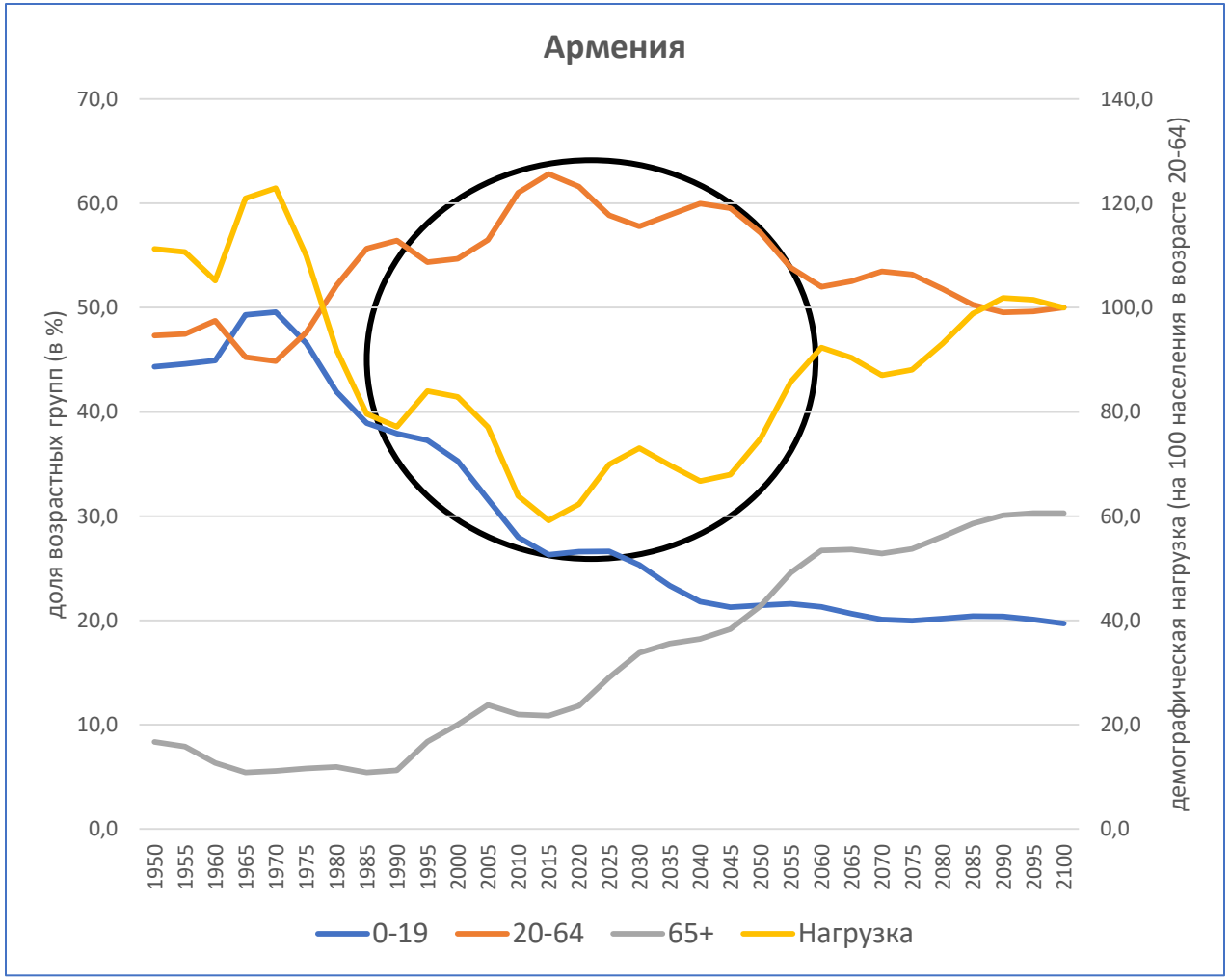
In the countries where the ageing process only begins and fertility declines, the window will close later in the 2070s.

The region is characterized by strong fluctuations in the ratio of demographic burden (especially Kazakhstan).

