HEALTH FINANCING CONSTRAINED BY POPULATION AGING – AN OPPORTUNITY TO LEARN FROM JAPANESE EXPERIENCE

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FINANSIRANJE ZDRAVSTVENE ZAŠTITE U USLOVIMA STARENJA POPUALCIJE - PRILIKA DA UČIMO NA JAPANSKOM ISKUSTVU

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The Global Aging of Nations

Population aging is a rather new phenomenon in historical demography (1). It initially began with increased life expectancy at birth followed by decreasing female fertility rates among the most developed countries. While its earliest shy roots were visible more than century ago (2), in most high income regions of the world, the phenomena started to attract academic and public attention only in the 1980's. Clearly one driving factor was the technological revolution in medicine, which succeeded in saving lives from many acute illnesses and controlling many chronic illnesses. The other factor is the changing social role of women; after decades of economic growth after the WWII, the economy started to absorb women from home to work places, giving them higher incentives to work, get education and have a job career, or, paying them to have less children.

Although the increased life expectancy and falling fertility had been observed in almost all the high income countries in the last quarter of XX century, some countries have been affected more than the others. Japan was one of those countries; it has the combination highest life expectancy and one of the lowest fertilities. Due to the success of its universal health insurance and aggressive public health policies, since 1980, the country has been consistently at the top of the life expectancy list of the world. Its fertility has started to dip noticeably in the second half of 1980's, and its TFR has been around 1.3 for the last several years. As a result, it has the most aged population that has been declining for almost a decade. During this period, it has been struggling to find ways to restore its fertility rates, and to pay for the mounting public pension costs and the health care costs.

Population aging among today's fast developing and emerging markets came with many decades delay mostly during last quarter of XX century (3). Up to date it is broadly accepted that this demographic change is common even among middle income developing nations (4). By far the most typical pattern of policy induced rapid aging among the communist countries belong to China and its one child policy (5). One of the picturesque sayings says that some of the Third World nations actually succeeded to become old even before they became fully developed and mature economies.

The case of population aging in Eastern Europe and the Balkans traces its causes in socialist policies of Cold War era. In this region total fertility threshold fell beneath 2.1 (children per female) mostly after the 1980`s (6). Socioeconomic transition taking place since 1989 actually worsened negative demographic trends in the region (7). Some recent public health successes of strategies designed to combat aging happened among the leading emerging BRICs economies mostly during the past decade (8).

Age Profile of Health Care Costs

There has been some strong disagreements particularly in the US regarding the practical importance of aging in explaining the increase in health care costs (9), but there is little doubt that aging contributes to increase health care costs; "In developed countries, where acute care and institutional long-term care services are widely available, the use of medical care services by adults rises with age, and per-capita expenditures on health care are relatively high among older age groups. Accordingly, the rising proportion of older people is placing upward pressure on overall health care spending in the developed world, although other factors such as income growth and advances in the technological capabilities of medicine generally play a much larger role." (10).

The per-capita health care costs by age-groups

Unlike the US which has a significant private health care market, 99% of Japanese health care goods and services are produced and consumed within the public health insurance framework. Prices have been tightly controlled,

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and introduction of new technologies have been regulated until the government is sure that public insurance can pay for them. The health care costs of a few months preceding death, for example, is a fraction of what they are in US. Moreover, for almost for two decades, there has been little income growth. In the ten year period between 2002 and 2012, however, the national health care costs increased from 30.95 trillion yen to 39.21 trillion yen, or almost 27 % increase. Clearly, it has been the population aging that drove the costs in Japan.

Let us first look at the empirical relationship between the per-capita health care costs and the age of a population. Presumably it is affected by a number of factors; the underlying health capital stock at different ages, relative costs of health care services, and access to health care services. Figure 1 shows the annual per-capita health care costs by five-year age group in 2012 Japan below age 65 (11). Since these costs are calculated from the public health care insurance benefits data, they are very precise, although they exclude two important items of the OECD accounting base; maternity related services and long-term care services.

It is hard to find age-profile data for per capital health care costs in other countries; in fact, the only one we could find was Yamamoto data for the US (12). Since the effect excluding long-term care services can be very significant beyond age 65, we limit the comparison below the age 65. The dashed line in Figure 1 represent the age-class profile for the US. In spite of the huge difference in the structure of the health care systems, we find the age-profiles of the two countries are surprisingly similar, once we control for the difference in the levels of health care costs. Moreover, part of the difference between the two countries may be due to the exclusion of maternity costs in Japanese data. This probably means that while the prices of medical goods and services may be much higher in the US, the underlying medical technologies or knowledge governing demand side and the supply side are still common. For example, parents take their children to the doctors in similar situations, seek medical help for themselves in response to similar health shocks, and do not encounter significant rationing in health care services in these age groups.

