Russian Power in Decline: A Demographic and Human Resource Perspective

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Abstract

Moscow's invasion of Ukraine highlights a geopolitical paradox of sorts. On the one hand, for over a decade and a half Putin's Kremlin has been talking and acting like an ambitious, dissatisfied "revisionist state" on the rise. On the other hand, to judge by the country's demographic and human resource trends, the Russian Federation very much looks like a power in decline. In this paper we examine Russia's demographic and human resource situation and their prospects over the coming decades. We argue that demographic constraints are gradually but unforgivingly restricting the realm of the possible for the Russian state on the international stage. Russia's demographic problems extend far beyond its familiar continuing depopulation. Russia seems to be a "high education/low human capital" society. Despite levels of schooling comparable to other European countries, Russian adult mortality levels are practically Fourth World. Despite its sizeable cadre of highly educated men and women, Russia also appears to have serious problems with "knowledge creation". Projections suggest Russia's shares of global manpower, and highly educated manpower, are set to decline steadily in the decades ahead, and that its working-age adult mortality profile will remain unfavorable for decades to come. The Putin Kremlin's increasing propensity for risk-taking in external policy may be a means to compensate for relative decline in national potential—but one that cannot work indefinitely.

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Introduction

The 2022 Russian invasion of Ukraine may have marked the end of one era and the beginning of another—but it was only one step (albeit a fateful one) along a strategic path the Kremlin has marked out, and methodically pursued, for over a decade and a half. What this progression has revealed is the classic *modus operandi* of a "revisionist power." From President Vladimir Putin's 2005 declaration that "the demise of the Soviet Union was the greatest geopolitical catastrophe of the [20th] century"[1] to his famous 2007 Munich Security Conference speech denouncing the "pernicious" "unipolar" [U.S.-dominated] order[2] to the 2008 war against neighboring Georgia to the 2014 annexation of the Crimea to the "special military operation" now underway in Ukraine, contemporary Russia's strategic logic and behavior will be entirely familiar to students of history's previous "revisionist" kingdoms, empires, and states.

But there is an interesting wrinkle in the current Russian case. History is full of instances where a rising power, aggrieved and dissatisfied, acts aggressively to obtain new borders or other international concessions. In Russia today we see a much more unusual situation, for here the increasingly menacing and ambitious geopolitical actor looks to be a state whose power is *in decline.*

Notwithstanding its nuclear arsenal and its vast territories, a striking feature—arguably, the distinguishing feature—of contemporary Russia is its comparative underdevelopment and relative economic weakness.

Over the years we have often heard a refrain about Russia's rising might as an "energy power." Yet for all its vaunted oil and gas, Russia's international sales of goods and services in 2021, the latest year for which we have figures, fell short of Belgium's (at roughly $550 billion vs. Belgium's nearly $680 billion, according to the World Trade Organization).[3] That same year, Russian exports were dwarfed by Holland's (at nearly $1.2 *trillion*, more than double Russia's earnings).[4] Russia's international economic standing was likewise overshadowed by the little Benelux countries even in the earlier boom times for global energy markets.

The plain fact of the matter is this: there has never been an "energy superpower"—anywhere, ever. In the modern era, the ultimate source of national wealth and power is not natural resources, rather it is human resources. And unfortunately, Russia's human resource situation is peculiarly bleak—with worse quite possibly in store for the years directly ahead.

In this paper we examine Russia's demographic and human resource conditions: recent, current, and prospective. Some of these facts and figures will be more or less familiar to both informed general readers and specialists. Other facets of this assessment, though in our view highly consequential, are likely to be much less familiar—even though in effect "hiding in plain sight."

There are three major virtues to examining Russia through the prism of demographics and its allied disciplines.

First, among all of the social sciences, it is arguably demography whose empirical depictions of reality are the most intrinsically accurate and intuitively comprehensible. It is conceptually easier to count heads than to determine, say, income levels or purchasing power. Furthermore, since population totals are an inherently "closed system", demographic change is relatively easy to track. In principle, next year's population should equal today's population,

netted for deaths, births and migration. Basic metrics for demography (such as births per woman for fertility or life expectancy at birth for mortality) may also be more intuitive than such constructs as GDP, GNP, or GNI.

Second, demography permits us to look further into the future—in appreciable detail, and with tolerable reliability—than any of the other social sciences. Absent catastrophe of Biblical proportion, the overwhelming majority of a low-birth-rate society's population some fifteen or twenty years hence, including virtually all working age manpower and absolutely all pensioners-to-be, is already alive today. Consequently we know much more today about a modern country's demographic outlook for the next two decades than we do about its economic outlook or its political outlook.

Third, demographic trends matter. They afford a direct and meaningful reading on a society's wellbeing, and cast light on a country's economic potential. Demographic trends also provide information about a country's capabilities in the international arena. None of this is to assert that "demography is destiny." We prefer a less ethereal claim: namely, that demographics slowly but inexorably alter the realm of the possible in human affairs. We shall attempt to demonstrate in accordance with this more modest dictum just how demographic constraints currently limit the realm of the possible for Russia and the Russian state—and how those demographic constraints stand to tighten further in the years immediately ahead.

Basic Demographic Trends in 21st Century Russia: Back to Depopulation

We start with basic "headcount" facts about Russia's post-Soviet demography: population totals, births, and deaths.

Since the collapse of the USSR, Russia has been a country depopulating. (SEE FIGURE 1)

To be clear: population decline is not determinative for personal living standards in our modern era—prosperous Japan, after all, has been a "shrinking society" for over a decade at this writing, and dynamic Germany has been on the verge of depopulation for years. But national population totals do bear directly on the human resources that the Kremlin (or for that matter any other state) can command.

For a time, Russia's post-Soviet population decline not only halted but marked out a modest recovery. Between a 2009 nadir and the start of 2014, thanks to modest immigration inflows, the Russian Federation's total population increased by nearly 1 million, according to official estimates of the Russian Federal State Statistical Service (also known as *Rosstat* and *Goskomstat*).

In 2014 the Kremlin came upon a new means of reversing population decline: territorial annexation. By wresting the Crimea from Ukraine and incorporating it into the Russian Federation (RF), total RF population instantly increased by 2.3 million persons. Forcible incorporation of external land has to date done considerably more to raise the Russian Federation's headcount than the Kremlin's pro-natal population policy initiatives launched in 2007.[5]

The Russian Federation's reprieve from depopulation, however, was only temporary. In 2018—that is to say, before the grim demographic shocks from the Covid-19 pandemic—population decline had already resumed, with marginal but symbolically significant decreases tallied for both calendar years 2018 and 2019.

With the Covid calamity, however, depopulation picked up terrible momentum. Whereas the officially estimated population decline for 2018 and 2019 together amounted to less than 150,000, the drop in 2020 and 2021 came to almost 1.3 million. (Russia's aggregate population drop between the beginning of 1993 and the start of 2009 amounted to about 5.8 million).

As Covid-19 devolves from a pandemic to an endemic contagion, it will exert less pressure for depopulation in Russia. The demographic shock from the coronavirus, in other words, should probably be regarded as a one-off: at least, until such a presumption is proved wrong. But other factors pressing for the continuation, and perhaps acceleration, of RF depopulation are gaining force. As we shall see, these factors will make even another temporary stabilization of Russia's population totals an increasingly challenging proposition.

The size and composition of the Russian population are shaped predominantly by vital events—births and deaths, trends deserve examination in their own right. (See Figure 2) Until the Covid-19 shock, Russia's birth totals had been rebounding from their post-Soviet collapse (hitting a low point in 1999), while death totals had been heading downward since 2003. In 2013—for the first time since the end of the Communist era—yearly births ever so slightly exceeded yearly deaths (by about twenty-four thousand).

In 2014, births again just barely outnumbered deaths for the second time in Russia's post-Communist history (by about thirty-nine thousand under pre-annexation boundaries, or about thirty-four thousand including Crimea). The year 2015 marked a "three-peat" with a reported net surfeit of births over deaths of about thirty-two thousand (this time including Crimea). But that achievement was fleeting. It was an apogee. In 2016, Russia once again reported (fractionally) fewer births than deaths. Thereafter the wedge between deaths and births began again to widen steadily.

By the year 2019—i.e., before Covid-19—Russian "negative natural increase" (demographers' infelicitous terminology for an excess of deaths over births) exceeded 300,000. Under the deadly shadow of the Coronavirus, 2020 and 2021 brought a cumulative total of 1.7 million more deaths than births to Russia—with net mortality of more than a million in 2021 alone.

Russian losses from Covid and pandemic-associated causes were severe, and actual causes of death were not necessarily diagnosed or recorded accurately in official *Rosstat/Gostkomstat* numbers. Two independent assessments each estimated Russia's combined 2020-2021 excess mortality at over one million deaths. One of them placed absolute excess mortality for Russia at 1.3 million—above the corresponding totals for the USA during those same years.[6] By contrast, official Russian figures tabulated just under 310,000 Covid deaths for all of 2020 and 2021.[7]

When one considers how poorly the USA coped with limiting mortality during the pandemic, and bears in mind that Russia's total population is well under half as large as America's, one begins to get a sense of the scale of excess mortality in Russia during those years. According to these same studies, only India (and possibly the USA) lost more people as a consequence of the pandemic. Russian age-standardized excess mortality over the course of those two pandemic years is estimated to have been over three times the global average, thus among the world's highest.

In the post-Soviet era, Russia became a net-mortality society during peacetime. Over the three decades of the 1992-2021 period—the years before the Ukraine invasion—deaths in Russia surpassed births by a cumulative 15.7 million, according to *Rosstat*. In absolute terms, the only postwar country to register a larger bout of "negative natural increase" was Maoist China in the

immediate aftermath of the catastrophic "Great Leap Forward." Nevertheless, in relation to each country's pre-existing total population, Russia's prolonged cumulative surfeit of deaths over births thus far has been proportionately much larger than China's briefer, more extreme episode.

The peacetime emergence of "negative natural increase" in Russia over the past generation is by no means unique. (See Figure 3). A number of other countries also reported more deaths than births over those same decades. Russia was not the most exceptional outlier, at least in proportional terms—though all of its close company did happen to be post-Communist states. By the reckoning of the U.S. Census Bureau, several post-Communist states more or less matched Russia proportionally in cumulative net mortality for 1992-2021, including Hungary and Belarus, while Ukraine and Bulgaria's ratios of net mortality to total population actually exceeded Russia's.[8]

Over the three decades of 1992-2021, Russia reported an average ratio of deaths to births of 137:100. (See Figure 4). This was extraordinary for an urban and literate society during peacetime—although not unparalleled, given the situation in some other post-Communist countries.

Eventually, high ratios of deaths to births may become characteristic of affluent societies under conditions of orderly progress, as their populations age and shrink. Germany and Italy, for example, are already on the "top 10" roster for 1992-2021 in Figure 4—and in the years since 2012, the EU-27 as a whole has slipped into "net mortality."[9] For the time being, however, extreme and persistent excess of deaths over births is still more likely to be an indicator of social shocks and dysfunctions—much as in days of old, when it was a warning sign of war, famine, pestilence and disastrous upheavals.

Fertility And Family Formation in Russia: A "Normal European Country" (More or Less)

Between 1999 and 2012 Russia witnessed a "birth surge" of sorts, with annual births jumping from 1.2 million to 1.9 million. (Qualification is required because this jump was actually a recovery from the slump that followed the end of Soviet Communism, not a boom in its own right.) But the "surge" was a passing event, not a "new normal." By 2015 birth totals had again begun to decline, and by 2019—before the pandemic shock—birth levels had dropped by almost a fourth from their 2014 levels, down roughly 450,000. Birth levels dropped further during the Covid-19 years of 2020 and 2021.

The rise of births in Russia between 2008 and 2014 coincided with the Kremlin's pro-natal birth benefits program, leading the Kremlin (and some foreign observers) to call that effort a success. But the program continued beyond 2014—it was in force during the birth downswing of 2014-19, and beyond. By 2018/19, Russian fertility levels (by the metrics of total fertility rates, or TFRs—births per woman per lifetime) did not look appreciably different from some erstwhile Soviet Bloc European states *without* big expensive pro-natal policies: such as the Baltic countries, Poland and Romania.[10] (In fact, some of these places were reporting higher fertility than the RF.) Fertility change is always taking place everywhere, and it is exceedingly difficult to explain the factors accounting for it unambiguously. Just how much (if at all) those Kremlin population policies impacted and altered Russia's fertility patterns will probably remain a matter of conjecture and unsettled debate.

That said: it is possible to offer a few confident observations about fertility and family formation patterns in contemporary Russia.

First, notwithstanding its passing baby surge, which temporarily took Russia's fertility level from below the European average to slightly above it, births in Russia, as in the rest of

Europe, remained below the replacement level. According to official *Rosstat* calculations, the high-water-mark for the Russian Federation's "net reproduction rate" (NRR) in the post-Soviet era was in 2015, when the rate hit 0.85—this by an index where 1.00 is the number for long-term population stability without in-migration. (See Figure 5).

To be sure, that reading was up very substantially from the low-water-mark of 1999, when the NRR was 0.54. Even so, by this metric contemporary Russia never came close to reaching childbearing patterns that could have assured the country intrinsic long-term population stability. By 2018—the most recent date for which Russia has calculated an official NRR—the rate was back to roughly 0.75, a trajectory on which the country's population would still be set to shrink by a quarter from one generation to the next, absent in-migration. The 2019 birth drop may have pushed Russia 30 percent below the replacement level. (NRRs appear to have declined further during the Covid-19 period, though it is difficult to tell what exactly this will portend for post-pandemic trends.)

Second, as within the rest of the European expanse, Russia's nationwide NRR is an arithmetic average of fertility levels that differ considerably from one region to another.[11] Whereas national NRR in 2018 averaged 0.75, it was as low as 0.54 in the Leningrad *oblast* surrounding the city of St. Petersburg. On the other extreme, the 2018 estimated NRR for Chechnya was 1.24—and almost 1.4 for Tuva. Given those fertility differentials, population composition within the Russian Federation would be shifting. Very few places within Russia, however, were on a course for naturally generated population stability, much less population growth. Of the 85 regions (*oblast*) for which *Rosstat/Goskomstat* provided NRR estimates for 2018, just 3 registered at or above net replacement. These three regions together accounted for under 2% of Russia's total population in 2018.[12]

Intra-Russian fertility variations were akin to those registered within the EU-27 that same year. According to Eurostat, the European Union's statistical office, that area's 2018 NRR was 0.74, with net reproduction rates as low as 0.49 in Sardinia and 0.47 in the Canary Islands, and as high as 1.01 in Romania's Nord-Est. That single sub-region of the continental EU expressing above-replacement fertility (one of about 220 such "statistical units" in the Eurostat taxonomy[13]) accounted for a little less than 1 percent of the territory's total population.[14] In this mirror, fertility levels and regional differentials within the vastness of Russia today look quite "European".

Finally, it is worth emphasizing that childbearing and family formation patterns in the Russian Federation also look characteristically European. We can see this by placing creating a scatterplot showing TFRs against proportion of births outside marriage for 2018/19 for the RF and the 27 European Union countries plus the UK. (See Figure 6) In 2018, at 1.58 birth per woman, Russia's TFR was almost identical to the EU's levels in 2018 (1.54 for EU-27, 1.56 if UK were still included). Its percentage of births outside marriage was lower than in most EU societies, although several European populations did report distinctly lower out of wedlock birth ratios.

All in all, as a society with below replacement fertility and a bit less than one in four births occurring outside marriage, Russia's childbearing patterns in 2018 may be regarded as "typically European," considering contemporary EU fertility patterns. The "second demographic transition"[15] that European demographers first noted in Western Europe in the 1980s—characterized by an evolution toward higher rates cohabitation of divorce, rising out of marriage childbearing, and a shift to indefinite sub replacement fertility—appears to be very much underway in Russia nowadays as well.

Russia's Disastrous Survival Profile

Yet while Russia's childbearing patterns today look entirely European, its mortality patterns look Third World—actually, worse than Third World in important respects.

The most recent "life tables"—actuarial computations tracking a population's survival trajectories—available at this writing for Russia and the rest of the world come from the World Health Organization (WHO) Global Health Observatory for the year 2019.[16] The year 2019 was a good one for life expectancy in Russia—in fact, higher than ever previously recorded. (As we shall see in a moment, it was higher than in either 2020 or 2021, when levels plummeted under the deadly Covid-19 pandemic.)