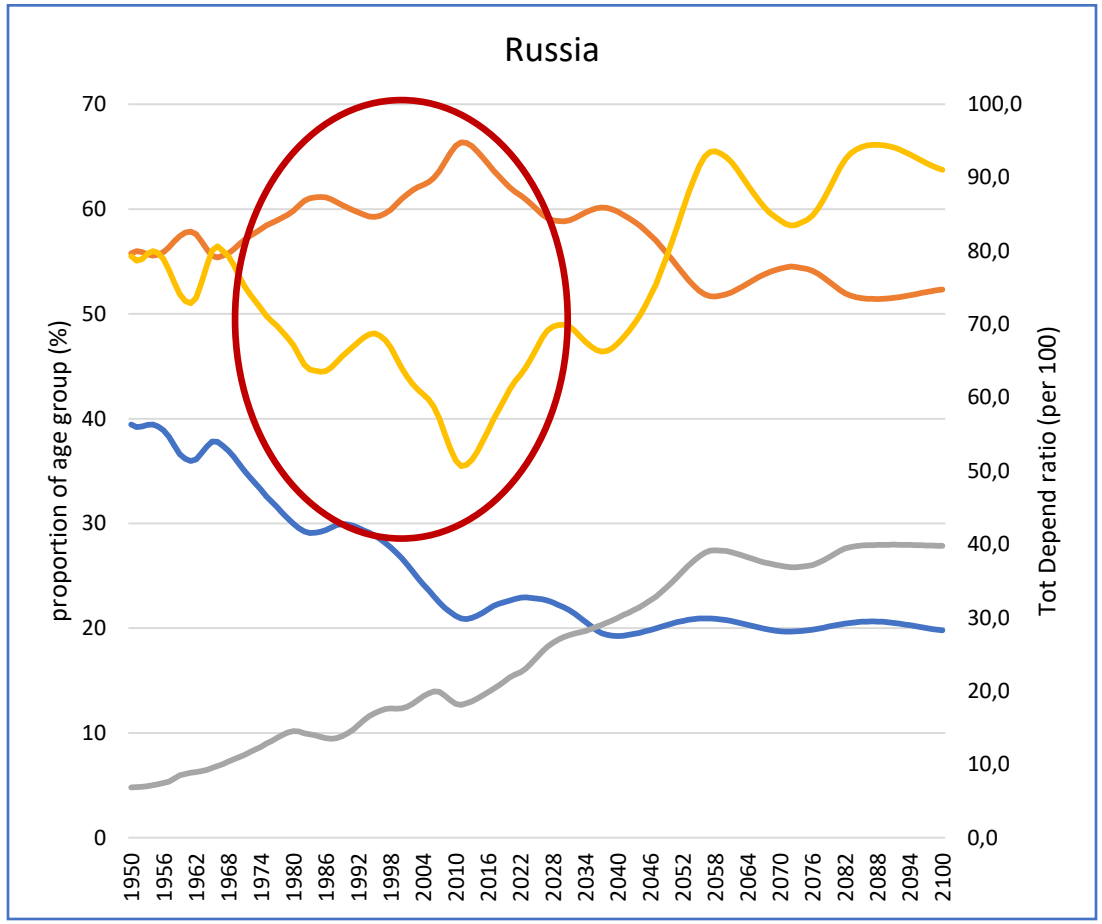


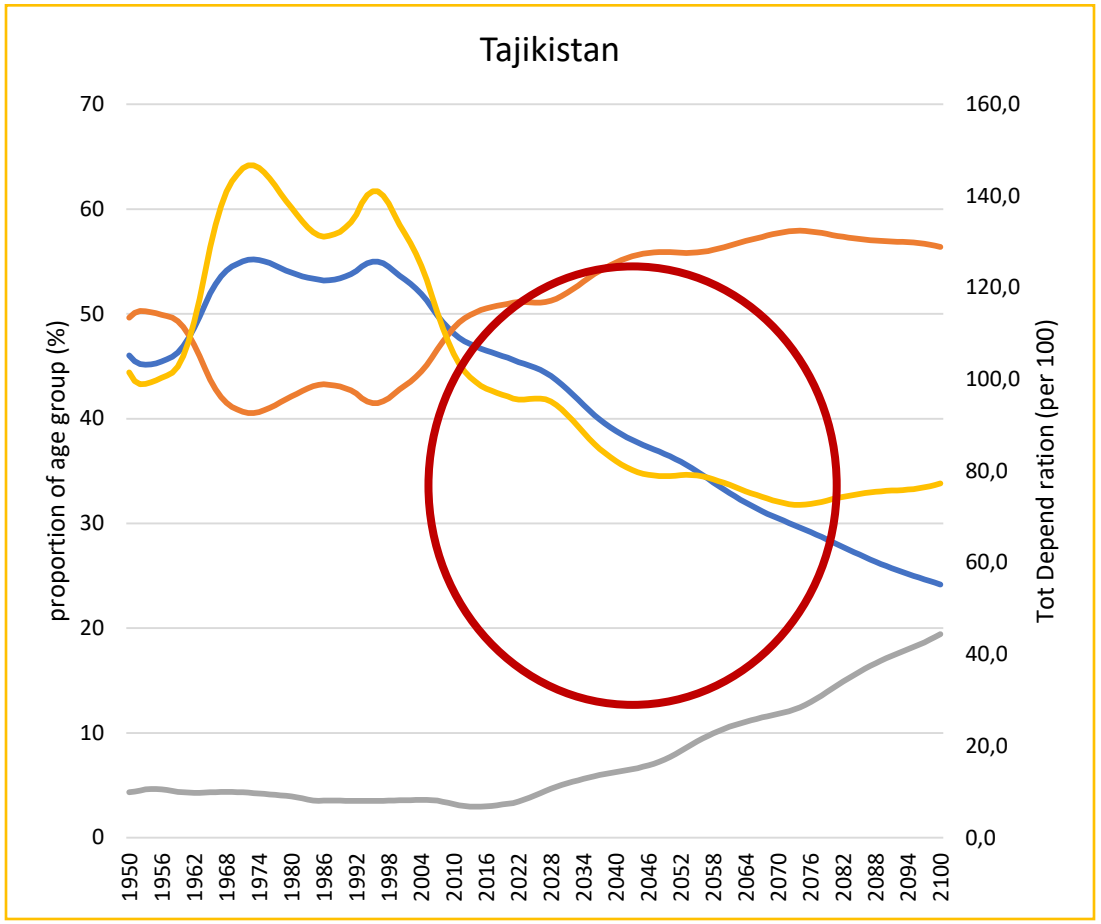
Demographic Window: China and Armenia



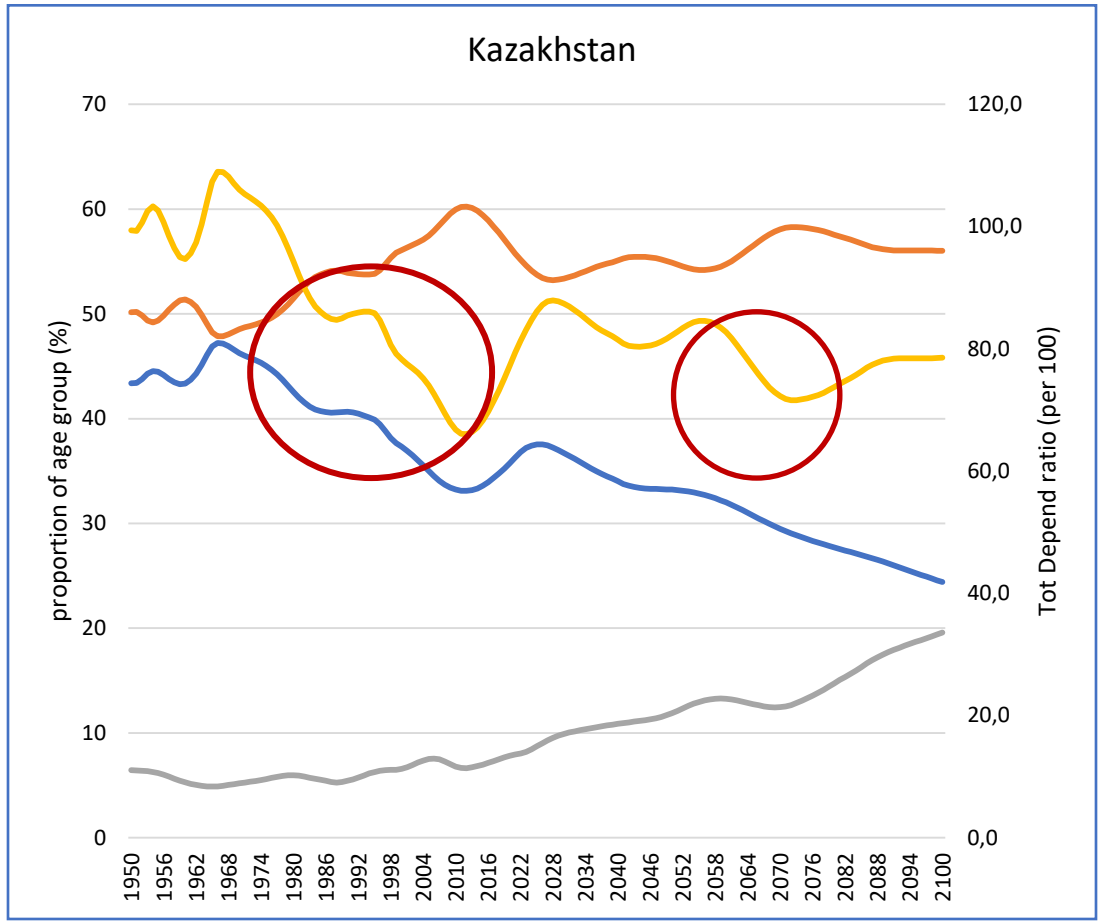


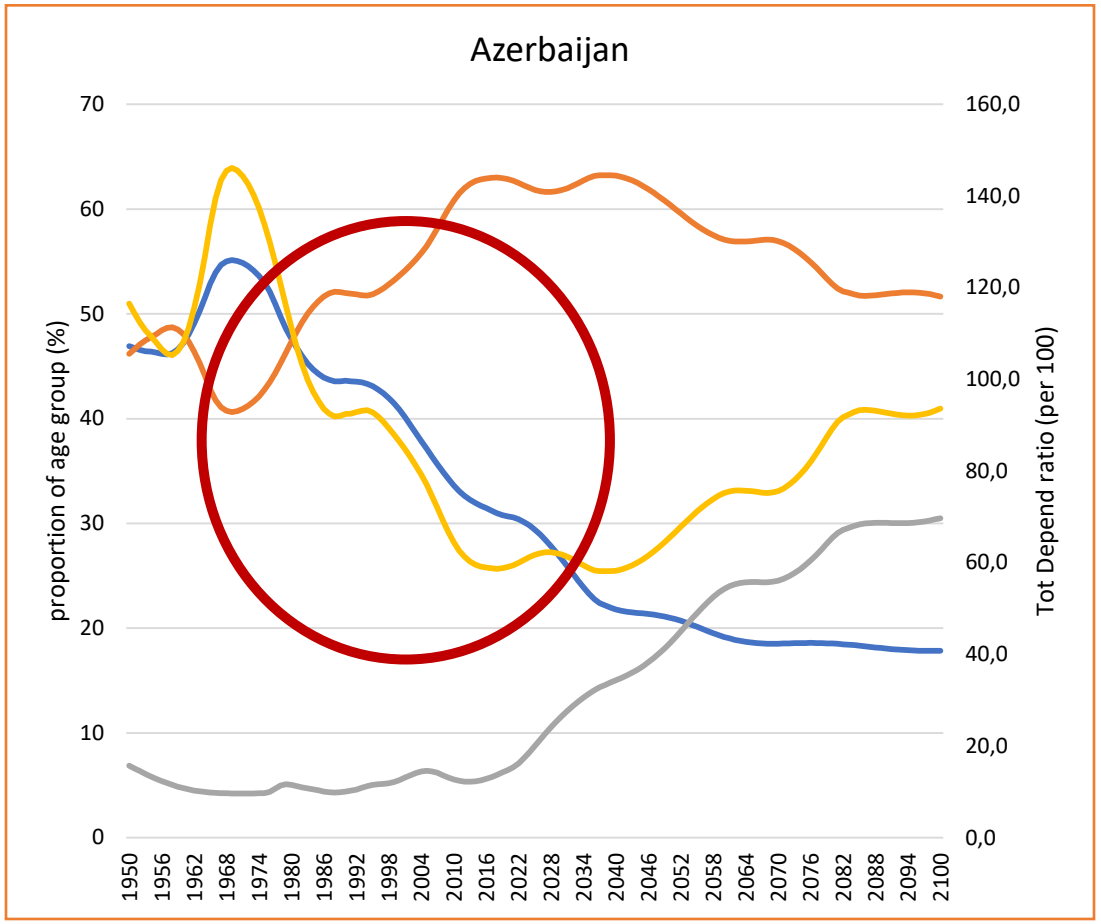
Demographic Window: Russia and Tajikistan





Demographic Window: Kazakhstan and Azerbaijan





National Transfer Accounts is a modern methodology for analyzing the economic consequences of demographic change

- How and by what mechanisms is national income [national wealth, time fund] distributed between generations or age groups?
- To answer this question, the American demographer Ronald Lee and economist Andrew Mason developed the Concept of National Transfer Accounts in the late 1990s.
- The basic NTA indicators are consistent with the macroeconomic aggregates of national accounts (SNA), but there are differences between them:
- In the NTA, the national accounts are broken down by age;
- transfers within families and households, between households, and through the public sector are presented in NTA;
- NTA incorporates time use data and home production by gender (NTTA).
- National accounts, administrative data, and population surveys are used to construct NTA.