Unfortunately, it is much harder to compare the per-capita health care costs beyond age 65, as long term care costs no longer can be ignored. Moreover, the line between the medical care and long-term care is very fuzzy, varying from one country to another. Also in the long-term care, since the role of public services may be vary greatly from one country to another, we will stay away from the comparison of the two countries beyond age 65.

The Survival Probability and Age Profile of Lifetime Healthcare Costs

Suppose two countries have the same average health care costs and the age profiles of the per-capita healthcare costs. It still could happen that the two countries could have a different size distribution of health care costs across age-groups, if the life expectancies in the two countries are different. Particularly, given the U shaped age-profile of average health care costs, the country with a longer life expectancy will have more elderly population who consume more healthcare, and hence will consume more proportion of total health care. For this reason, in computing age profile of lifetime healthcare costs, we have to take into account the survival probabilities to given ages.

The second column of Table 1 represents the per-capita average health care costs in thousand yen (or about 10 dollars). The third column represents the unisex survival probability of an average Japanese at each age class. For simplicity, we have computed the square root of the product of male and female survival probabilities at the midpoint age of each age-class in the 2012 Life Tables (13) as our unisex survival probability of the age-class. The fourth column shows the product of the second and third columns, or their expected values for an individual of a given age in the group, multiplied by a factor of 5. Notice that as each age-class represents 5 different ages, and an individual is going to stay in a given age-class cell for five years, the expected value the product of health care costs and survival probability must be multiplied by 5. By summing the entries of our fourth column, we the average lifetime health care expenditure of 25,253 thousand yen.

Of particular interest for us is the age distribution of the lifetime health care costs, for which we have computed the cumulative costs and the proportion in the fifth and sixth column of the table. From the sixth column, we can see that an individual has spent only 42% of the lifetime costs before he/she reaches age 65. In other words, he/she is yet to spend the remaining 58% after the age 65, almost half of which he/she will spend in the ten-year period of ages 65-74. Clearly this heavy spending in the last two or three decades is the core of our financing problem in the health care of the elderly, particularly in view of the age distribution of lifetime income.
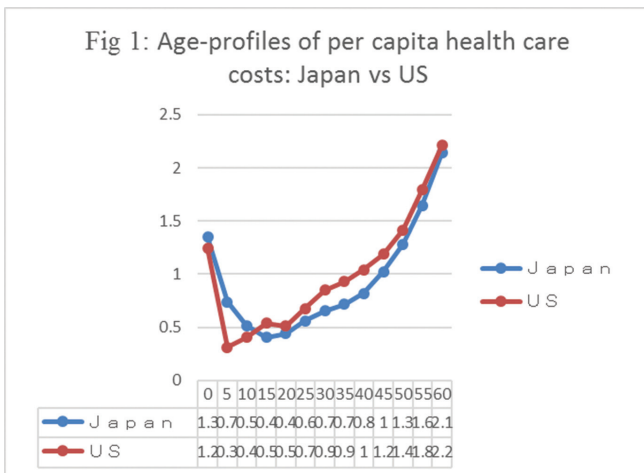

Fig 1: Age-profiles of per capita health care costs: Japan vs US

	0	5	10	15	20	25	30	35	40	45	50	55	60
Japan	1.3	0.7	0.5	0.4	0.4	0.6	0.7	0.7	0.8	1	1.3	1.6	2.1
US	1.2	0.3	0.4	0.5	0.5	0.7	0.9	0.9	1	1.2	1.4	1.8	2.2

Figure 1. Age-profiles of per capita health care costs: Japan vs US (the annual per-capita health care costs by five-year age group in 2012 in Japan and the US below age 65)