Thus 2019 seems particularly apposite for international comparisons, as it may be the most favorable possible benchmark from the Russian standpoint. Yet according to WHO figures, Russia's life expectancy in 2019 for a 15-year-old male was essentially indistinguishable from Haiti's. (See Figure 7)

This is not a typographical error. By WHO's reckoning, male life expectancy in 2019 in both Haiti and Russia stood at 53.7 years (rounding to the nearest decimal). That same year a 15-year-old youth stood worse estimated survival chances in Russia than in at least 23 of the 48 places the UN categorizes as "least developed countries (LDCs)"—including such impoverished locales as Mali, Yemen, and even Afghanistan.[17] (We say "at least 23" because the WHO does not estimate life tables for all the LDCs.)

According to these same WHO data, the Russian Federation's mortality schedule for adult men in 2019 was remarkably similar to that for African males that same year. (The Africa data are continent-wide and thus include North Africa, not just the sub-Sahara). (See Figure 8).

On 2019 survival trajectories, over one in four of both Russia's and Africa's 20-year-old males would have died before their 60th birthday. The corresponding risk of death in WHO's Europe region is only half that high—and those European aggregates, remember, are distorted by dint of including Russia in them. (Spain's risk was just a fourth of Russia's, for example.) Further: after age 60, survival odds actually appear to be slightly better for African men than for Russian men. When one considers the tremendous socioeconomic advantages that Russians enjoy over Africans vis-à-vis income, education, housing, and other factors, these estimated Russian male mortality patterns are—there is no diplomatic word for it—shocking.

Although survival prospects are distinctly better for women than men in Russia, WHO estimated life expectancy for 15-year-old Russian females in 2019 were comparable with Bangladesh, the healthiest of the UN's LDCs. (See Figure 9). The overall risk of dying between 15 and 60 years of age for males and females together in these national populations was appreciably higher in 2019 for Russia than Bangladesh: roughly 19% vs. roughly 12%. And combined male and female life expectancy at age 15 in 2019 was estimated to be over three years higher in Bangladesh than in Russia: 62.0 years versus 58.8 years. Contrast these Russian survival schedules with Switzerland's, where the corresponding national risk of dying between 20 and 60 was an estimated risk was roughly 4%, and life expectancy at 15 almost 69.[18]

The Russian Paradox: High Levels of Education, Low Levels of "Human Capital"

Unlike Bangladesh, Russia is an urbanized and literate society—seemingly, a highly educated society. By UNESCO estimates, the RF population ages 25 and older may have one of the very highest shares of men and women with some post-secondary or tertiary education in the contemporary world. (See Figure 10)

Of course, Russian higher education may be "diploma happy"—the RF and precursor Soviet educational systems may have granted higher degrees at lower levels of attainment than was customary in many counterpart countries. That apparent systemic bias notwithstanding, overall years of schooling in Russia nevertheless look to be quite comparable to those of OECD (Organization for Economic Cooperation and Development) societies.

We can see as much by comparing mean years of schooling (MYS) in the year 2010 for the population 15 years of age and older in the Russian Federation and the OECD country grouping, thanks to the Barro-Lee Database,[19] a project on global educational attainment directed by Professors Robert Barro of Harvard and Jong-Hwa Lee of Korea University.[20] (See Figure 11). According to the Barro-Lee estimates, Russia's MYS for the 15+ population in 2010 averaged 11.5 years. Such a rating would have placed the RF squarely in the middle of the OECD's corresponding rankings. Russia's MYS would have been lower than those of the USA or Switzerland (both over 13)—but it would have been higher than for either France or Belgium (both 10.7) and more or less equivalent to those of Australia (11.5) or Japan (11.6).

Herein lies a terrible Russian paradox and mystery: in one and the same country, internationally high levels of educational attainment seem to coincide with inexplicably low levels of "human capital." Despite Russia's nearly 12 estimated mean years of schooling for the 15+ population, life expectancy at age 15 is reportedly lower for RF males than for counterparts in Yemen or South Sudan—and lower for RF adults of both sexes than for Bangladesh or Sudan. Yet Barro-Lee estimates place MYS in 2010 for the 15+ population of Bangladesh at less than 6 years—and at just over 3 years for Sudan!

The Mystery Of Russia's Mortality Structure

How does a country with an educational profile of a developed country end up with a least developed county's survival profile? "Attaining" such profiles—and during peacetime—is not that easy: in effect, it requires the development of extraordinary, anomalous new causes of premature mortality. Alas: this is something Russia has "succeeded" at for decades.

The Human Mortality Database (HMD)[21] is a project, launched by demographers at the Max Planck Institute for Demographic Research in Germany and the University of California at Berkeley, examining international mortality data for internal inconsistencies, reconstructing long-term mortality trends, and presenting these in fully comparable fashion for over three dozen countries from the OECD, Asia, Oceania, and the NIS area. According to HMD reconstructions, life expectancy at birth for the RF for both sexes together was no higher in 2010 than it had been in 1961 (in the RF's predecessor republic within the USSR), half a century earlier. (See Figure 12). Although life expectancy at birth for females was a bit higher in 2010 than it had been in 1961, male life expectancy was actually nearly a year lower in 2010 than it had been in 1961—half a century earlier. As of 2010, according to HMD estimates, combined male and female life expectancy at birth in Russia had not yet broken the 70-year threshold.

The HMD project's most recent update of its Russian Federation trends at this writing (July 2022) come from 2016, offering life table for the country only through 2014. But *Rosstat* reports on Russian life expectancy at birth are very close to HMD reconstructions for the many decades both series cover—so we can probably take official Russian estimates since 2014 as reasonably reliable indicators.

By these numbers, Russia enjoyed steady improvement in life expectancy at birth for its entire population over the near decade and a half between 2005 and 2019, with a jump in overall

life expectancy of nearly 8 years overall, and of nearly a decade for men. This was the most sustained improvement in Russian life chances since the death of Stalin. (See Figure 13). Exhibiting mortality trends of a "normal country" is a new development in modern Russia, one to be welcomed. Two qualifications here are nevertheless necessary here.

First: since steady health improvements are the norm rather than the exception in the rest of the world, Russia's recent improvements still leave the country well behind peers of comparable income level. Russia's officially reported 2019 overall life expectancy at birth of almost 74 years would have been roughly a year higher than the UN Population Division (UNPD) estimate for *global* life expectancy that same year—a decade and a half of (for Russia) exceptional health progress only brought the country back up barely above the world average. Even at its 2019 peak, life expectancy in Russia was still about two and a half lower than the average for other countries in the World Bank "Upper Middle Income" grouping[22], and over seven years below the designated "High Income" countries.[23]

Second, as we know, during the Covid pandemic Russia suffered a harsh upswing in death rates—and thus a marked drop in life expectancy. According to *Rosstat*, RF life expectancy fell by 1.6 years in 2020.[24] Russia's life expectancy setback in 2020, according to one international study, was the largest in absolute terms of the 37 high- and upper middle income-countries for which corresponding data were available.[25] *Rosstat* has recently also announced that RF life expectancy dropped 2021 by an additional 1.6 years.[26] By that report, Russian life expectancy would be back to about 70 years again. (The UNPD's projections suggest an even steeper fall in the face of the pandemic: by their numbers, a drop of four and a half years between 2019 and 2021, with Russian life expectancy back below the 70 mark again in 2021[27].) How quickly it recovers as the pandemic attenuates remains to be seen.

How could a country whose overall life expectancy at birth was (just) above average in global terms, as Russia's was in 2019, also suffer from the woeful survival patterns we have highlighted? The contradiction is explained by Russia's mysterious mortality structure. While death rates for Russian infants and children are close to First World, death rates for Russia's working age population are Fourth World. And generating Fourth World death rates in a literate urban society during peacetime requires very different causes of death from those that impose similarly brutal survival trajectories on the world's least developed populations today.

We can examine this mystery with the aid of age-standardized mortality rates, which adjust a country's death rates against a fixed and unchanging notional population structure, so as to avoid misleading inferences that might be drawn if one society had an unusually youthful population and another had an unusually "grey" population. (See Figure 14).

Figure 14 relies upon the WHO-Europe "Health for All Database" (HFA-DB)[28] for age-standardized mortality estimates, adjusted against a "European" model age structure. We present their estimates for the Russian Federation (and its predecessor republic within the USSR), the "old EU" (the 15 original EU countries comprising all of Western Europe apart from Norway and Switzerland—now 14 countries, given Brexit), and the "new EU" (states that joined in 2004 or later—all of them formerly Soviet-bloc or onetime parts of Communist Yugoslavia, excepting only tiny Malta and Cyprus).

Over the decades under consideration, Western Europe's mortality levels have undergone a smooth and continuing decline. The same is true for the post-Communist societies represented in this "new EU" grouping—at least since the end of Communism. But Russia is a gruesome exception to these European tendencies. Its mortality level—both under Communism and

since—has been erratic and unstable, with improvements in one period tending to be erased by mortality upswings in the next.

As is well known, Communist Europe had much poorer public health performance than non-Communist Europe in the final decades of the Cold War Era. In 1990, mortality levels for what are now the "new EU" countries were on average 46% above those of the "old EU"; RF mortality levels were about 53% higher. This means mortality levels in Russia and much of the rest of Communist Europe were fairly similar at the end of the Soviet era. After that, however, the mortality gap between Russia and those former Soviet bloc states widened. Evidently, whatever ails Russian public health cannot be attributed solely to a legacy of Soviet-style Communism.

When Russia's life expectancy headed into a phase of sustained (albeit now interrupted) improvement after 2005, age-standardized mortality likewise reached a turning point in 2005, dropping sharply thereafter. The standardized mortality differential between Russia on the one hand and both "old" and "new" EU countries on the other narrowed—but only to a degree. By 2015 (the most recent year for which the WHO HFA dataset has number for all three places in question) age-standardized mortality was still 35 percent higher than in the "new" EU countries, and a bit over twice as high as in the "old" EU countries. Those differentials narrowed further, through 2019, before splaying out again.

The relative improvements in overall Russian mortality from 2005 up to 2019 can be seen in Figure 15, which draws on estimates from the University of Washington's Institute of Health Metrics and Evaluation (IHME), and compares age-standardized mortality in Russia to that of the OECD countries since 1990. (See Figure 15). Remember that the OECD now includes a number of countries that were members of the Soviet bloc.

By these estimates, age-standardized mortality dropped more dramatically between 2005 and 2019 in Russia than the OECD—but because RF mortality trends over the previous decade and a half had been so awful, the death mortality gap separating Russia and the OECD was actually wider in 2019 than it had been in 1990, in the last days of Soviet Communism. In 1990, Russian age-standardized death rates were around two fifths higher than those of (current) OECD countries. Nearly three decades later in 2019, they were almost three fourths above OECD levels. According to IHME, the EU-Russia mortality differential doubled between 1990 and 2019—from a 37% surfeit for Russia in 1990 to a 74% surfeit in 2019.[29] Those Russian differentials with OECD and EU would be even wider today, in the wake of Covid-19, if we had those up to date numbers.

In "least developed countries," foreshortened life is typically due to the collision of malnutrition and communicable disease (tuberculosis, malaria, cholera and other "diseases of poverty"). Although Russia's TB and HIV problems are very real, estimates from WHO-Europe and IHME nevertheless suggest that differences in death rates from infectious and parasitic diseases account for only a tiny share—around one fiftieth—of the vast chasm separating all-cause age-standardized mortality levels in Russia and the EU. Instead, Russia's terrible new killers are cardiovascular disease (or CVD—heart attacks, strokes, and the like) and injuries (homicides, suicides, traffic fatalities, deadly accidents).

For decades—year-in, year-out—Russia's death rates from CVD were higher than the highest levels ever recorded in any Western country (i.e. Finland, circa 1970). As late as 2008, according to WHO estimates, working-age Russian men had the worst CVD death levels of any country covered by the WHO.[30] Indeed, male CVD mortality levels for the Russian Federation

that year were about three and a half times higher than would have been predicted on the basis of the country's income.[31]

Age-standardized Russian CVD mortality fell by two fifths between 2005 and 2019 in the IHME's reckoning. Even so, 2019 CVD mortality was two and a half times higher in Russia than Finland—with similar disparities for both males and females. According to IHME, progress since 2005 notwithstanding, 2019 Russian CVD rates were still 2.7 times EU levels, and 3.2 times overall levels for the OECD—this despite the roughly equivalent levels of educational attainment in Russia, the EU, and the OECD. (See Figure 16)

As for injuries and poisonings, the WHO estimated death rates in 2008 for working-age Russian men were four times higher than would have been predicted by their income levels—with absolute levels of violent death exceeded only in a handful of places: civil war-riven Iraq and Sri Lanka among them.[32] Violent death, of course, is overwhelmingly a male problem (as opposed to a female problem) more or less everywhere, but in Russia general levels are so shockingly high that for a time the country managed to achieve a dubious gender-equality "crossover." For much of the first decade of the 21st Century, according to IHME, age-standardized death rates from injuries and poisonings were higher for Russian *women* than for EU or OECD *men.* (See Figure 17).

Between 2005 and 2019, Russia reportedly managed to cut mortality from injury and poisonings by more than half—a meaningful achievement. Even so, 2019 Russian injury and poisoning death levels remained over twice as high as in the OECD, and over two and a half times higher than in the EU.

While the mortality gap between Russia and the West (whether by that we mean the EU or the broader OECD grouping) narrowed between 2005 and 2019, it remained imposing in

scale—and its basic structure was unchanged. In 2019, as earlier, almost all of Russia's mortality excess was attributable to its much higher level of adult mortality, and its much higher rates of death from non-communicable disease (NCD)—specifically, cardiovascular disease and injuries/poisonings. These two killers accounted for 94% of the overall difference in Russia/EU death rates in 2019, and for 98% of the death gap separating Russia and the OECD. As Figure 18 demonstrates, even in its "peak health" year of 2019, Russia remained an outlier in the structure of its cause-of-death structure. (See Figure 18)

We have identified only the mystery of Russia's mortality structure for the reader here; explaining that mystery stands as a major task in its own right, one far beyond the scope of this paper.[33]

Russia's "Knowledge Production" and "Knowledge Economy" Problems

Russia's "high education, low human capital" paradox does not end with health: it shows up acutely in the country's "knowledge production" and "knowledge economy" deficits, too. Nowadays long-term economic progress depends critically on improving productivity through knowledge—but this is something Russia appears oddly ill-equipped to do.

America's Patent Office (now known as the U.S. Patent and Trade Office or PTO) was established in the 1830s, but nearly half of its total patent awards and well over half of its awards to foreign inventers have been granted just since the year 2000. Of the 2.5 million such overseas patents awarded between 2000 and 2020, applicants from Russia took home fewer than 6,600—a mere 0.3% of the overseas total, and in fact a smaller fraction of total international patents than Washington had earlier awarded to the former USSR during the Soviet era. In the 2002-2020 period, Russia—the country with the world's ninth largest population—ranked 25th in the PTO's

award tally: behind places like tiny Norway and Finland, and only just ahead of New Zealand. (See Figure 19).

To situate Russia's performance within the context of America's fifty states , the Russian Federation's total annual PTO awards, though gradually increasing, are currently only on par with the state of Alabama. (See Figure 20). But Alabama's population is just 5 million—while Russia's is over 140 million, very nearly 30 times larger.

Although it boasts of some fine research facilities, Alabama is not one of America's "knowledge production" hubs. The contrast between Russia and California is telling. Russia's population is over three and a half times larger, but in 2020 California produced over 80 times more patents—meaning that on a per capita basis Californians generated 300 times more U.S. patents than Russians.

Perhaps some harbor suspicions that the U.S. patent regime is biased against Russia (although that would also raise the question of how the old Soviet system managed to fare better than the new Russian Federation in US PTO grants). So another take on the Russian knowledge creation problem can be drawn from the international Patent Cooperation Treaty (PCT), the global system for tracking these out-of-country applications. Once again, Russia's performance is extremely poor. In 2019, according to the UN World Intellectual Property Organization, Russia came in number 22—after Austria and Belgium—racking up less than 0.5% of the world's total. (See Figure 21).