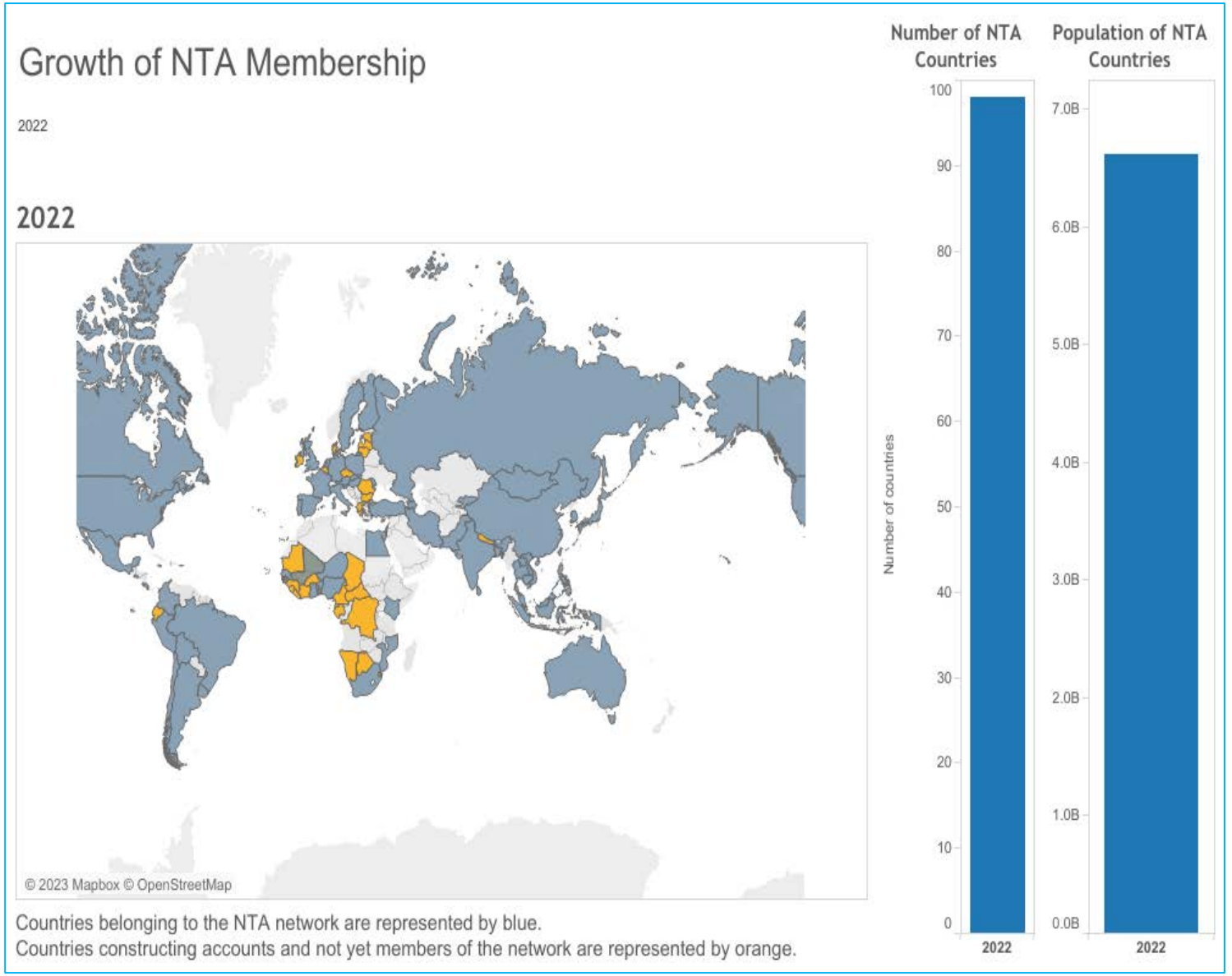
NTA
is an international project

https://www.ntaccounts.org/web/nta/show

The methodology of building national intergenerational accounts has gained international recognition. It has given impetus to the development of Economic demography and Generational economics.

Since 2007, a special project under the auspices of the UN Population Fund is being implemented.

By the end of 2022 about 100 countries participated in the project. Among the CIS countries participating in the project are Azerbaijan, Kyrgyzstan, Moldova, Russia



The Economic Life Cycle - the Central Concept of Generational Economics and NTA

$$\underbrace{Y^l(a) + Y^a(a) + \tau^+(a)}_{\text{inflows}} = \underbrace{C(a) + S(a) + \tau^-(a)}_{\text{outflows}}$$

Life cycle deficit — Age reallocation

$$C(a) - Y^l(a) = \tau^+(a) - \tau^-(a) + Y^A(a) - S(a)$$

Net transfers — Asset based reallocations

C(a) – consumption in age a
$Y^l(a)$ – labour income in age a
$Y^A(a)$ – asset income in age a
$\tau^+(a)$ – transfer inflow in age a
$\tau^-(a)$ – transfer outflow in age a
S(a) – saving in age a

The economic life cycle: the stages a person passes through in terms of the ratio of consumption and income generation (depending on age).

At certain stages of the life cycle, a person's material needs and the opportunities for their satisfaction created by his labor may not coincide.

Thus, there is a shortage of resources for consumption at the stages of childhood and old age, and their excess (surplus) in middle age.

NTA shows how and through what mechanisms resources are redistributed between age groups (generations) to ensure the consumption of those who need them.

NTA in standard format

National transfer accounts, as well as the national ones, are a system of accounts. In the standard NTA are distinguished :

1) life-cycle accounts;
2a) public age reallocation account
3a) private age reallocation account

The elements of the last two accounts can be regrouped into:
(2b) transfer age reallocation account;
(3b) asset-based reallocation account