Table 1. Lifetime Health Care Costs and Lifetime Income (per capita average health care costs in 1000 ¥ (∞10 $))

|	Per Capita Health Care Costs (2012)	Unisex Survival Probability	Five Year Period Health Care Costs	Cumulative Health Care Costs	Cumulative Health Care Costs (%)	Per Capita Income (2013)	Five Year Period Income	Cumulative Income	Cumulative Income (%)
0 ~ 4	¥236	0.997	¥1,178	¥1,178	0.05				
5 ~ 9	¥129	0.997	¥644	¥1,822	0.07				
10 ~ 14	¥92	0.997	¥457	¥2,279	0.09				
15 ~ 19	¥73	0.995	¥362	¥2,640	0.10				
20 ~ 24	¥79	0.994	¥393	¥3,034	0.12	¥170	¥8,444	¥8,444	0.06
25 ~ 29	¥102	0.992	¥503	¥3,537	0.14	¥170	¥8,427	¥16,871	0.13
30 ~ 34	¥119	0.989	¥587	¥4,124	0.16	¥173	¥8,559	¥25,430	0.20
35 ~ 39	¥130	0.987	¥642	¥4,766	0.19	¥173	¥8,538	¥33,968	0.27
40 ~ 44	¥148	0.982	¥727	¥5,493	0.22	¥198	¥9,741	¥43,709	0.35
45 ~ 49	¥181	0.976	¥882	¥6,375	0.25	¥198	¥9,677	¥53,386	0.43
50 ~ 54	¥229	0.966	¥1,104	¥7,479	0.30	¥247	¥11,934	¥65,320	0.52
55 ~ 59	¥292	0.950	¥1,385	¥8,864	0.35	¥247	¥11,742	¥77,062	0.62
60 ~ 64	¥379	0.927	¥1,757	¥10,621	0.42	¥212	¥9,847	¥86,910	0.70
65 ~ 69	¥477	0.892	¥2,126	¥12,746	0.50	¥212	¥9,470	¥96,380	0.78
70 ~ 74	¥625	0.840	¥2,623	¥15,369	0.61	¥187	¥7,842	¥104,222	0.84
75 ~ 79	¥776	0.761	¥2,953	¥18,323	0.73	¥187	¥7,107	¥111,329	0.89
80 ~ 84	¥914	0.634	¥2,899	¥21,221	0.84	¥187	¥5,924	¥117,254	0.94
85	¥1,037	0.450	¥2,333	¥23,555	0.93	¥187	¥4,204	¥121,458	0.98
90	¥1,037	0.238	¥1,234	¥24,789	0.98	¥187	¥2,223	¥123,682	0.99
95	¥1,037	0.078	¥402	¥25,191	1.00	¥187	¥725	¥124,407	1.00
100	¥1,037	0.012	¥62	¥25,254	1.00	¥187	¥112	¥124,519	1.00

Size of Out-of-Pocket Payments

In spite of the universal public health insurance coverage, the government has controlled the access to health care of particular groups in the population by changing their out-of-pocket payments. For most Japanese, the standard out-of-pocket payment is 30% of the cost of treatment at clinics/hospitals and 30% of the cost of drugs at the pharmacy. Two groups are exceptions to this rule; the first group are children; the out-of-pocket rate for children under the age 6 is 0.2, or 20% of the cost of treatment or drugs. However, most municipalities offer programs to relieve all or most of the co-payments for infants and children under the age 16. The second group are the elderly; the out-of-pocket payment of the elderly between the ages 70-74 are now set at 0.2, and the out-of-pocket payment of the elderly above the age 75 is 0.1.

For the last three decades, the government has been increasing the co-payments of the elderly. The elderly whose income are above certain levels are now subject to the standard co-payment rate.

Distribution of economic well-being across age-groups

The distribution of income across different age-groups is primarily determined in the labor market, and then modified by the tax system and the transfer programs of the government. Compared with other developed nations, the age profile of wages/salaries in Japanese firms has been known to be steeper; it starts lower, keeps on increasing until early 50' s , much later than American or European firms, and then falls in the latter part of 50's. Most firms terminate labor contracts with a worker when he/she reaches the age 60, but offer some form of continued employment up to the age 65 at reduced wages/salaries. As a result, the labor force participation rate is generally higher, and the proportion of elderly households that have labor income is much higher, than in the other developed countries. For example, in 2012, 86% of households whose heads are between age 60-64 have some labor income, and the proportions are 65% for 65-69, 47% for 70-74, 35% for 75-79, and 29% for age 80 or over, although some of which are the earnings of younger family members (14). Once retired, the public pension programs