And Russia's record here is worse than this comparison implies. Russia has over 12 times Belgium's population and 16 times Austria's, but the share of adults with university/tertiary education is even higher, as we saw in Figure 11. This means Russia's "yield" of international patent applications per university educated working age adult would be all the lower.

We can get a better sense of the magnitude of Russia's global underperformance in international patent applications with the help of educational attainment estimates from the Wittgenstein Centre for Demography and Human Capital in Austria, a dataset akin the aforementioned Barro-Lee database.[34] Using 2020 as the benchmark year for national totals of working age people with university or tertiary education, Belgium's 2020 "yield" of international patent applications would have been 15 times higher than Russia's; Austria's 23 times higher. (See Figure 22). By this reckoning, over 50 countries in 2020—not just Western countries, and China, but also places like Saudi Arabia and South Africa—registered higher patent application yields per million working-age persons with higher education than Russia.

Structurally, Russia performs like a knowledge-poor economy. As of the year 2019, the Russian Federation accounted for about 2% of the world's population.[35] By the estimations of the World Bank, Russia's PPP-adjusted share of global economic output that same year was half again as large (3.1%).[36] Yet in 2019, according to the World Trade Organization, Russia generated only 1% of total global service-sector exports (See Figure 23).

Note that international service exports are a trade in human skills—unlike merchandise trade, which is a commerce in commodities or natural resources and thus less generally "skills-intensive." Curiously, given Russia's well-known expertise in this particular realm, RF even fares poorly in information technology service exports, where its 2020 share of the global market was only slightly ahead of the Philippines. (See Figure 24).

Note as well that the Ukraine invasion seems to be affecting the talent base for Russia's "knowledge economy". Russian aggression appears to be triggering a "brain drain"—not in Ukraine, but in Russia. In the initial weeks of the war, by some estimates, up to 200,000 high-skilled Russians fled their country[37]—many of them IT specialists.[38] According to another early

assessment, as much as 10 percent of Russia's IT manpower might leave the country in just the first three months of the war.[39] Depending on the coming course of that war, and on the consequent Russian domestic outlook, the bleed of talent out of Russia may be faster or slower in the months and years ahead—but it is difficult at the moment to envision a plausible scenario that staunches the outflow altogether. Thus the newly precipitated decline in manpower for Russian "knowledge production" and the Russian "knowledge economy" could, all else equal, further diminish RF performance in those realms.

Russia's Demographic/Human Resource Outlook

Compromised as Russia's current demographic and human resource situation may appear, the outlook for the years ahead promises to be still less favorable—at least in relative terms, the metric arguably most important to would-be practitioners of power politics in the Kremlin.

Consider first the matter of "headcounts"—total population and its composition. Given the birth slump of the past two decades, Russia's labor force, which is already shrinking, is set to be still smaller in 2030 and 2040 than it is today. There is not too much conjecture in these projections, given that all, or almost all, of Russia's prospective working age 2040 manpower has already been born as of 2022 (depending upon which ages groups we use to define "working age manpower").

According to U.S. Census Bureau estimates and projections, Russia's 20-64 cohort peaked in 2011 and is on a path of steady shrinkage through at least 2040, while the 25-54 "prime working age" group peaked two decades ago, back in 2002. Very similar prognoses are offered by the UNPD (for ages 15-64), the Wittgenstein Center (ages 20-64), and—not so

incidentally—by *Rosstat*. Early 2020 projections from *Rosstat* extend only to 2036, but all three variants—high, medium and low—envision a smaller 15-64 population for Russia in 2036 than in 2021. (See Figures 25-26). In light of continuing prospective growth of global working age population over the decades immediately ahead, the absolute drop in Russian manpower can only mean that Russia's share of global manpower is set for continuing decline; "medium variant" UNPD projections suggest Russia's share of global 15-64 working age manpower could be just half as large in 2040 as in 1990, near the end of the Cold War. (See Figure 27).

Then there is the issue of Russia's total future population—a somewhat more conjectural matter that begs the question of births and deaths in the years ahead.[40] There is reason to think that Russian deaths will continue to outnumber Russian births. One of the principal reasons for that surmise is that Russia's population structure is creating long-term pressure for both higher death totals and lower birth totals. (See Figure 28). Due to the post-Soviet baby crash of the 1990s and the early 2000s, the pool of Russian women entering their 20s is set to stagnate or shrink for the next decade and more. At the same time, the overall Russian population will be getting greyer. Again, there is little presumption here, as most of the people under consideration are already alive and living in Russia. All other things being equal, these two trends create pressure for increasing "negative natural increase"—even if fertility does not drop below current levels, and Russia does not experience any further health setbacks.

Future Russian fertility prospects will depend in large measure on the outlook for desired family size on the part of prospective parents. Barring some true revolution in attitudes, continuation of sub-replacement childbearing seems the most likely trend for the decades ahead. For their part, the prospects for long-term improvements in Russian mortality might be somewhat more constrained than one might first assume. For mortality trends are "cohort-

dependent," following the life course of the men and women in question. Russia's current cohorts have a significant measure of "negative health momentum" in their population structure, as may be seen by comparison with counterparts in Japan, where each rising generation experiences lower death rates at any age than his predecessors. (See Figures 29-30).

This matter of "negative momentum" is one reason the UNPD's projections for Russia's life expectancy are so cautious for the decades immediately ahead. Russia's combined male and female life expectancy at birth, by the UNPD's reckoning, was over 20 years higher than for the world's "developing regions" in the early 1960s. But Russian levels were indistinguishable from those of "the developing regions" (aka "Third World" countries) by the early 21st Century—and UNDP projections envision that symmetry to continue for the next several decades. (See Figure 31).

To be sure: in the 2022 revisions of its "World Population Prospects" compendium, UNPD is somewhat more 'optimistic' about Russia's mortality outlook than in its previous assessment (released in 2019). Currently the UNPD series suggests that RF life expectancy fell below the developing region's level for a few years in the first decades of the 21st Century, and then again during the Covid-19 pandemic, but would be two years above this agglomeration's life expectancy by 2040 and about two and a half years above it by 2050.[41] Even so—that would be six years below projected 2040 life expectancy for the 'developed regions' (an average already somewhat reduced by the UN's decision to define Russia as part of that grouping).[42]

This background helps explain why all of the demographic authorities offering projections for Russia's future population see Russia as a net-mortality society in the years ahead. (See Figure 32). That same vision is shared by Russia's official statistical service, *Rosstat*, in all its projections—including its "high variant" for Russia.

Given such portents, continuing depopulation in Russia would only be prevented by substantially increased immigration. Immigration is an imponderable for demographers since it is so dependent upon non-demographic factors. But with that important caveat in mind, we may note that population decline is regarded as the plausible outlook for Russia for the next several decades: under all "scenarios" contemplated by the UNPD; the U.S. Census Bureau's International Data Base; the Wittgenstein Center—and also Russia's own official *Rosstat* "medium variant" projection. (See Figure 33). Note, furthermore, those *Rosstat* projections were released *before* the onset of the Covid-19 pandemic. Projections undertaken today would likely envision even steeper trajectories of depopulation for Russia in the years ahead.

If all this were not sobering enough for an ambitious Kremlin, Russia's geopolitical potential is being squeezed further by the rapid worldwide growth of skilled manpower pools. Russia's global share of working age manpower with secondary education, and with post-secondary education, is on track to decline even more rapidly over the coming decades than its "headcount" share of global working age manpower. (See Figure 34). Wittgenstein Center projections envision Russia as accounting for barely a fortieth of the world's highly educated working age manpower by 2040—not only trailing distantly behind the U.S., China and India, but also lagging behind Japan, Indonesia, and Nigeria by 2050. (See Figure 35).

And the economic potential of Russian human resources stands to be constrained by continuing health problems. The 2022 revisions of UNPD's World Population Prospects illustrate the problem with their projections for the risk of mortality between ages 15 and 60 (a serviceable if imperfect proxy for working age manpower). By the UNPD projections, the 2040 mortality level for Russia's 15-60 population would be almost two and a half times that of the high-income countries—and somewhat higher than for the developing regions as a whole. In

2040 Russia's working age mortality levels would be far higher than China's and Brazil's—but perhaps surprisingly, also a bit higher than India's. And although 2040 RF working age mortality would be significantly lower than for the least developed countries *in toto*, some least developed countries—Bangladesh and Senegal among them—are nonetheless projected to have lower working age mortality than Russia in 2040. (See Figure 36). Severe and enduring adult mortality troubles stand to reduce Russian worker productivity not only directly, but perhaps also indirectly—by adversely influencing the returns on investments in education and other aspects of human capital that only pay of over the longer run, and consequently also influencing decision making about committing to such long-run investments.

Concluding Observations

Russia's demographic and human resource problems are daunting. It is a country already in the grip of a prolonged if still gradual population decline driven by a continuing surfeit of deaths over births. Russia is also experiencing long-term decline in working age population. And Russia's working age manpower is beset by an extraordinary and continuing health crisis, which is generating Fourth World mortality rates for a country with First World educational attainment.

Although education is widely observed to confer health benefits in the modern world, Russia is in important respects an ominous exception to this global rule. Further, despite an adult education profile (in terms of mean years of schooling) comparable to those of affluent European OECD states, Russia seems strangely incapable of competing in "knowledge production." Russia's share of the global trade in services—that highly human-skills-intensive sector of the

world economy—is drastically smaller than one would expect for a population with such an ostensibly high level of schooling.

Surveying these various fundamentals, we may appreciate how imposing the demographic and human resource constraints on Russian potential promise to be in the years ahead. All these trends place considerable downward pressure on Russia's relative potential in the world in coming decades.

Demographic change slowly but inexorably alters the realm of the possible in human affairs. From the standpoint of ambitious leadership in Moscow, demography has been relentlessly reducing options—and stands to continue to do so, unforgivingly, as far as the demographer's eye can see.

The contrast between Russia's negative human resource trends and the Kremlin's assertive, revisionist international policies is arresting. Consider the dictator's proclivity for ever-greater risk-taking internationally, from Georgia to Crimea and now Ukraine: likewise the steady rise in implicit and explicit nuclear sabre-rattling. Greater risk taking, in the context of the contemporary Russian state, could perhaps be seen as a stratagem: one method of compensating for declining national potential. In any event, up until now the escalation of risk-taking has arguably proved a successful approach for the Kremlin and the dictator. Yet given the demographic foundations of Russian power, increasingly risky gambles simply do not look like a viable pathway over the long run.

The question is not *whether* Russian ambitions eventually come back into conformity with Russian human resource realities. Rather, it is *how* they do so. While we cannot yet know the nature of the ultimate "adjustments" of "ends" and "means" that bring Moscow's ambitions into line with the capabilities of a middle power, we can be fairly confident such adjustments

will occur sooner or later, under the pressure of brute facts, no matter what the Kremlin may wish. The scenarios that might bring Russia's current unstable geostrategic over-reach to an end deserve more examination, regardless of how unpleasant they may be to contemplate.

[1] "Putin: Soviet collapse a 'genuine tragedy,'" *NBC News*, 25 Apr., 2005, https://www.nbcnews.com/id/wbna7632057.
[2] "TRANSCRIPT: 2007 Putin Speech and the Following Discussion at the Munich Conference on Security Policy," *Johnson's Russia List*, 27 March, 2014, https://russialist.org/transcript-putin-speech-and-the-following-discussion-at-the-munich-conference-on-security-policy/ .
[3] Derived from World Trade Organization "WTO Stats"; 2021 export data for merchandise and commercial services combined; accessed 23 Apr., 2022, https://stats.wto.org/.
[4] Ibid.
[5] Tomas Frejka and Sergei Zakharov, "The Apparent Failure of Russia's Pronatalist Family Policies," *Population and Development Review* 39.4 (December 2013): 635-647. https://www.jstor.org/stable/23655311.
[6] David Adam, "The pandemic's true death toll: millions more than official counts," *Nature*, 18 Jan., 2022, https://www.nature.com/articles/d41586-022-00104-8.
[7] Cf https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Russia. Not all "excess mortality" associated with the Covid pandemic is undiagnosed Coronavirus mortality: in the USA, for example, the pandemic coincided with an upsdurge in deaths from drug overdoses. But a discrepancy on the Russian scale suggests pervasive undercounting of Covid deaths.
[8] Serbia's totals in Figure 3 would imply it would have been in the same proportional league as Russia—but it is excluded from comparison because it was not a peacetime society for the entirety of the period under consideration. Note as well the discrepancy between official Russian estimates of cumulative net mortality totals for Russia 1992-2021 and those of the U.S. Census Bureau's International Data Base: 15.7 million vs. 17.1 million. We do not attempt to reconcile those discrepancies here.
[9] Eurostat, "Population change - Demographic balance and crude rates at national https://apps.who.int/gho/data/node.main.LIFECOUNTRYlevel," 6 Jan., 2022, https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_gind&lang=en.
[10] Ibid.
[11] Details concerning fertility levels by nationality in Russia today will be available when the returns from the RF 2021 census (which was originally to be conducted in 2020) are made

available; its release is currently scheduled for December 2022, and will be found here: "In what stages does the census occur?" [В КАКИЕ ЭТАПЫ ПРОХОДИТ ПЕРЕПИСЬ?], https://www.strana2020.ru/landing/censusgoing.php.

[12] Russia's pronounced and geographically pervasive sub-replacement fertility must be borne in mind when one hears claims about the country's supposedly prolific "Muslim" population. The Pew Research Center, for example, estimates Russia's 2020 "Muslim" population at about 16 million, or roughly 11 percent of total population. To go by those figures, Russia would include far more "Muslims" than any other European country, though some European countries (from the area once under Ottoman rule) would have much higher "Muslim" proportions of their national populations. But Russia's "Muslim" groups are mainly characterized by sub-replacement fertility. We can see hints of this from regional fertility patterns—of all the historically/culturally Muslim-majority areas in Russia, only Chechnya's fertility levels are persistently above replacement. While Russians of Muslim heritage may on average have higher fertility than the rest of the country—and thereby stand to account for a somewhat larger share of national population in the years ahead than they do today— Russia's "Muslims" are also on a trajectory of overall population decline unless their current childbearing patterns dramatically change.

[13] Eurostat, "NUTS – Nomenclature of Territorial Units for Statistics," https://ec.europa.eu/eurostat/web/nuts/background.

[14] Derived from https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do, Fertility indicators; under the assumption that EU required a TFR of 2.07 for population stability in 2018, as implied in WPP 2019 projections for Europe for the 215/20 period. Cf. https://population.un.org/wpp/DataQuery.

[15] Cf. Van De Kaa, "Europe's second demographic transition," *Population Bulletin*, 42.1 (1987): 1-59. https://pubmed.ncbi.nlm.nih.gov/12268395/.

[16] World Health Organization, Global Health Observatory Data Repository, "Life Tables by Country," https://apps.who.int/gho/data/node.main.LIFECOUNTRY; the WHO estimates life tables for 194 countries and territories.

[17] The United Nations' officially designated "Least Developed Countries" are:
"defined as low-income countries suffering from structural impediments to sustainable development." United Nations, Department of Economic and Social Affairs, Economy Analysis, "2021 Country Snapshots," 5 May, 2021.
https://www.un.org/development/desa/dpad/publication/2018-country-snapshots/.

[18] Combined survival schedules for the countries and regions in question for 2019 derived from World Health Organization, Global Health Observatory Data Repository, "Life Expectancy: Life tables by country," accessed 24 Apr., 2022,
https://apps.who.int/gho/data/node.main.LIFECOUNTRY.

[19] Robert Barro and Jong-Wha Lee, "A New Data Set of Educational Attainment in the World, 1950-2010," *Journal of Development Economics* 104 (2013): 184-198.
https://www.nber.org/papers/w15902.

[20] MYS profiles for the 25+ populations are unlikely to have changed greatly over the past decade, given the gradual nature of population-wide changes in educational attainment.

[21] Human Mortality Database, University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany), accessed May 1, 2022.
https://www.mortality.org/.