Annual aggregate flows, (mln Roubles), Russia			Exchange rate US Dollars		64,618 4							
		NEW-2019			age							
Version 1.0			0	1	2	3	4	5	6	7	8	9
Life Cycle Deficit (+) / Life Cycle Supply (-)	LCD	12 264 513	457070	430560	555898	657967	681923	694367	707196	681702	650486	652794
Consumption	C	64 746 927	457070	430560	555898	657967	681923	694367	707196	681702	650486	652794
Public Consumption	CG	20 067 152	251075	208492	302855	380243	390794	392574	393750	363214	336753	331604
Public Consumption, Education	CGE	3 246 664	497	19191	102245	166898	183157	186591	187707	168805	158069	157884
Public Consumption, Health	CGH	3 294 569	117662	47487	46288	46998	38916	37051	37165	31159	24691	23451
Public Consumption, Other than health and education	CGX	13 525 920	132916	141814	154322	166347	168721	168932	168878	163249	153993	150269
Public Consumption, Social Welfare		920 347	860	835	1163	2448	2488	3357	3719	2196	2715	3393
Public Consumption, Other than health and education		12 605 573	132056	140979	153159	163899	166233	165574	165159	161054	151278	146876
Private Consumption	CF	44 679 775	205995	222068	253043	277724	291129	301793	313446	318488	313733	321190
Private Consumption, Education	CFE	375 061	0	3864	15031	18693	20634	21436	20039	16611	13616	12484
Private Consumption, Health	CFH	2 591 292	26015	26947	27718	27650	25930	23846	22058	20129	17909	16686
Private Consumption, Other than health and education	CFX	41 713 422	179980	191258	210294	231381	244565	256511	271349	281748	282208	292020
Less: Labour Income	YL	52 482 415	0	0	0	0	0	0	0	0	0	0
Earnings	YLE	48 488 882	0	0	0	0	0	0	0	0	0	0
Self-employment Labor Income	YLS	3 993 533	0	0	0	0	0	0	0	0	0	0
Age Reallocations	R	12 264 513	457 070	430 560	555 898	657 967	681 923	694 367	707 196	681 702	650 486	652 794
Net Transfers	T	-657 329	429 205	419 378	549 439	661 211	684 366	697 394	711 132	685 240	653 638	647 075
Public Transfers	TG	134 779	245 551	203 610	297 343	375 471	380 309	381 296	382 700	351 617	326 859	315 944
Public Transfers, Inflows	TGI	33 882 720	285126	246270	345944	428805	436208	439234	442868	412746	387070	377582
Public Transfers, Outflows	TGO	33 747 940	39575	42659	48601	53334	55899	57938	60168	61129	60211	61637
Public Transfers, Education	TGE	0	-3310	15087	97569	161767	177779	181017	181919	162924	152276	151954
Public Transfers, Education, Inflows	TGEI	3 246 664	497	19191	102245	166898	183157	186591	187707	168805	158069	157884
Public Transfers, Education, Outflows	TGEO	3 246 664	3807	4104	4676	5131	5378	5574	5788	5881	5792	5930
Public Transfers, Health	TGH	0	113798	43323	41543	41792	33459	31395	31291	25192	18813	17434
Public Transfers, Health, Inflows	TGHI	3 294 569	117662	47487	46288	46998	38916	37051	37165	31159	24691	23451