Fig 2 Annual Household Income by Age-class of Head of Household (in thousand ¥) 2013
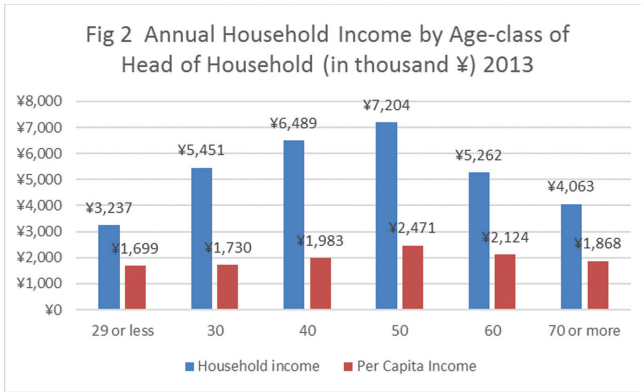
Figure 2. Household Income by Age-class of Head of Household (the total income and per-capita income by 10 year age-class in 2013)

of retired workers have been fairly generous; for example, the replacement rate for employee's pension has been set at 60%. In contrast, the basic pension benefit for self-employed workers is rather modest. Most of public pension benefits are exempt from income taxation.

It is very difficult to find reliable statistics on age distribution of income, and, in spite of its relatively small sample size for measuring income distribution, the income questionnaire of Comprehensive Survey of MHLW is almost the only source of the information. Specifically, the Survey provides total household income and per-capita income by the age-class of head of household. Our Figure 2 shows the total income and per-capita income by 10 year age-class in 2013; as expected, household income falls substantially with the age of the head of household moves from the 50's to the 60's, and then to the 70's or over. On the other hand, the fall in the per-capita income is surprisingly modest; it drops by 14% from as the head age goes from the 50's to 60's, but only by 8% from the 60's to 70's or over.

Using the per-capita income information in a similar manner to the per-capita health care costs, in Table 1, we have added the age-class distribution of income the cumulative income prior to reaching each age-class, and the distribution of lifetime income (%) respectively in columns 8, 9, and 10 of the table. Given the age-class income data of *Comprehensive Survey 2013*, we came up with a figure of 124.5 million yen as our per capita lifetime income. From the 10th column, we can see that an individual has already received 70% of lifetime income before he/she reaches age 65. In other words, even with the relatively generous public pension programs and high rate of labor force participation of the elderly, he/she can expect to receive only 30% of lifetime income to finance consumption after the age 65.

Thus before the age 65, since an individual incurs 40 percent of lifetime costs but receives 70% of lifetime income, the ratio of costs to income, which is a measure of the economic burden of health care costs is 4/7, or 0.57. After the age 65, an individual incurs 60% of lifetime costs but receives only 30% of lifetime income, the ratio of income to costs is 6/3, or 2.0. Thus if we divide our population into two insurance groups, one group consisting of individuals less than age 65, the other group consisting of individuals at age 65 or older, the first group's economic burden is only 60% of the lifetime average, while the second group's economic burden is 200% of the lifetime average.

Japanese Health Care Financing for the Elderly and Retired

Now we earn most of labor income before age 65 but, unfortunately, we need most of health care after age 65. For any country providing public health care insurance for workers and their families, this means that it is not difficult to provide health insurance for workers and their family members, but it is extremely difficult to continue to provide health insurance after they retire. The retirees program will be always running deficits, as the cost of its benefits will be much higher while the revenue will be much lower. In the beginning, the government will make up the difference by subsidies. But as the population ages, and the number of retired workers swells, the government will no longer be able to pay the entire deficit from the tax revenue. Thus, the government will start collecting more money from the workers than they need to pay for the cost of their benefits, and use the surplus to make up the shortage. As we will explain below, Japan is an example of such a mixture of government subsidies and cross-subsidization.

In 2006, Ogura et al. wrote, "Japan's current public medical insurance can be compared to an unstable two-story building whose second floor is becoming heavier each day while its first floor is losing strength. There are three pillars in the first floor that support the weight of the whole building." "The second floor of our building consists of the health care insurance for the elderly, which provides medical care benefits to those over age seventy for very little cost" (15).

After almost a decade, this structure has added another floor between the first and the second, a mezzanine floor, changed some rules in accommodating people between the floors, but it's not clear if it has become less unstable. At the moment, the first floor of this public health insurance building accommodates everyone under the age 75, and the second floor accommodates everyone over the age 75. Between the first and the second, there is a mezzanine that accommodates everyone over the age 65, accessible only from the first floor.