[22] Cf. Nada Hammadeh, Catherine Van Rompaey, Eric Metreau and Shwetha Grace Eapen, "New World Bank country classifications by income level: 2022-2023,"*World Bank Blogs*, 1 July, 2022, https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2022-2023.
[23] Cf. United Nations, Department of Economic and Social Affairs, Population Division, "Life expectancy at birth," *World Population Prospects: The 2022 Revision*, https://population.un.org/dataportal/data/indicators/61/locations/643,1503,1501,1502,1505,1500/start/2019/end/2019/table/pivotbylocation; see also "World Development Indicators," The World Bank, https://databank.worldbank.org/reports.aspx?source=world-development-indicators.
[24] "Study Shows COVID-19 Slashed Russia's Life Expectancy By Over Two Years," *Radio Free Europe*, 5 Nov., 2021, https://www.rferl.org/a/russia-covid-life-expectancy/31547862.html.
[25] Nazrul Islam, Dmitri Jdanov, Vladimir Shkolnikov, Kamlesh Khunti, Ichiro Kawachi, Martin White, Sarah Lewington, and Ben Lacey, "Effects of covid-19 pandemic on life expectancy and premature mortality in 2020: time series analysis in 37 countries," *BMJ* 375 (2021), doi: https://doi.org/10.1136/bmj-2021-066768.
[26] "Life expectancy has fallen sharply in Russia – The Moscow Times," *Hindustan News Hub*, 24 March, 2022, https://hindustannewshub.com/russia-ukraine-news/life-expectancy-has-fallen-sharply-in-russia-the-moscow-times/.
[27] United Nations, Department of Economic and Social Affairs, Population Division, "Life expectancy at birth," *World Population Prospects: The 2022 Revision*, https://population.un.org/dataportal/data/indicators/61/locations/643/start/2013/end/2028/line/linetimeplot.
[28] WHO-Europe, "European Health for All database," accessed April 28, 2022. https://gateway.euro.who.int/en/datasets/european-health-for-all-database/.
[29] The IHME and WHO-HFA standardization "models" are slightly different, so figures from the two databases are not directly comparable.
[30] Nicholas Eberstadt, *Russia's Peacetime Demographic Crisis: Dimensions, Causes, Implications* (Seattle, WA: National Bureau of Asian Research, 2010), https://www.nbr.org/publication/russias-peacetime-demographic-crisis-dimensions-causes-implications/.
[31] Ibid.
[32] Ibid.
[33] For an initial foray, see "The Mystery of Russian Mortality" Chapter 4 in Nicholas Eberstadt, *Russia's Peacetime Demographic Crisis: Dimensions, Causes, Implications* (Seattle, WA: National Bureau of Asian Research, 2010), https://www.nbr.org/publication/russias-peacetime-demographic-crisis-dimensions-causes-implications/.
[34] For more detail, consult the Wittgenstein Centre Data Explorer; accessed Dec. 26, 2016. http://dataexplorer.wittgensteincentre.org/wcde-v2/
[35] "International Database," United States Census Bureau; accessed Dec.26, 2016. https://www.census.gov/programs-surveys/international-programs/about/idb.html
[36] "World Development Indicators," The World Bank, https://databank.worldbank.org/reports.aspx?source=world-development-indicators.
[37] Leonid Bershidsky, "Russia's Brain Drain Becomes a Stampede for the Exits," *Bloomberg*, 16 March, 2022, https://www.bqprime.com/businessweek/russia-emigration-up-after-putin-s-ukraine-invasion.

[38] Cade Metz and Adam Satariano, "Russian Tech Industry Faces 'Brain Drain' as Workers Flee," *The New York Times*, 13 Apr., 2022, https://www.nytimes.com/2022/04/13/technology/russia-tech-workers.html.
[39] Anthony Faiola, "Mass Flight of Tech Workers Turns Russian IT into Another Casualty of War," *The Washington Post*, 1 May, 2022, https://www.washingtonpost.com/world/2022/05/01/russia-tech-exodus-ukraine-war/.
[40] We leave aside immigration—not because it is irrelevant here, but because demographers have no tools by which to offer accurate forecasts for this quantity.
[41] United Nations, Department of Economic and Social Affairs, Population Division, "Life expectancy at birth," *World Population Prospects: The 2022 Revision*, https://population.un.org/dataportal/data/indicators/61/locations/643,902/start/2040/end/2050/table/pivotbylocation.
[42] United Nations, Department of Economic and Social Affairs, Population Division, "Life expectancy at birth," *World Population Prospects: The 2022 Revision*, https://population.un.org/dataportal/data/indicators/61/locations/643,901/start/2040/end/2050/table/pivotbylocation

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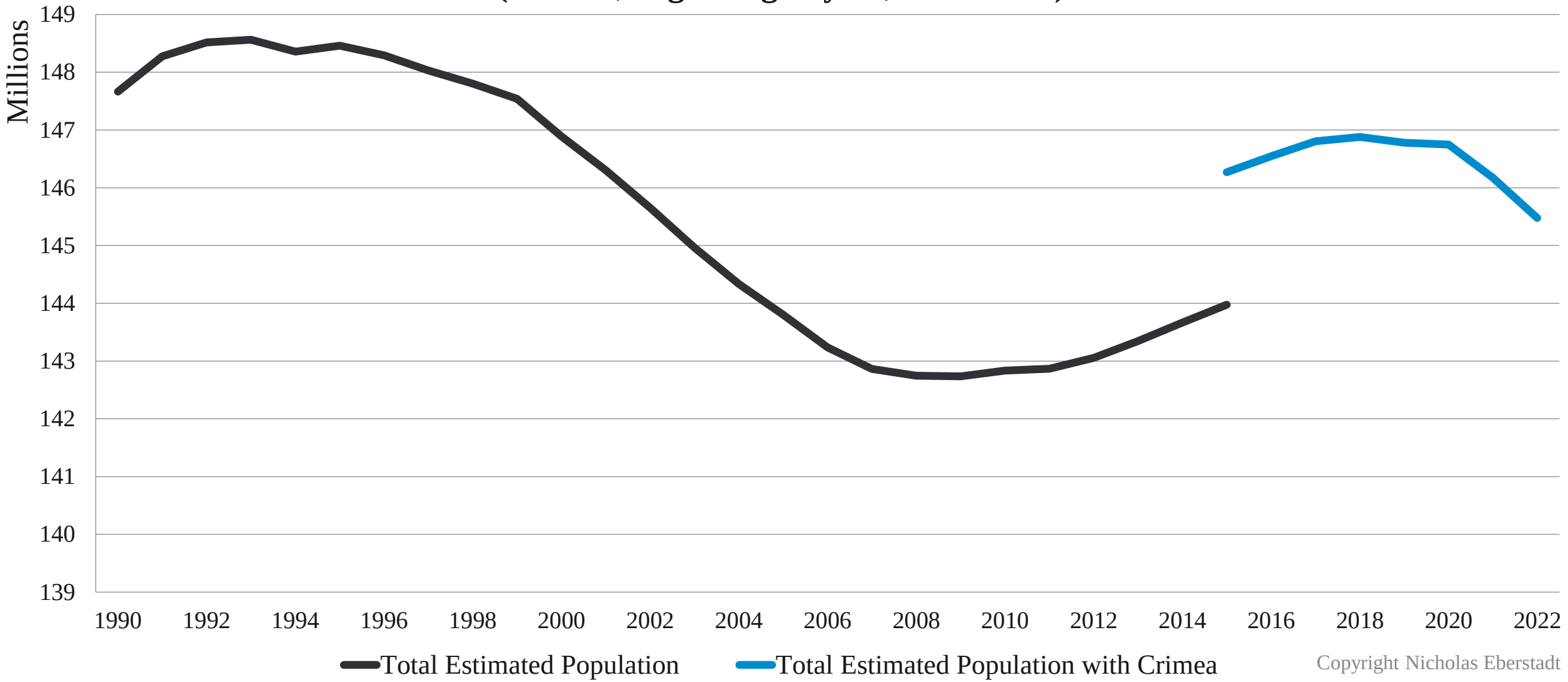
Russian Power in Decline: A Demographic and Human Resource Perspective

Accompanying Tables And Figures

Figure 1

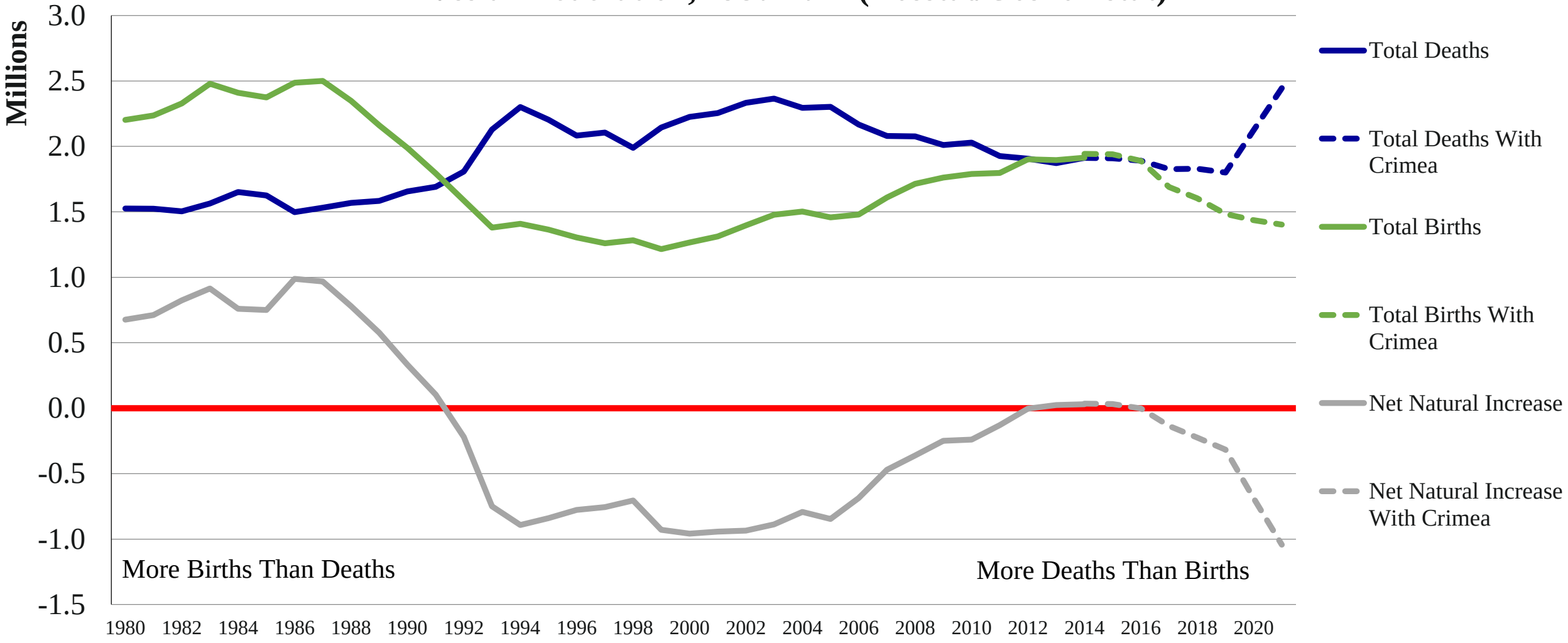
Total Population of Russian Federation, 1990-2022
(Rosstat, beginning of year, in millions)



Sources: 1990-2018: Russian Federation Federal Statistical Service (Goskomstat), The Demographic Yearbook of Russia – 2019, available at http://www.gks.ru/bgd/regl/B17_19/Main.htm accessed March 2, 2022; 2019-2021: Federal State Statistics Service, "De jure population of Russia as of January 1," https://eng.rosstat.gov.ru/ accessed March 16, 2022; 2022: "Why the Population Decline in Russia Has Hit Its Highest in History, *TRTWorld*, https://www.trtworld.com/magazine/why-the-population-decline-in-russia-has-hit-its-highest-in-history-54327, accessed March 16, 2022.

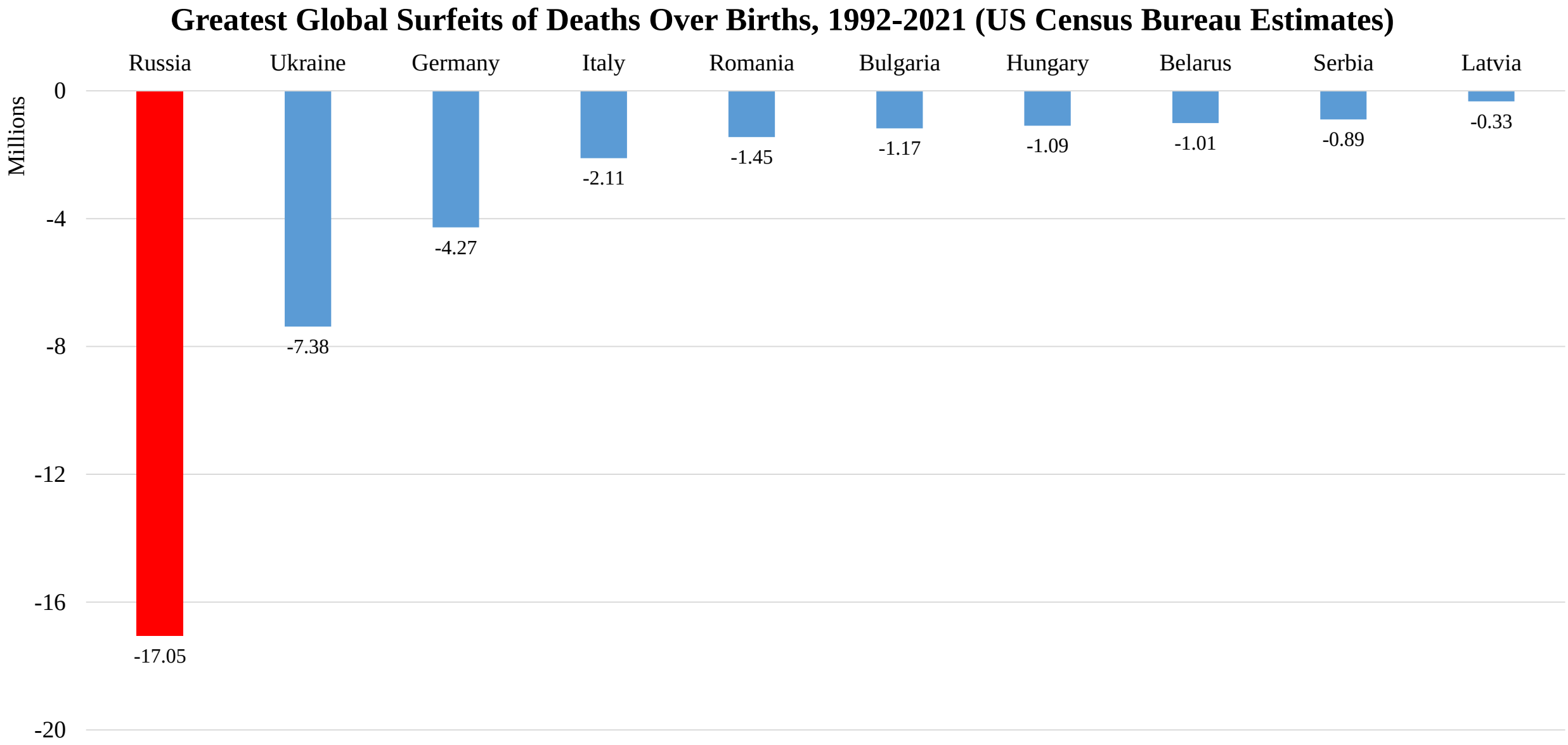
Figure 2

Births, Deaths, and Net Natural Increase: Russian Federation, 1980-2021 (Rosstat/Goskomstat)



Sources: 1980-2018: 1980 General Population Replacement Indices, The Demographic Yearbook of Russia – 2019, available at http://www.gks.ru/bgd/regl/B19_16/Main.htm, accessed March 2, 2022; 2019: RosStat, "Vital Movement of the Population Conditions of the Russian Federation – 2020 (archive)," edn12_2020k.xlsx, tab 1, https://rosstat.gov.ru/storage/mediabank/wxWlqMlx/edn2020.rar accessed March 16, 2022; 2020-2021: "General Results of the Natural Movement of the Population of the Russian Federation," https://rosstat.gov.ru/storage/mediabank/2021_edn12.htm, accessed March 16, 2022.