SHORT VERSION OF NTA, RUSSIA, 2019

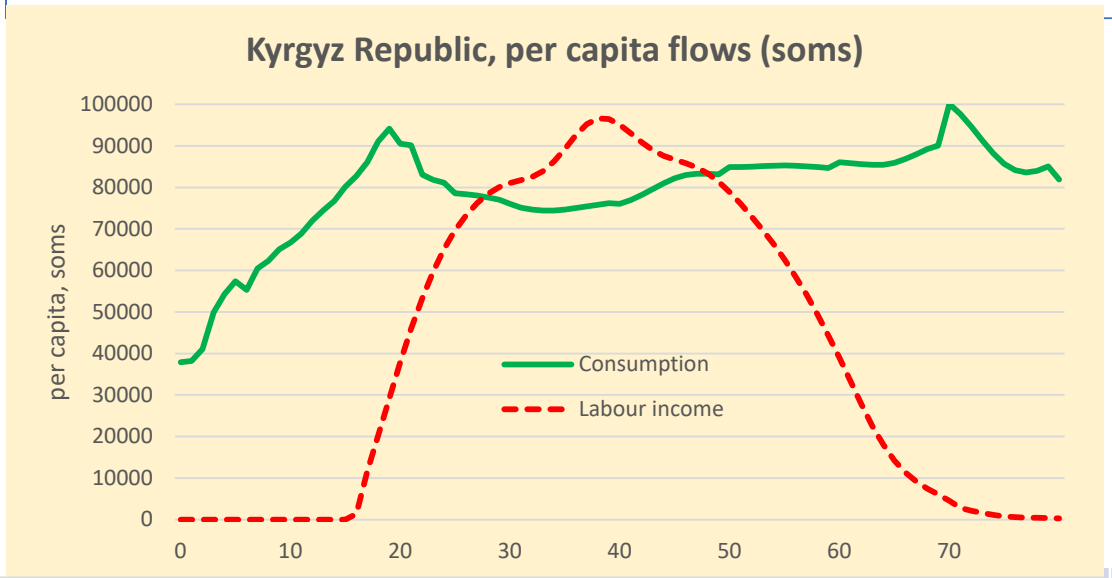
AGGREGATE ACCOUNT

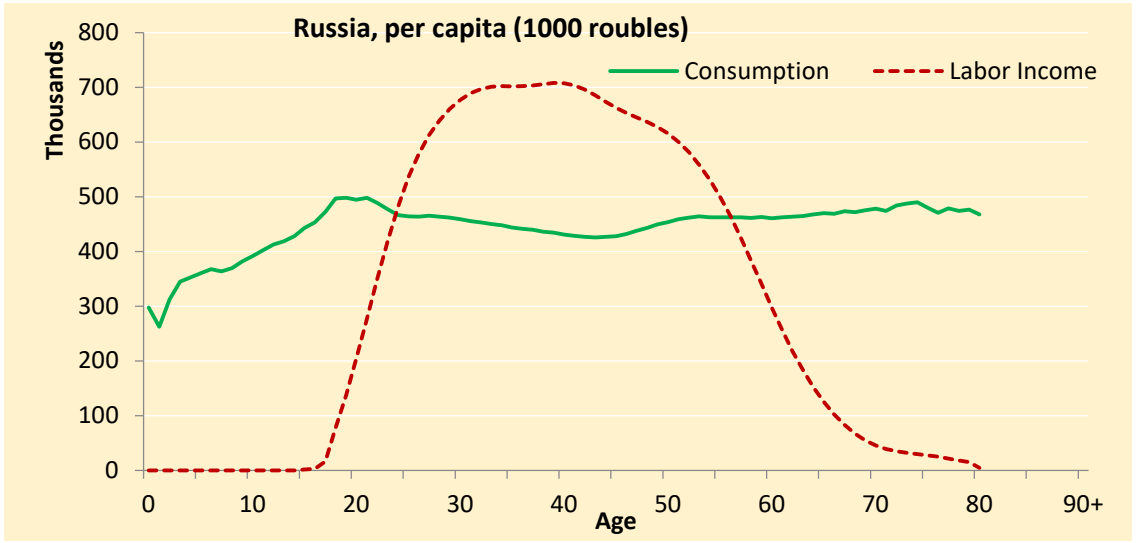
Indicator	BILLION ROUBLES			
	Total	**0-19**	**20-64**	**65+**
Lifecycle Deficit	12264.5	12432.4	-9739.7	9571.8
Consumption	64746.9	12750.0	41420.3	10576.6
Labour income	52482.4	317.7	51160.0	1004.8
Transfers	-657.3	12200.9	-16800.8	3942.6
Public	134.8	5921.7	-10444.0	4657.0
Private	-792.1	6279.2	-6356.9	-714.4
Asset-based Reallocations	12921.8	231.4	7061.2	5629.2
Public Asset Income	6767.6	273.9	5673.7	820.1
Public Saving	6526.4	264.1	5471.5	790.9
Private Asset Income	21099.3	114.8	16701.9	4282.6
Private Saving	8418.6	-106.9	9843.0	-1317.4

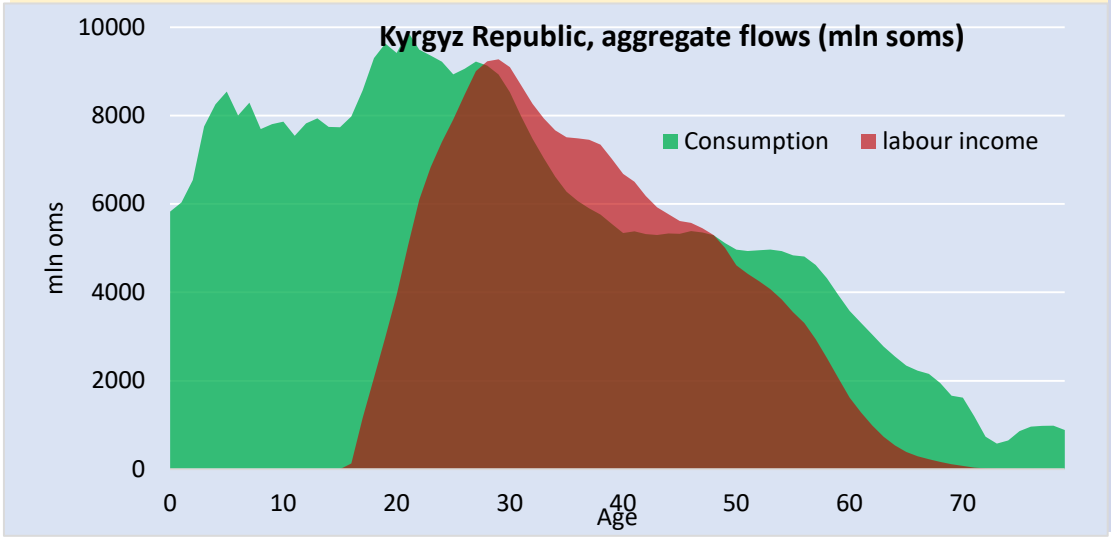
PER CAPITA

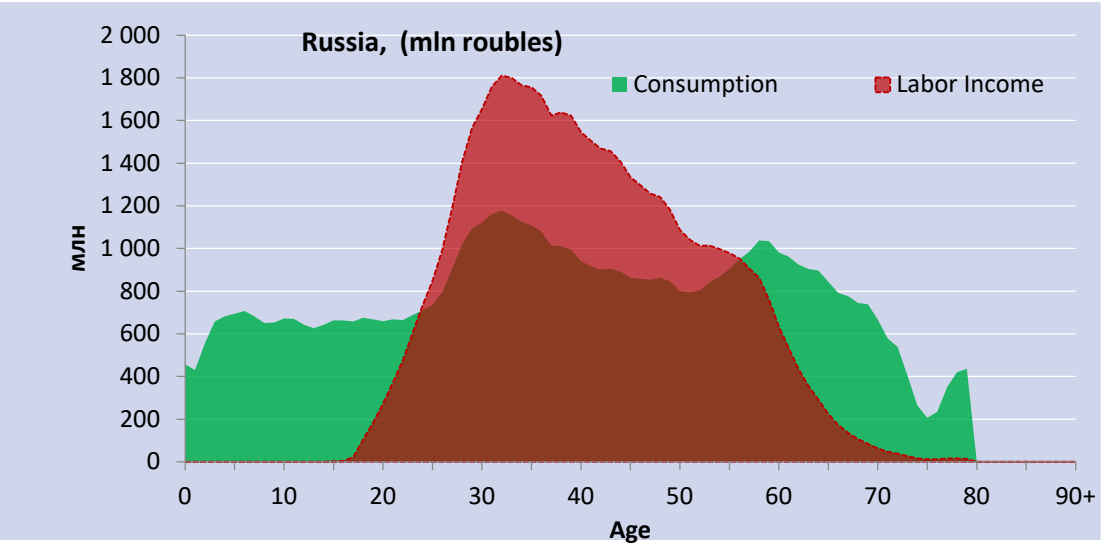
Indicator	ROUBLES			
	Total	**0-19**	**20-64**	**65+**
Lifecycle Deficit	83565.8	376806.1	-106522.5	428508.7
Consumption	441161.6	386434.3	453012.1	473490.2
Labour income	357595.7	9628.2	559534.6	44981.5
Transfers	-4478.8	369791.6	-183750.2	176501.1
Public	918.3	179479.5	-114225.6	208484.0
Private	-5397.1	190312.1	-69524.6	-31983.0
Asset-based Reallocations	88044.6	7014.5	77227.7	252007.6
Public Asset Income	46112.1	8300.1	62052.8	36713.5
Public Saving	44468.5	8004.3	59841.1	35405.0
Private Asset Income	143762.7	4255.5	185060.9	180779.9
Private Saving	57361.5	-3239.4	107652.1	-58978.5