In the first floor, we still see three pillars supporting the weight of the whole building; employees insurance programs, national health insurance programs, and government subsidies. The first pillar is the strongest of the three, and consists of (a) more than 14 hundred firm- specific health insurance associations covering 29 million employees and dependents (Health Insurance Managed by Associations), (b) the single Health Insurance Managed by Government (HIMG), covering 35 million employees and dependents of smaller firms, and (c) less than 50 programs known as the Health Insurance for Government Employees (HIGEs), covering 9 million public sector employees and dependents. These programs collect different premiums from the employees and their employers in proportion to their

wages/salaries. In fact, they collect more than twice the costs of their own benefits, and provide an important support for the health care costs of the elderly. Their financial strength comes from (a) almost perfect withholding at the source of income, (b) sharing of the tax with the employers.

The second pillar represents more than 18 hundred "National Health Insurance" programs (NHIs) run by municipal governments, covering 33 million self-employed, retired, or unemployed workers and their family members. In short, they insure everyone under the age 75 who are not covered by the employees programs. On closer examination, this pillar is actually not standing on its own, leaning heavily on the third pillar. There are three reasons for their structural weakness; first, on average, these individuals have limited financial means; the average per-capita income, in fact, is 830 thousand yen, about one-half of the employees programs. Secondly, unlike the employees, they do not have employers to share the cost of the premium.

Thirdly, they are much older because NHIs accept the retired workers; their mean age is 50.4 years old, compared with 34.3 for HIMA, or 36.4 for HIMG. As a result, while the per-capita cost of the benefits (316 thousand yen) is roughly twice of the employees programs, they manage to collect only 3.2 trillion yen, less than one-third of the costs of their benefits (10.1 trillion yen), from their premiums.

The third pillar then represents the subsidies of the governments that supports the second (NHIs), and the first (HIMG) to a lesser degree. Because of NHIs financial weakness, for decades, the national government had been subsidizing half of the costs of their benefits. With the introduction of reinsurance schemes for the elderly in 1985, the subsidies also have covered the contributions for reinsurance programs; at the moment there are two such programs; contributions for the young-old (age 65-74), and the contribution for the old-old (age 75 plus). In addition to NHIs, HIMG is also subsidized currently at the rate of 16.4% for its benefits and contributions, to compensate the income differential with HIMA.

The new mezzanine of our building represents the reinsurance program for the young-old, or those above the age 65 but below age 75. Since it is a pure reinsurance program involving all the first floor programs, we will call it a mezzanine floor. As we have seen, since NHIs no longer can pay for all the benefits of everyone under the age 75, starting in 2009, everyone between the age 65 to age 74 are asked to go up to the mezzanine. The reinsurance program then computes the total costs of their benefits, 6.5 trillion yen in 2014, which are to be collected from all the insurance programs in the first floor, according to their shares in the number of insured individuals under the age 75.

Not surprisingly, most of them in the mezzanine are already retired, and NHIs insure almost 80% of them, but nationally, NHIs account only 32% of the individuals under the age 75. Instead of paying 80% of the costs, NHIs now have to pay only 32%. Hence this mezzanine scheme transfers almost 50% (= 80% - 32%) of the cost of benefits for young-old, or 3.0 trillion yen, from NHIs to the employees programs. Another smaller transfer program for the retired workers under the age 65 transfers 0.7 trillion yen from the NHIs to the employees programs. These reinsurance schemes leave a shortfall of 3.2 trillion yen in NHIs still to pay for the individuals in the first floor. Although the financial transactions are very complex, this is what governments pay to NHI under various subsidy schemes.

The second floor, which is actually the third story of this building, supports the health care costs of the old-old, or those age 75 or older. Currently, there are 15 million elderly above the age, and the costs of their benefits amount to 14.4 trillion yen per year, or more than 40% of the entire costs of public health insurance benefits. The elderly themselves are asked to contribute 10%, or more if their income is high enough, and hence, in effect, they pay 1.6 trillion yen. Governments contribute 6.8 trillion yen, in statutory 50% direct contributions, and 1.0 trillion yen in indirect subsidies for NHI and HIMG's contributions. The employees programs contribute 5.0 trillion yen, or 40% of the costs of benefits for the elderly.