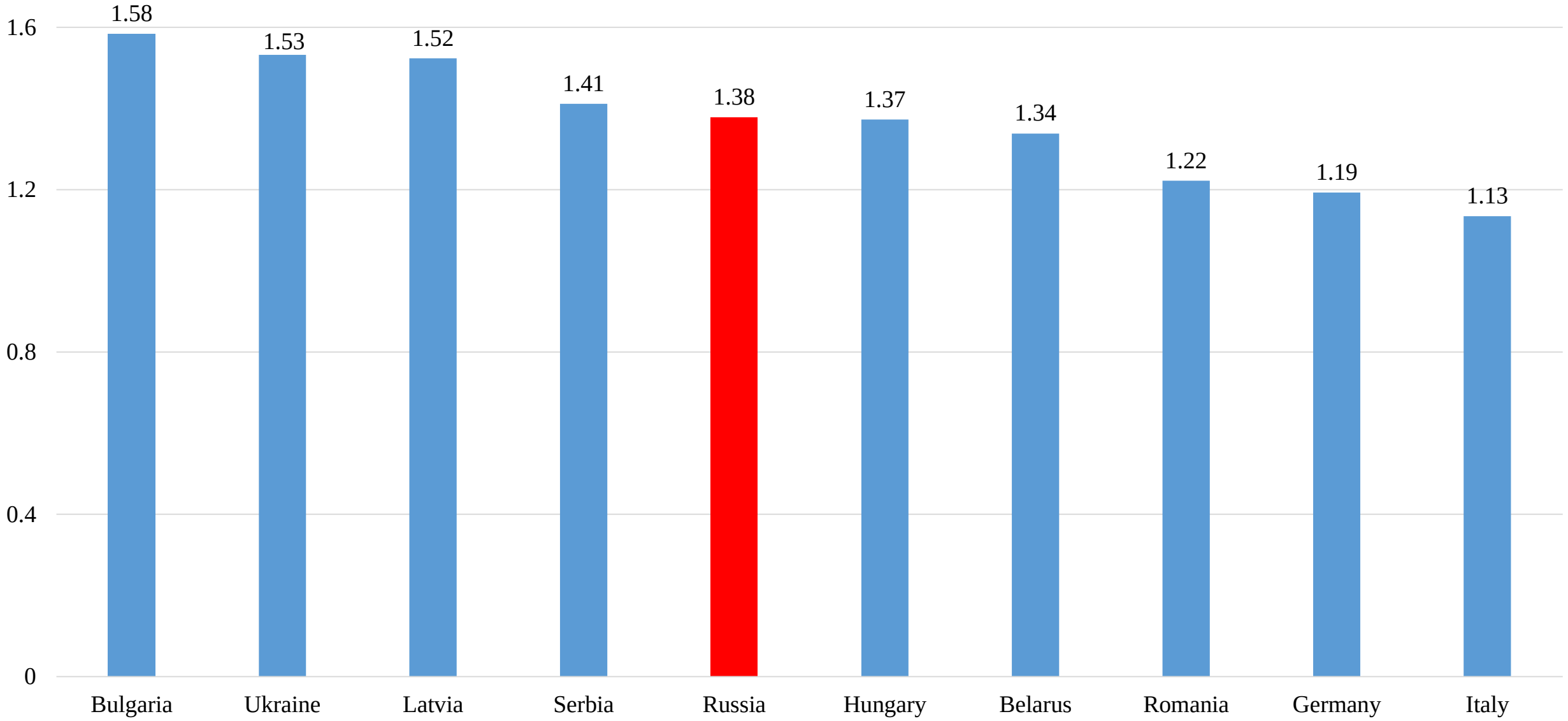
Figure 3



Source: United States Census Bureau, "Components of Population Growth 1992-2012," International Data Base, www.census.gov/population/international/data/idb/region.php. (Date Accessed: March 2, 2022).

Figure 4

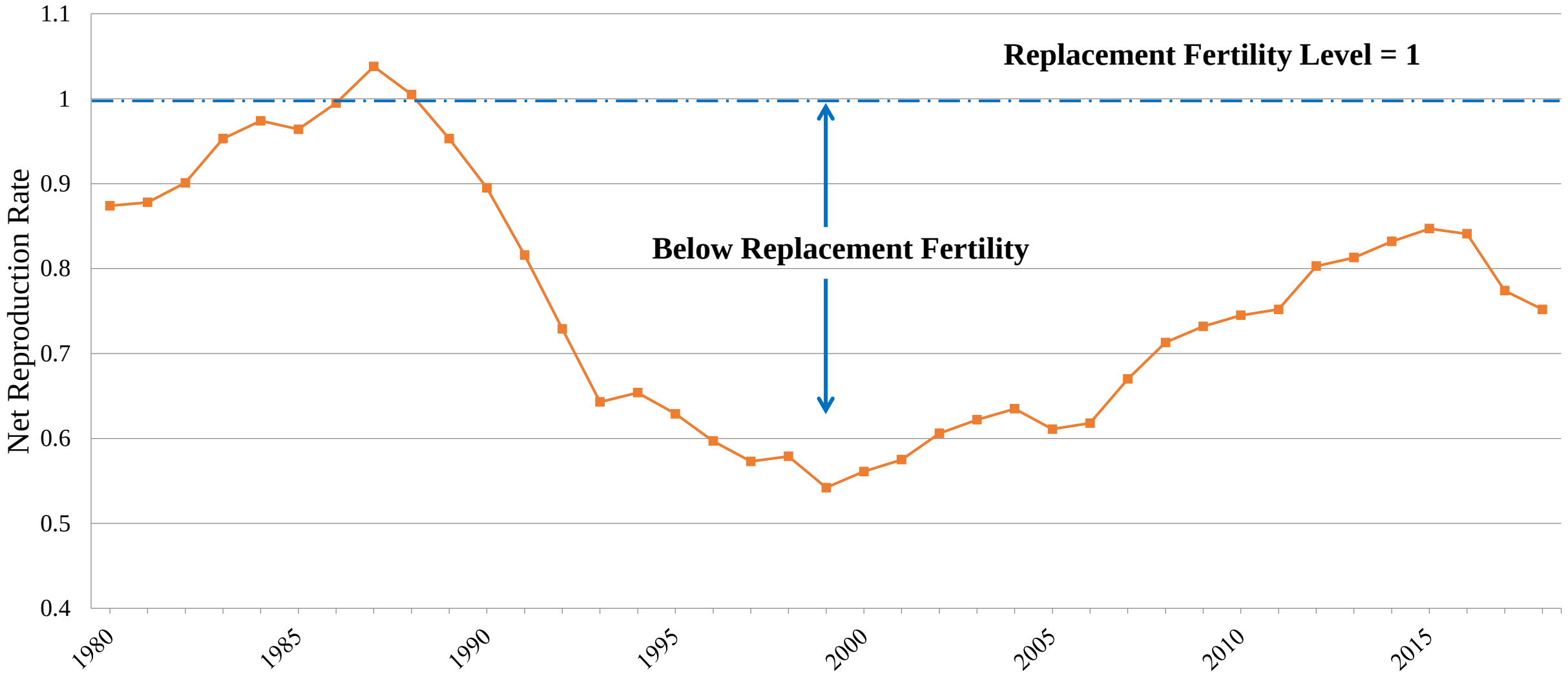
Ratio of Deaths to Births: Top 10 Net Mortality Countries, 1992-2021 (US Census Bureau)



Source: United States Census Bureau, "Components of Population Growth 1992-2012," International Data Base, www.census.gov/population/international/data/idb/region.php, (Date Accessed: March 2, 2022).

Figure 5

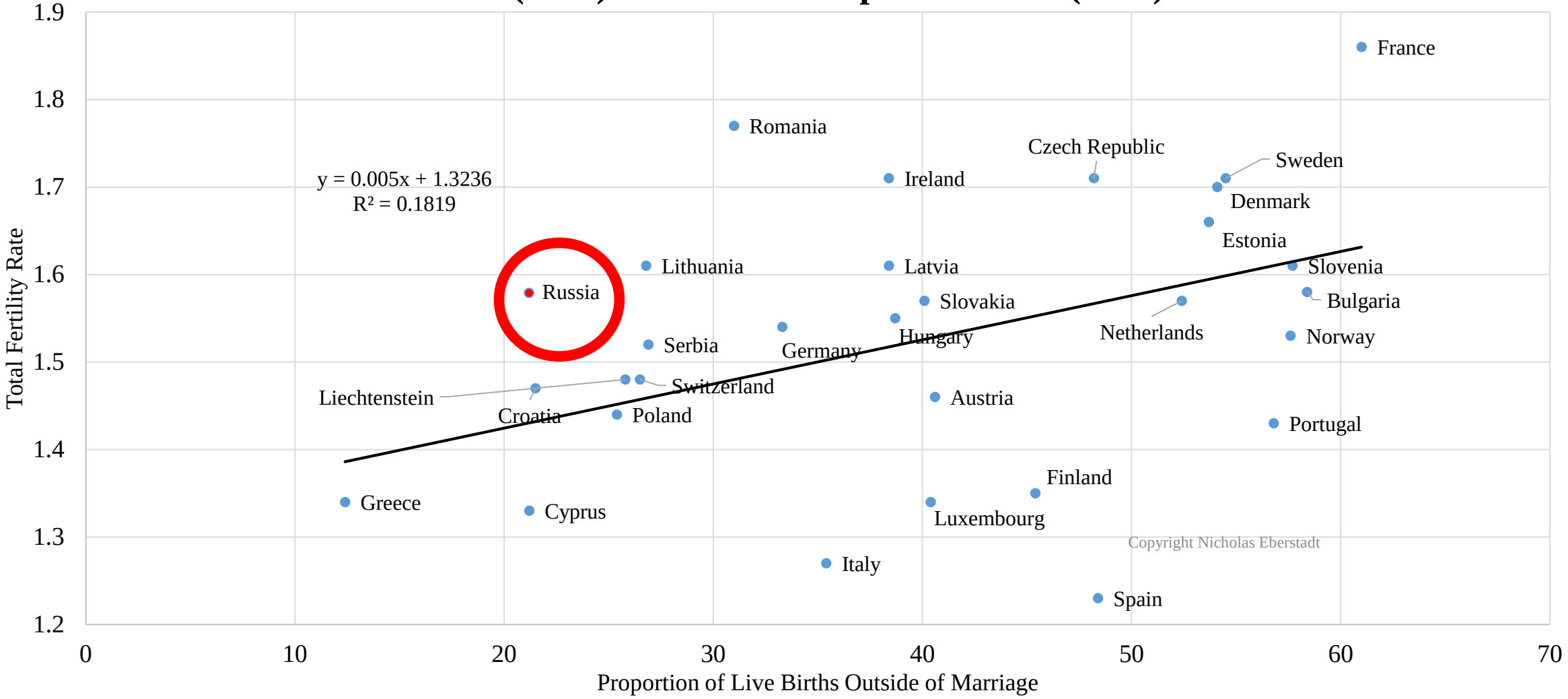
Net Reproduction Rate: Russia, 1980-2018 (Rosstat/Goskomstat Estimates)



Sources: "Table 2.08. Net Reproduction Rate," The Demographic Yearbook of Russia 2019 https://www.gks.ru/bgd/regl/B19_16/Main.htm, (Date Accessed: March 2, 2022), "Table 2.08. Net Reproduction Rate", The Demographic Yearbook of Russia 2006, http://www.gks.ru/bgd/regl/B06_16/Main.htm, (Date Accessed, April 26, 2014). "Table 2.8. Net Reproduction Rate," The Demographic Yearbook of Russia 2019, https://www.gks.ru/bgd/regl/B19_16/Main.htm. (Date Accessed, March 2, 2022).

Figure 6

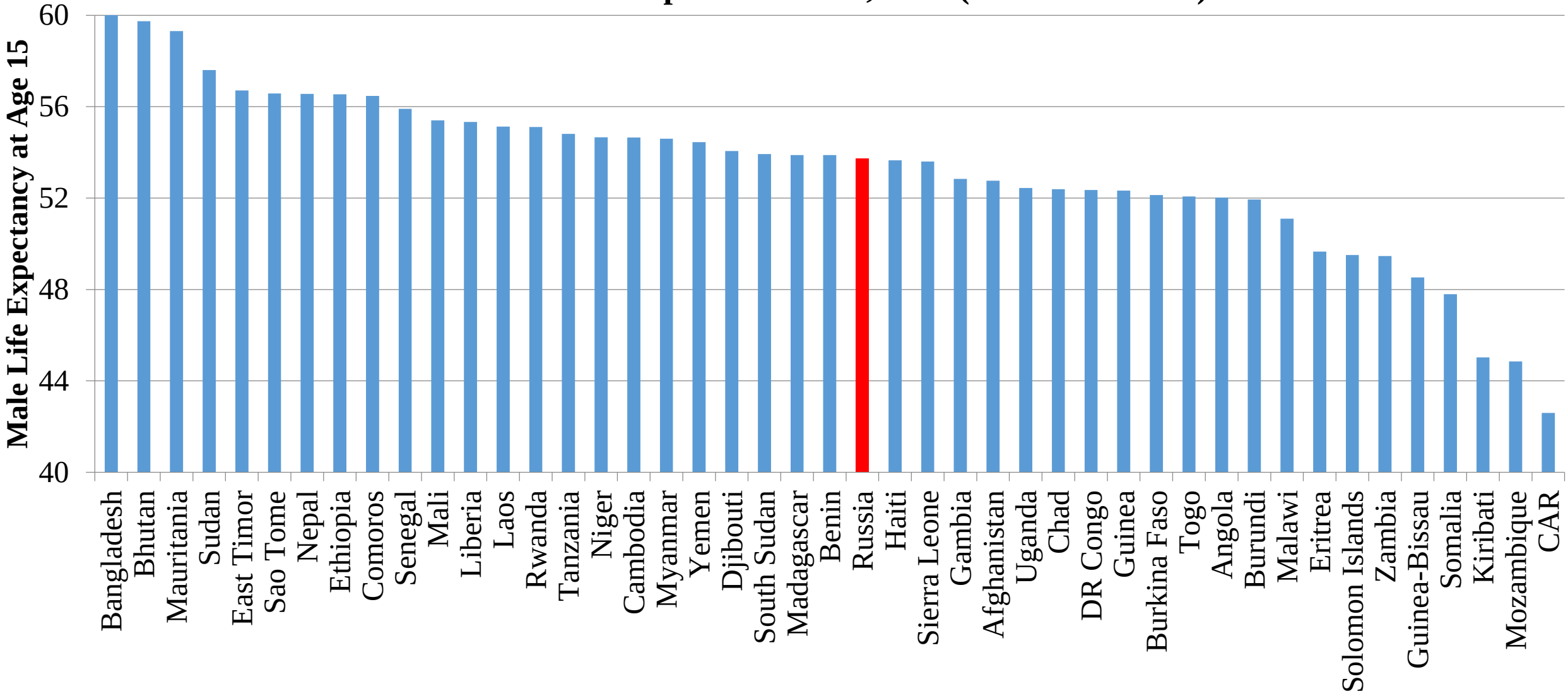
TFR vs. Percentage Births Outside of Marriage: Russia (2018) and Select European Nations (2019)



Sources: EU data: Eurostat, "Total fertility rate (TPS00199)" https://ec.europa.eu/eurostat/databrowser/view/tps00199/default/table?lang=en (accessed March 2, 2022); Eurostat, "Live births outside marriage (tps00018)" http://ec.europa.eu/eurostat/web/products-datasets/-/tps00018 (accessed March 2, 2022). Russia data: Fertility rate, total (births per woman), World Bank Data, https://data.worldbank.org/indicator/SP.DYN.TFRT.IN?locations=RU (Date Accessed: March 2, 2022); Demographic Yearbook of Russia 2017, Fertility, "Live births by mothers marital status, Table 4.5," http://www.gks.ru/bgd/regl/B17_16/Main.htm (Date Accessed: February 23, 2018).