Economic life cycle, consumption and labour income in Kyrgyz Republic (2017) and Russia (2019)

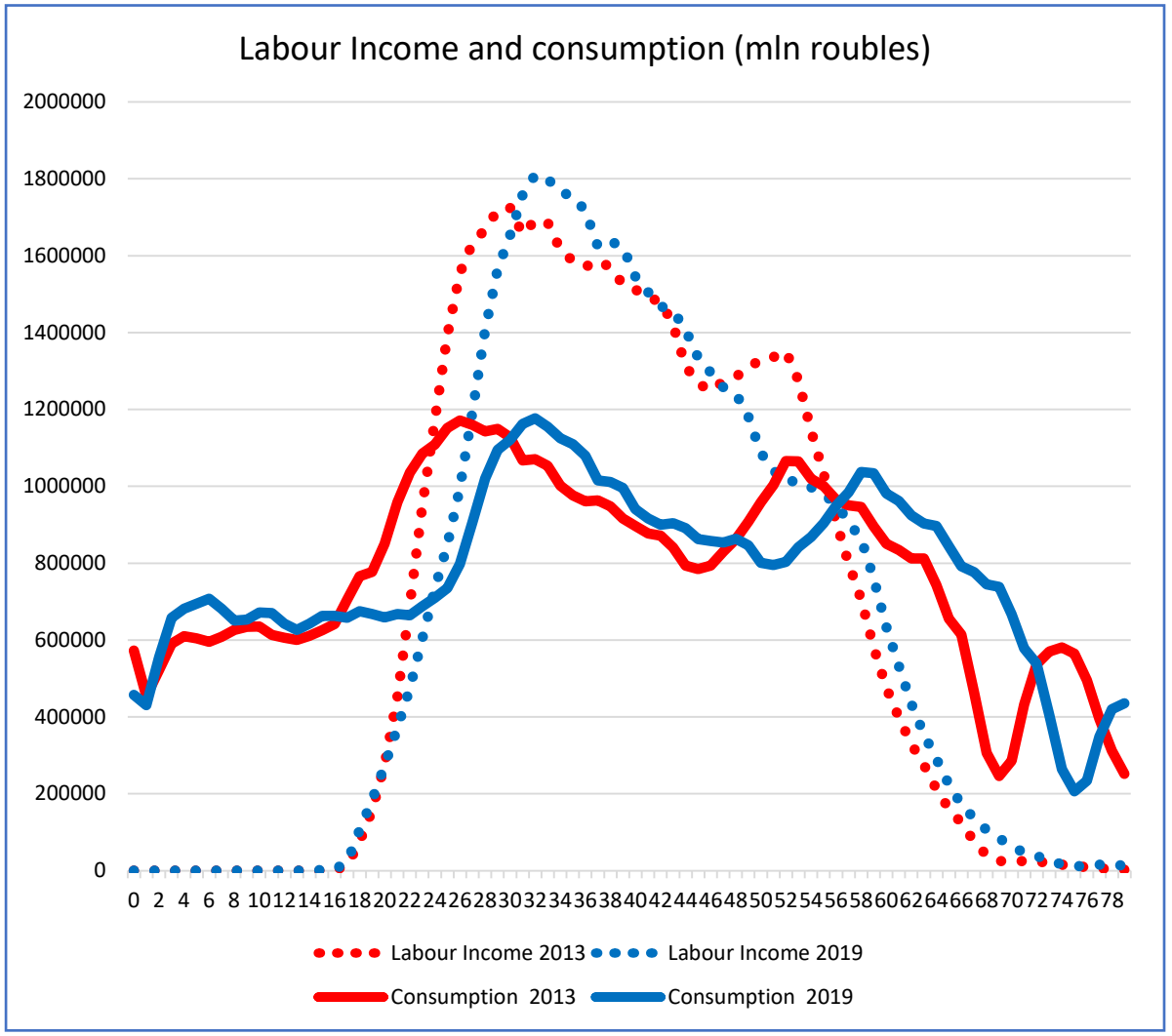








ESTIMATING THE IMPACT OF CHANGES IN AGE COMPOSITION ON LABOR INCOME AND CONSUMPTION AGGREGATES BETWEEN 2013 AND 2019



Decomposition of total consumption and income increase by two components: changes in age structure and age profile (mln roubles)

Changes	Consumption	Income	LCD
Increase	424.8	-1744.8	2169.6
Population age structure	1262.1	-950.8	2212.9
Age profiles (labour income and consumption)	-837.3	-794.0	-43.3

SOURCES OF CONSUMPTION OF PERSONS AGED 65 AND OLDER IN SOME COUNTRIES (IN %)

Countries	Labour Income	Private transfers	Public transfers	Asset-based income
India (2004)	27	1	2	70
China (2007)	20	16	45	19
South Africa (2005)	11	-23	0	112
USA (2011)	24	-4	28	52
Japan (2004)	12	0	51	37
France (2011)	3	-7	71	32
Germany (2008)	3	-10	56	51
Sweden (2003)	6	-12	99	6
Hungary (2010)	5	2	62	31
Russia (2013)*	**7**	**-7**	**54**	**46**
Russia (2019)*	**10**	**-7**	**44**	**53**

Sources: * author estomations, National Transfer Accounts data, 2016

SOURCES OF CONSUMPTION OF PERSONS AGED 0-19 YEARS IN SOME COUNTRIES OF THE WORLD (IN %)

Страны	Трудовой доход	Частные Трансферты	Общественные трансферты	Активы
India (2004)	22	66	7	5
China (2007)	48	66	20	-34
South Africa (2005)	1	55	42	2
USA (2011)	13	43	38	6
Japan (2004)	14	50	33	3
France (2011)	17	46	44	-7
Germany (2008)	18	41	40	2
Sweden (2003)	18	42	38	3
Hungary (2010)	2	45	52	1
Russia (2013)*	**2**	**49**	**48**	**1**
Russia (2019)*	**3**	**49**	**46**	**2**

Sources: * author estomations, National Transfer Accounts data, 2016

The "effective" support ratio is a relevant measure of the impact of changes in the age structure on the economy

Demographic support ratio

The ratio of the population aged 20 to 64 years to the sum of the population aged 0 to 19 years and 65 years and older.