Why is the system so complex? First, Japan started with two-kinds of employees programs; in addition to self-sustaining, firm-specific employees programs, the government was running and subsidizing a huge program for the employees of small firms. Secondly, Japan started also with programs for the rest of population; for farmers, the self-employed, the unemployed or the retired that needed heavy subsidy from the very beginning. Thus as aging started, and cross-subsidization from the non-elderly was needed, the government had to subsidy the weaker ones to help them pay the cross-subsidy. It is this subsidy-on-subsidy that makes the financing system of the elderly's health care costs extremely complex, and non-transparent.

The Example of Aging Serbia

Serbia as the largest country of Western Balkans falls within the same distinct population shrinking trend common throughout the surrounding region (16). This trends becomes particularly concerning while keeping in mind uneven distribution of sexes across the country. Due to half a century long village-to-town migration pattern substantial geographic heterogeneity has been created with excess of healthy young men (aged 20-39) in remote, rural areas and excess of healthy young women (aged 20-39) in urban cores (17). Fertility rates were steadily decreasing and life expectancy exhibited modest rise since 1991. Nevertheless serious population shrinking continued because of net reproduction rate lower than one since 1955 (18). The process was likely substantially slowed down by an influx of over 600,000 refuges during the civil wars and dissolution of Yugoslavia (19). Important part of the complex landscape is the long term migration of young people in their most productive age towards the rich economies of Western Europe and North America (20). This emigration, geographically uneven, was most intense for underdeveloped Eastern and Southern regions of the country, ironically the ones that accepted the least portion of permanently inhabited refu-

gees during the 1990`s. All of aforementioned facts make the population aging issue even more peculiar and difficult to reach by common policies. After years of substantial efforts by policy makers and experts in the field, Government of Serbia has adopted and implemented its National Strategy in Aging 2006 – 2015 whose outcomes are yet to be seen (21).

Consequences of Aging for the National Health System of Serbia

Serbia's health system is funded as a mixed Bismarck system with elements of former Yugoslavia's municipally funded health care (22). Bismarck's social insurance financing pattern relies on mandatory contributions for social and health insurance by the employers and employees. Essential feature of increased portion of the elderly within society and decreased portion of youth is shrinking labour force of the country. This dwindling taxpayer's base will inevitable contribute less revenues in the long run and thus lead to weakened health care funding. Such phenomenon has already been clearly described in locally published evidence (23). Another issues presents rapidly increasing number of retired senior citizens who are about to be supported by shrinking actively employed national work force (24). Ultimate impact to the overall capacities of health system is significantly greater demand for medical care by the elderly (25). Economic burden of some prosperity illnesses has been assessed in cost-of-illness studies and turned out to be substantial (26-28). Particularly sensitive issue is very expensive terminal and palliative care for the aged patients in their last year of life with incurable cancer (29). Among many of the vulnerabilities of the aged comes under development of long term home care supportive network in Serbia (30). Many of the retired senior citizens after their spouse's death are left alone by their families sunk in poverty with income insufficient to cover basic medical and nutrition needs (31).

The true size of work load for medical facilities and an overall economic burden imposed by steady aging of Serbian community is yet to be assessed in the upcoming years. As elsewhere across Eastern Europe and Balkans there is significant lag in development of electronic patient records. This fact is limiting our ability to properly assess resource utilization patterns and establish demand based provision of medical services (32). Therefore responsiveness of the system remains unsatisfactory with long waiting lists in some therapeutic areas such as orthopaedic, cardiovascular surgery and interventional radiology (33). Implementation of cost-effective solutions to cope with problems is still far from being common practice among policy makers while Health Technology Assessment agencies are absent in most of the Western Balkans region (34).

Health expenditure in the country has been recording almost steady growth since 2000 with modes, global recession induced temporary shortcomings (35). Large part of Serbian health market value increase was attributed to the approved reimbursement of novel medical technologies by the authorities such as high-tech pharmaceuticals (36). In some therapeutic areas the National Health Insurance Fund's polices have contributed to the growing public debt due to Increased civil expectations for cutting edge medical care. Few other issue such as overregulation, informal payments and unequal access to medical services among the poor citizens and in rural areas, due to their joint complexity, are unlikely to be met soon (37). Strategic determination by the national authorities to adjust undergoing health reforms to dominant population aging trend shall be urgently needed. As we have witnessed from the examples from Asia as well as Europe, responsiveness of the health systems and social services to the sensible needs of massive population of senior citizens will remain one of the key challenges in future.

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