Figure 7

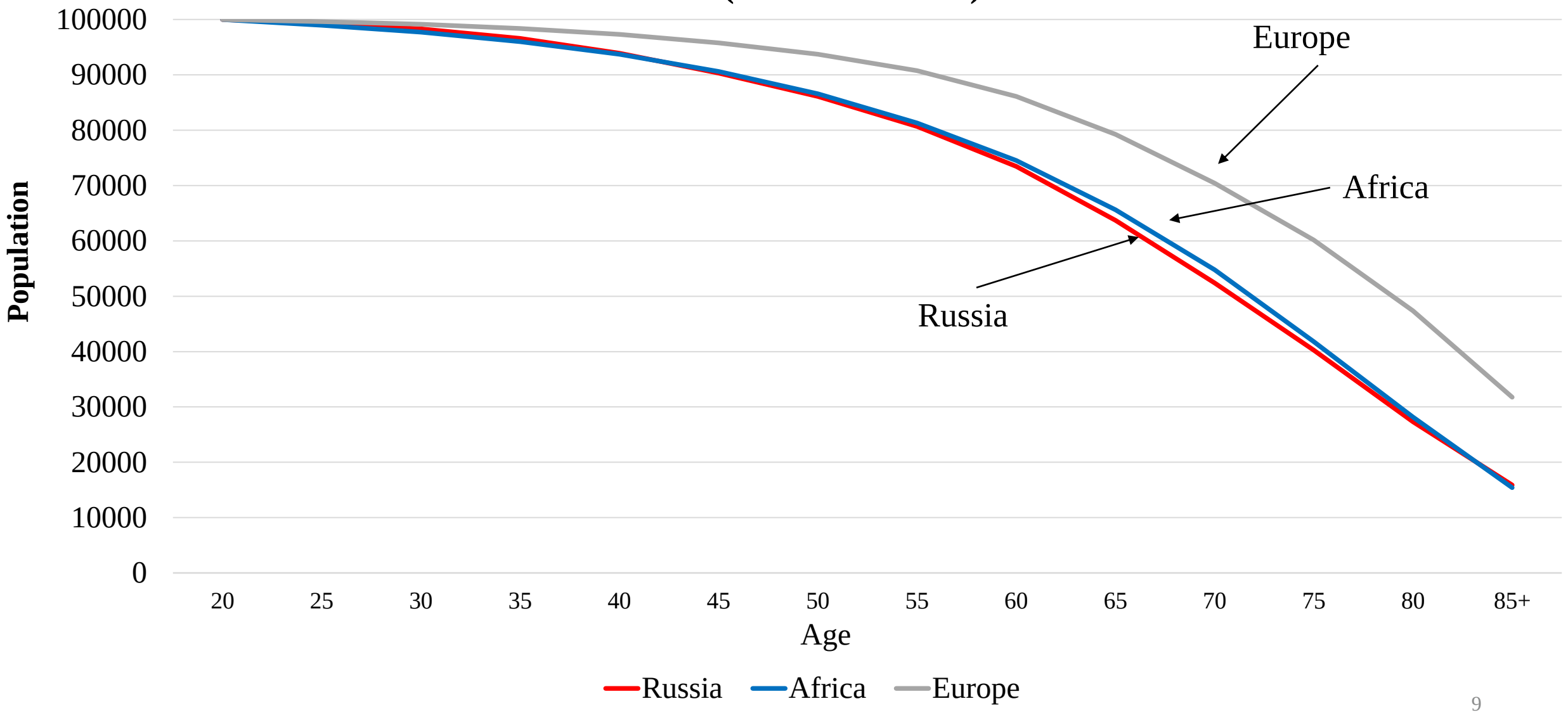
Male Life Expectancy at age 15:
Russia vs. all Least Developed Countries, 2019 (WHO estimates)



Source: World Health Organization, Global Health Observatory Data Repository, "Life Expectancy: Life tables by country," https://apps.who.int/gho/data/node.main.LIFECOUNTRY (Date Accessed: March 9, 2022).

Figure 8

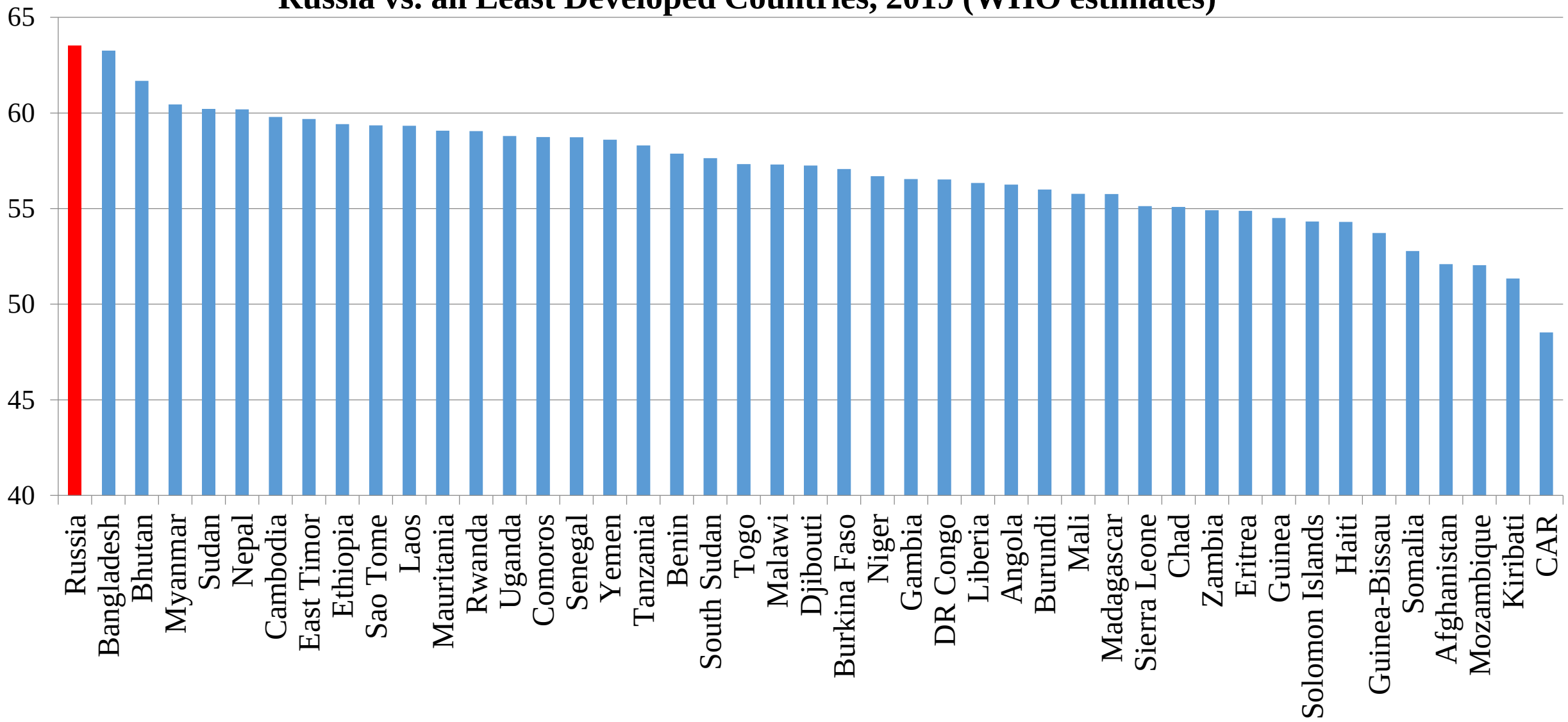
Survival Schedule for Male Population at Age 20: Russia vs. Africa and Europe, 2019 (WHO Estimates)



Source: World Health Organization, Health Statistics and Health Information Systems, http://apps.who.int/gho/data/node.main.687?lang=en/_.(Date Accessed: March 11, 2022)

Figure 9

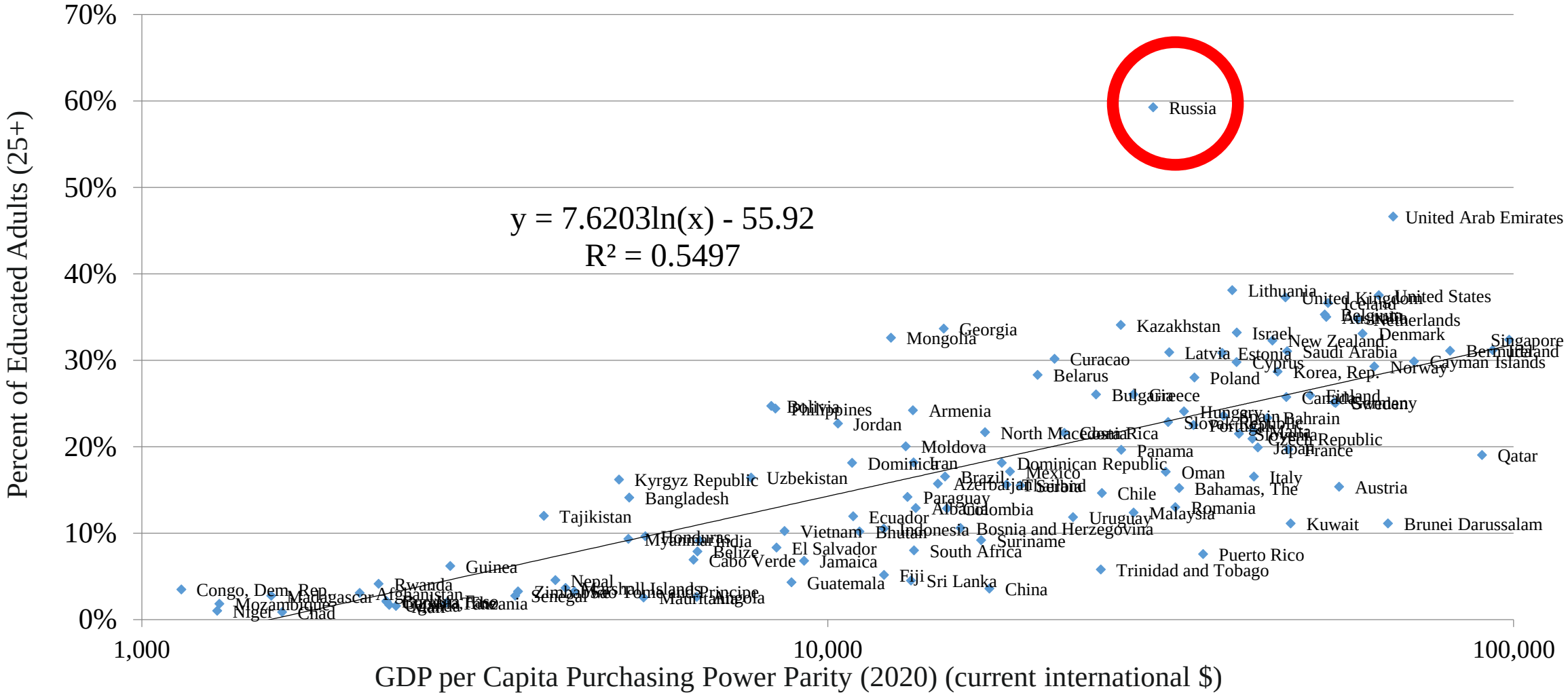
Female Life Expectancy at age 15:
Russia vs. all Least Developed Countries, 2019 (WHO estimates)



Source: World Health Organization, Global Health Observatory Data Repository, "Life Expectancy: Life tables by country," http://apps.who.int/gho/data/view.main.60600?lang=en (Date Accessed: March 9, 2022).

Figure 10

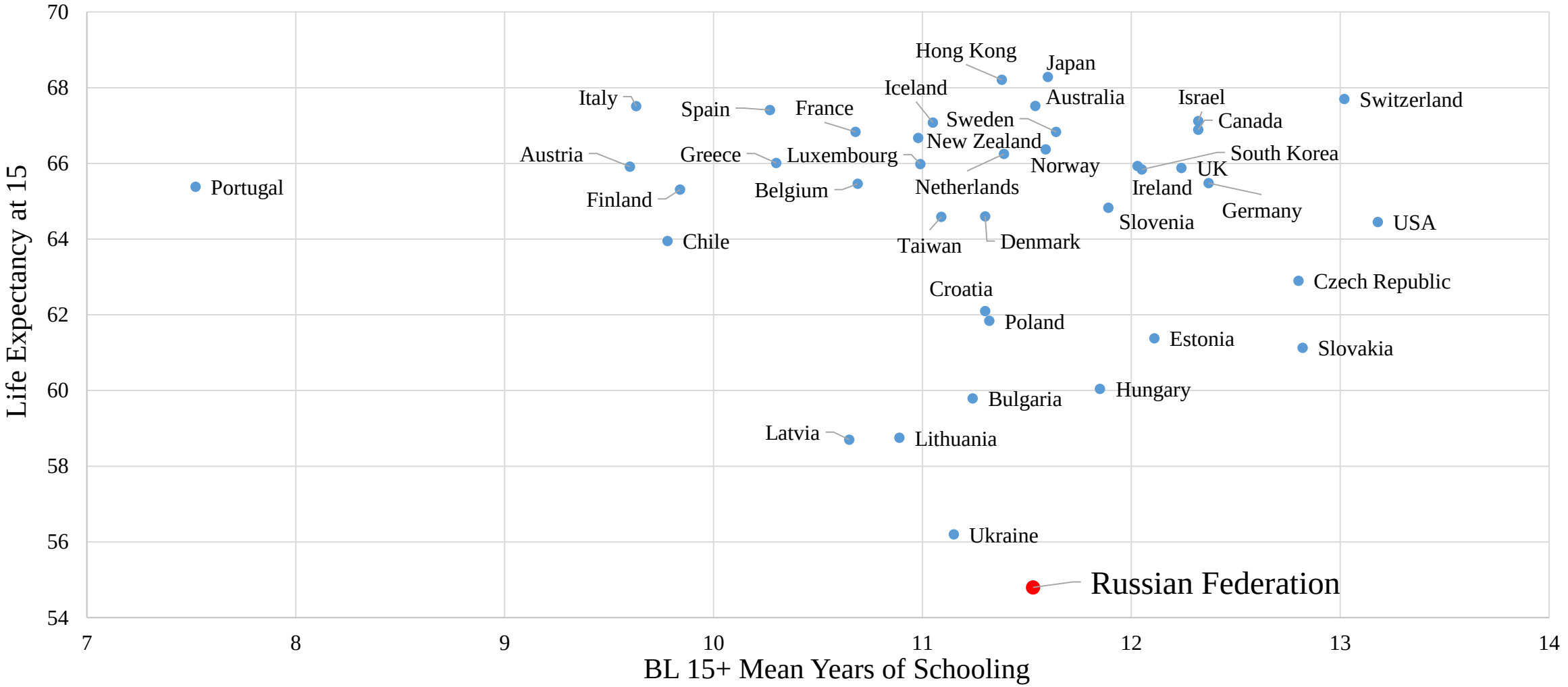
Percent of Adult Population with Bachelors Degree or Higher (latest available 2009 - 2021) versus GDP per Capita PPP: Russia and Selected Other Countries, 2020



Sources: World Bank, "GDP per Capita, PPP (Current International $)," World Development Indicators, http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD; and United Nations Educational, Scientific, and Cultural Organization Institute for Statistics, Sustainable Development Goals, "Educational Attainment Rate, completed Bachelor's or equivalent education or higher, population 25+ years, both sexes (%)," http://stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx. (Date Accessed: March 3, 2022)

Figure 11

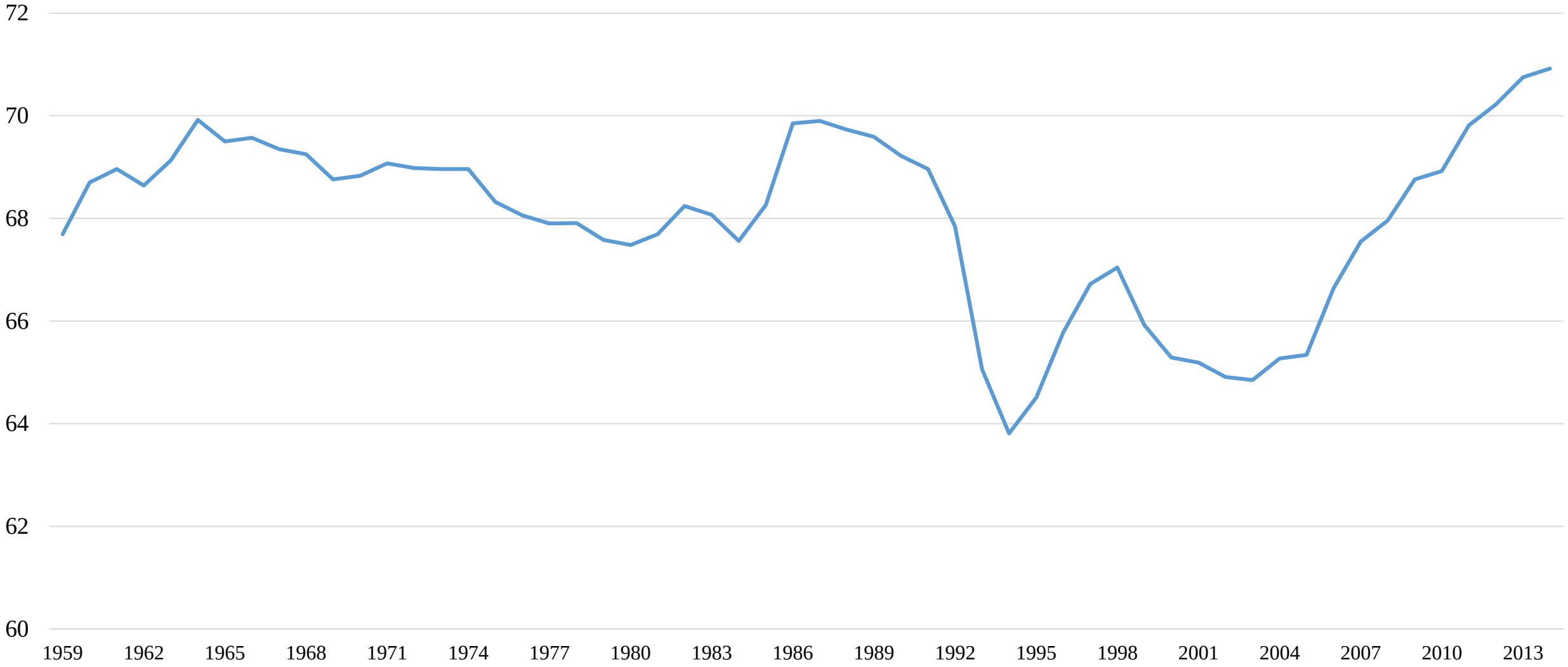
Barro-Lee Estimates of Mean Years of Schooling at Age 15 vs Human Mortality Database (HMD) Estimated Life Expectancy at 15: 2010, All 41 Countries in the HMD Database



Sources: Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany), www.mortality.org or www.humanmortality.de (data downloaded on April 25, 2022); Barro, Robert and Jong-Wha Lee, 2013, "A New Data Set of Educational Attainment in the World, 1950-2010." *Journal of Development Economics*, vol 104, pp.184-198.