The contingent boundaries are clearly defined

The "effective support“ ratio

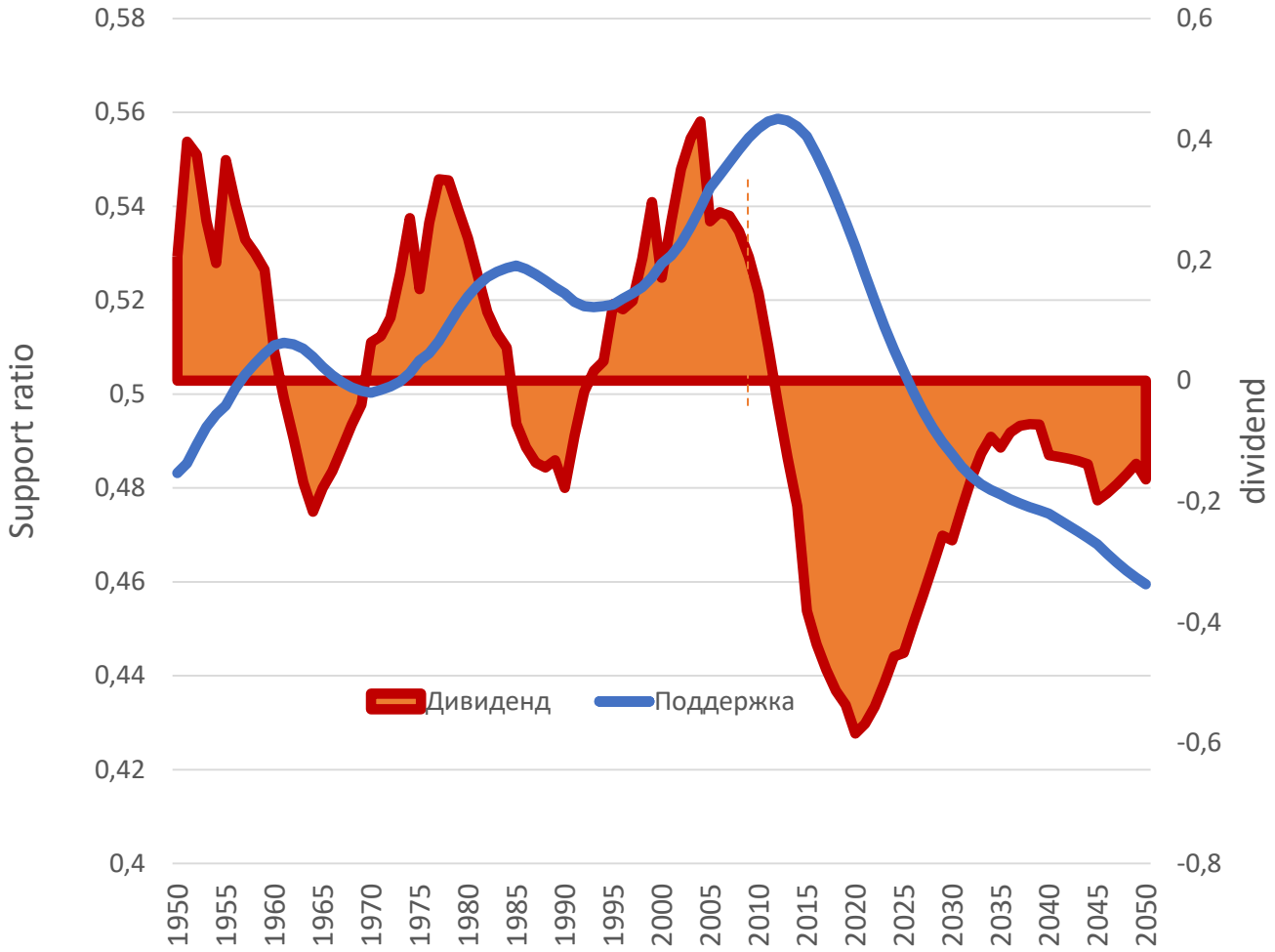
- $SR = \frac{effective\ workers}{effective\ consumers}$
- $SR = \frac{\sum P(x)\hat{y}(x)}{\sum P(x)\hat{c}(x)}$,

Где P(x) – Population at age x,

$\hat{y}(x)$ – normalized per capita income at age x (the ratio of income at age x, to the average income at ages 30 to 49),

$\hat{c}(x)$ – normalized per capita consumption at age x (the ratio of income at age x to average consumption at ages 30 to 49).

SUPPORT RATIO (LINE) AND DEMOGRAPHIC DIVIDEND (AREA) IN PERCENT PER YEAR FOR RUSSIA, 1950-2050



Economic growth depends on productivity gains and the rate of growth of the SR support ratio

$$gr\left[\frac{Y(t)}{N(t)}\right] = gr\left[\frac{Y(t)}{L(t)}\right] + gr[SR(t)]$$

The first dividend is calculated as the growth rate of the support ratio. With productivity unchanged, it measures the contribution of changes in the age structure to economic growth.In calculating the demographic dividend, the age profiles of consumption and income are assumed unchanged.

CONCLUSION

- Demographic changes that overturn the age pyramid radically change the basis of social organization. The CIS countries are no exception in this respect.
- The National Transfer Accounts (NTA) methodology is proposed to assess the economic impact of these changes (including the first and the second demographic dividends).
- This NTA methodology is continuously being improved. In addition to analyzing intergenerational economic flows for a given period :
- NTA are constructed for specific socio-demographic groups (gender, urban-rural, education)

➢ NTA include national time transfer accounts (NTTA)

➢ NTA are built for real cohorts

➢ NTA are expanded to include wealth (inheritance) accounts

➢ NTA results are used in macroeconomic analysis and forecasting, as well as in the development of socio-economic policies to take demographic factors into account.

This methodology can improve the quality of human development decision-making in the CIS countries.