Figure 12

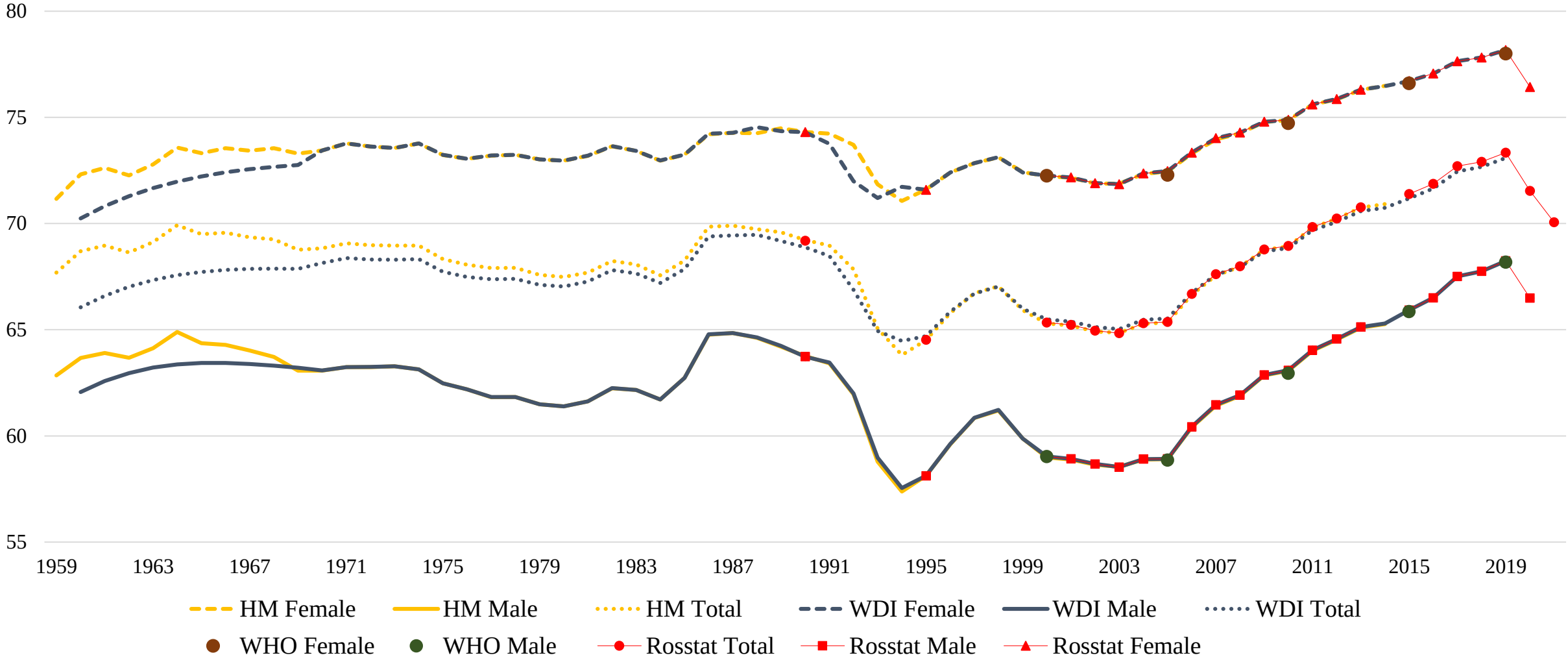
Estimated Russian Life Expectancy at Birth from the Human Mortality Database: Both Sexes, Russian Federation, 1959-2014



Sources: Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany), www.mortality.org or www.humanmortality.de (data downloaded on April 25, 2022).

Figure 13

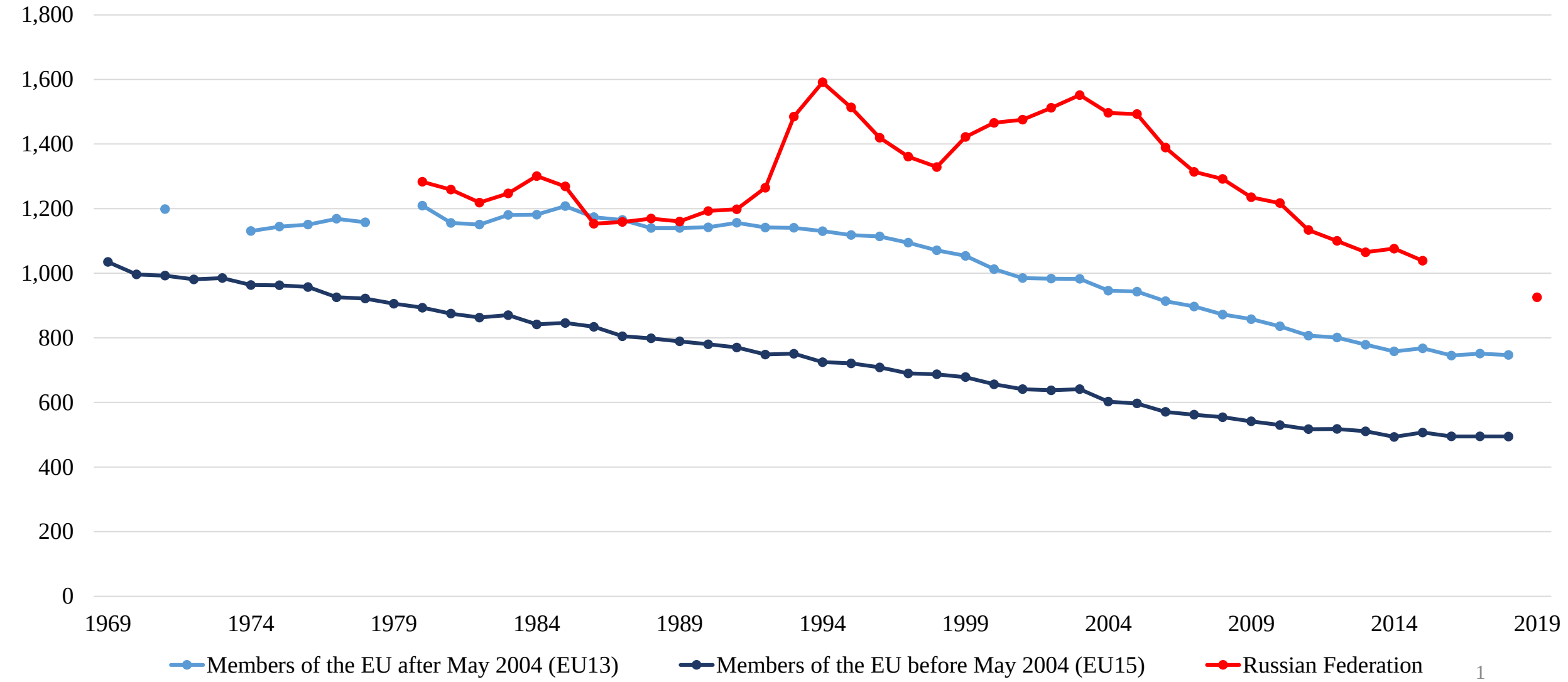
Russian Federation Life Expectancy at Birth, 1959-2021: Human Mortality Database, Rosstat, WHO and WDI



Sources: Human Mortality Database, University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany), www.mortality.org or www.humanmortality.de (data downloaded on April 25, 2022); World Health Organization Life Tables, https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-ghe-life-tables-by-country; World Bank World Development Indicators, https://databank.worldbank.org/source/world-development-indicators, Rosstat, "Life Expectancy at birth in the Russian Federation," 1990-2020: https://rosstat.gov.ru/folder/12781; 2021: http://www.demoscope.ru/weekly/2022/0939/rossia01.php.

Figure 14

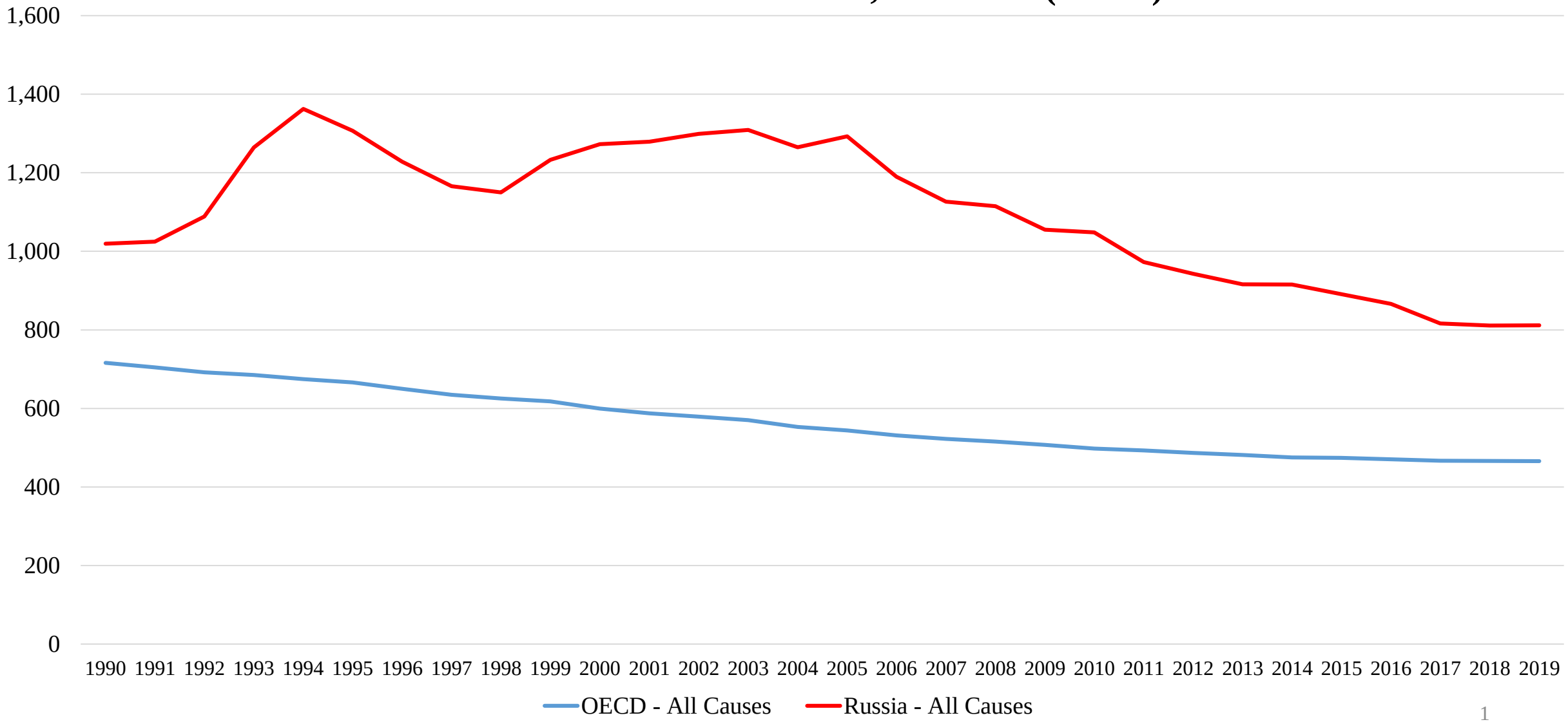
WHO-HFA Age-standardized Death Rates for All Causes and All Ages: Russia vs. "Old" and "New" EU Members, 1969-2019



Sources: World Health Organization-European Health, Health for All Database, https://gateway.euro.who.int/en/hfa-explorer/.

Figure 15

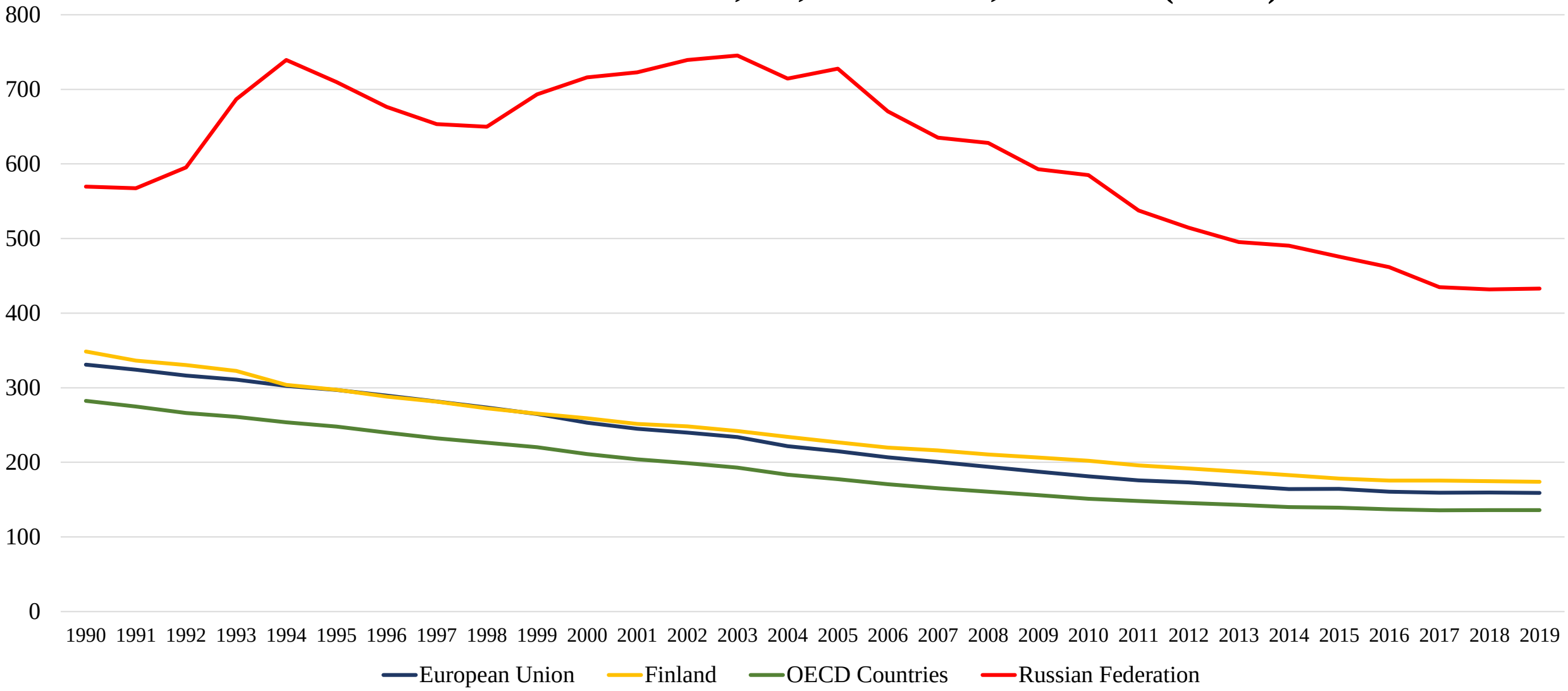
Age Standardized Death Rates, All Causes
Russian Federation vs. OECD, 1990-2019 (IMHE)



Sources: Institute for Health Metrics Evaluation, https://ghdx.healthdata.org/gbd-results-tool.

Figure 16

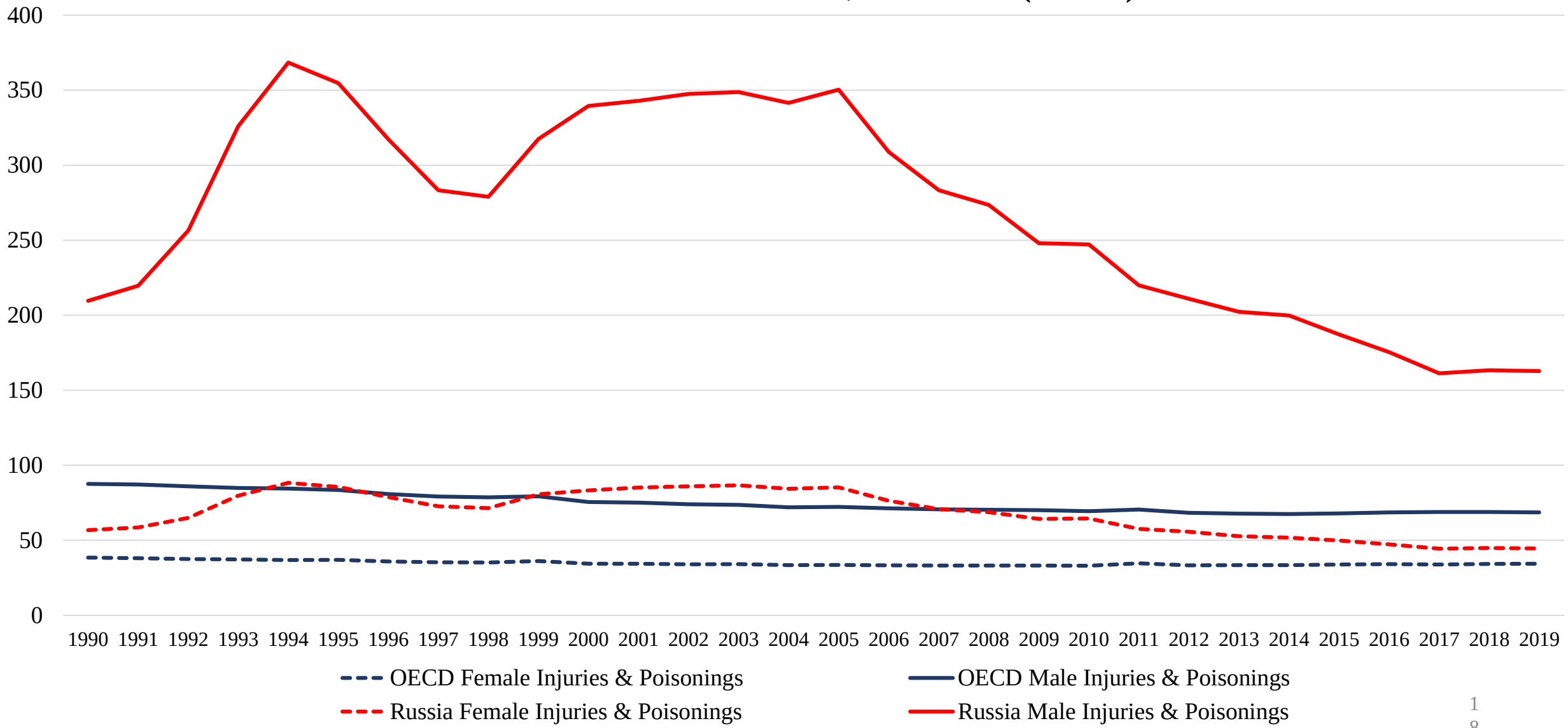
Age Standardized Death Rates, Cardiovascular Disease: Russian Federation vs. OECD, EU, and Finland, 1990-2019 (IHME)



Sources: Institute for Health Metrics Evaluation, https://ghdx.healthdata.org/gbd-results-tool.

Figure 17

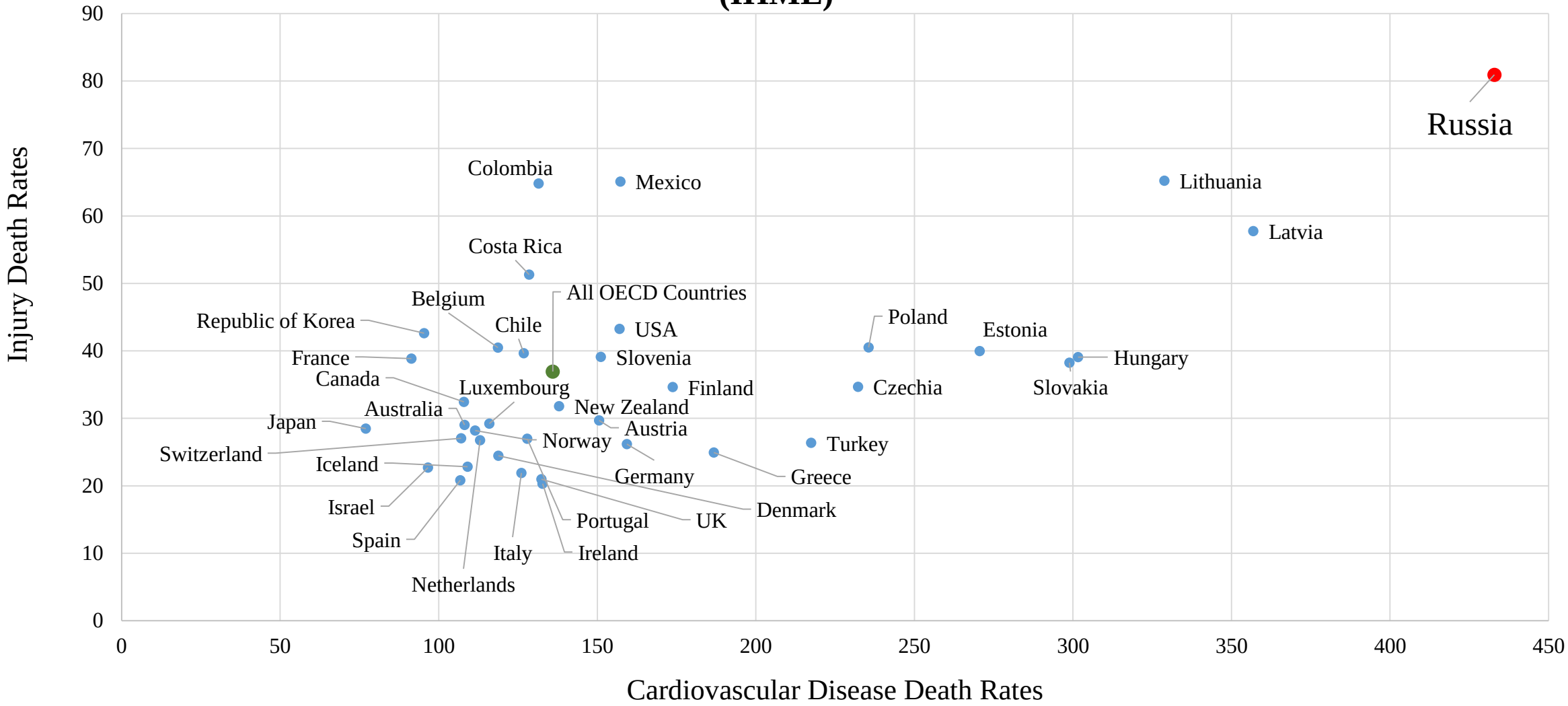
Age Standardized Death Rates, Injuries and Poisoning: Russian Federation vs. OECD, 1990-2019 (IHME)



Sources: Institute for Health Metrics Evaluation, https://ghdx.healthdata.org/gbd-results-tool.

Figure 18

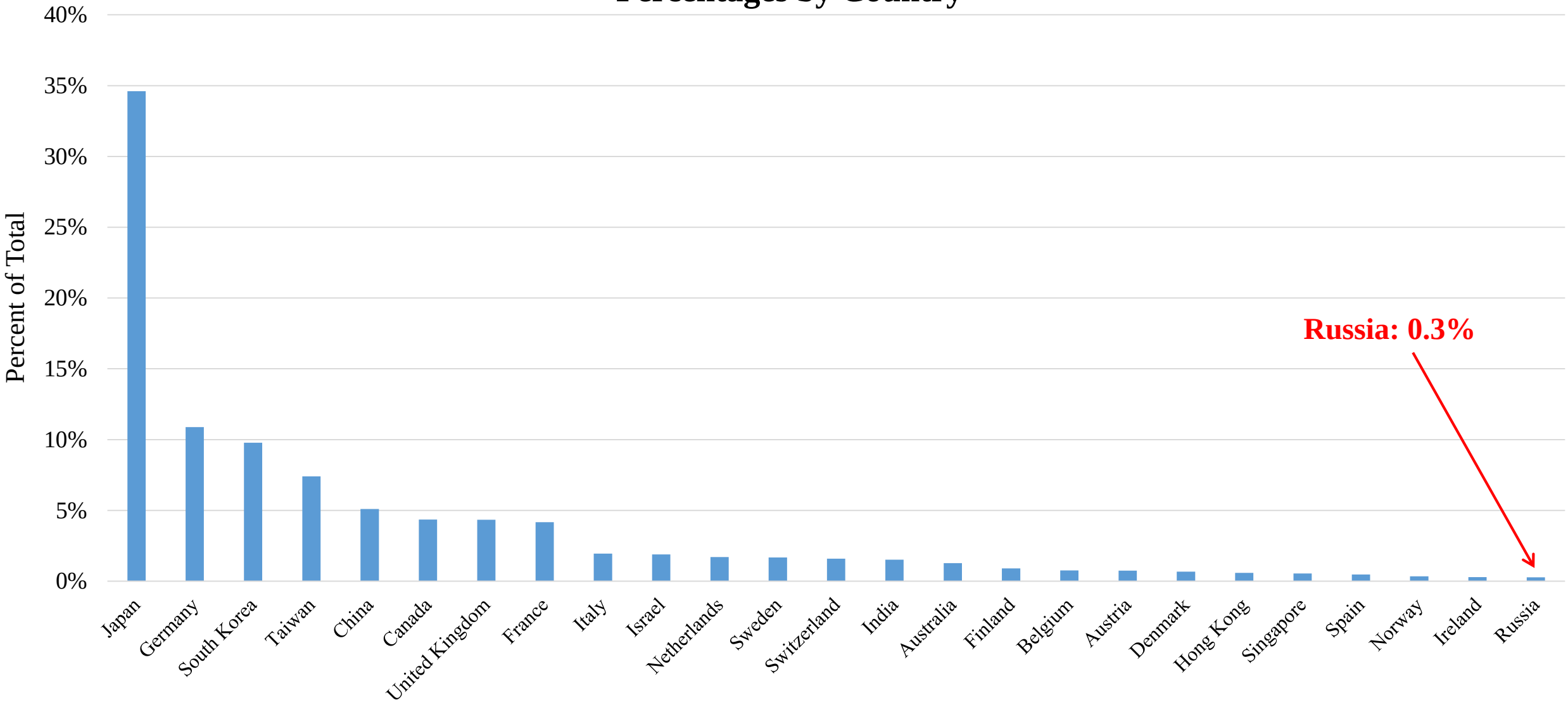
Age-standardized Death Rates from Cardiovascular Disease & from Injuries
Russia & OECD Countries, 2019
(IHME)



Sources: Institute for Health Metrics Evaluation, https://ghdx.healthdata.org/gbd-results-tool.

Figure 19

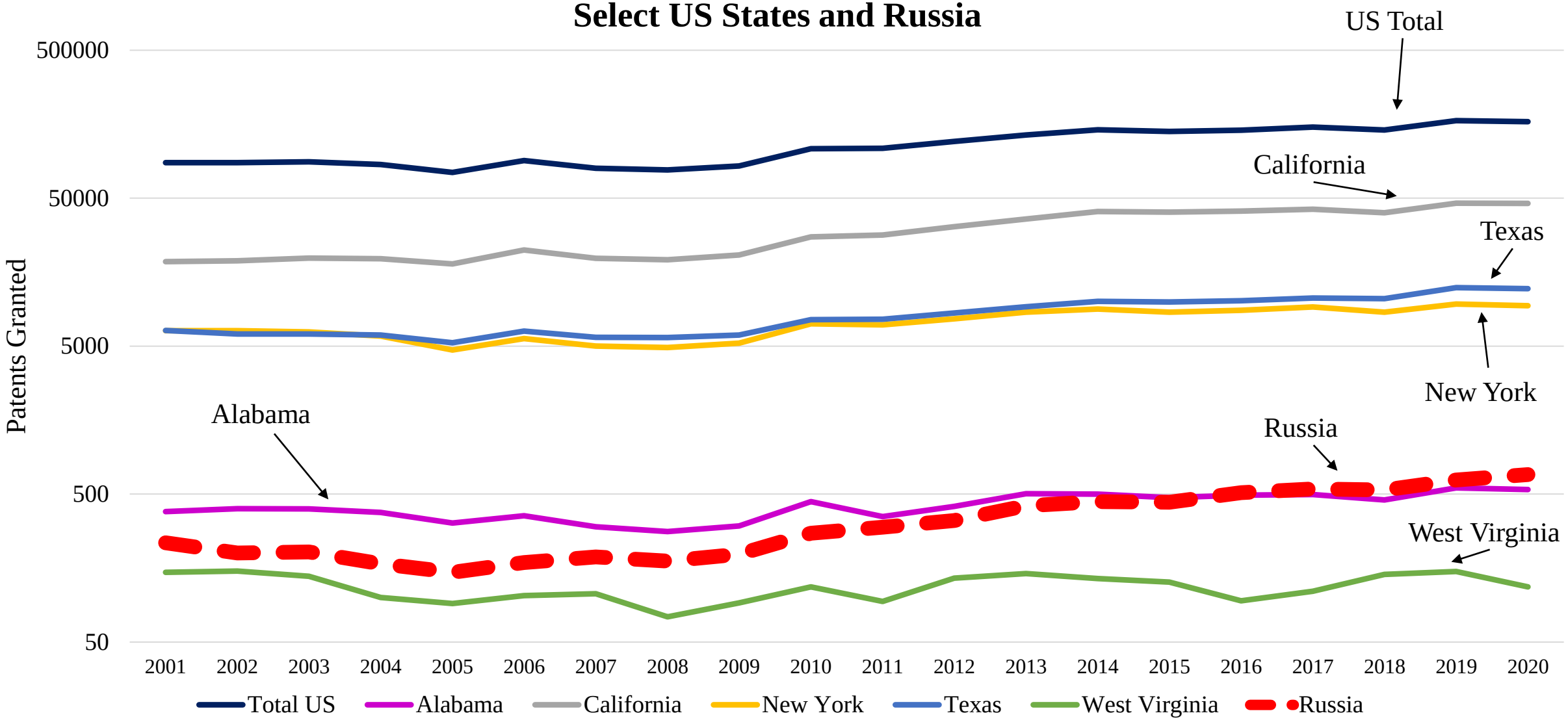
International Patent Awards by USPTO 2000-2020
Percentages by Country



Sources: USPTO, "Calendar Year Patent Statistics," https://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports_stco.htm, accessed: May 2, 2022.

Figure 20

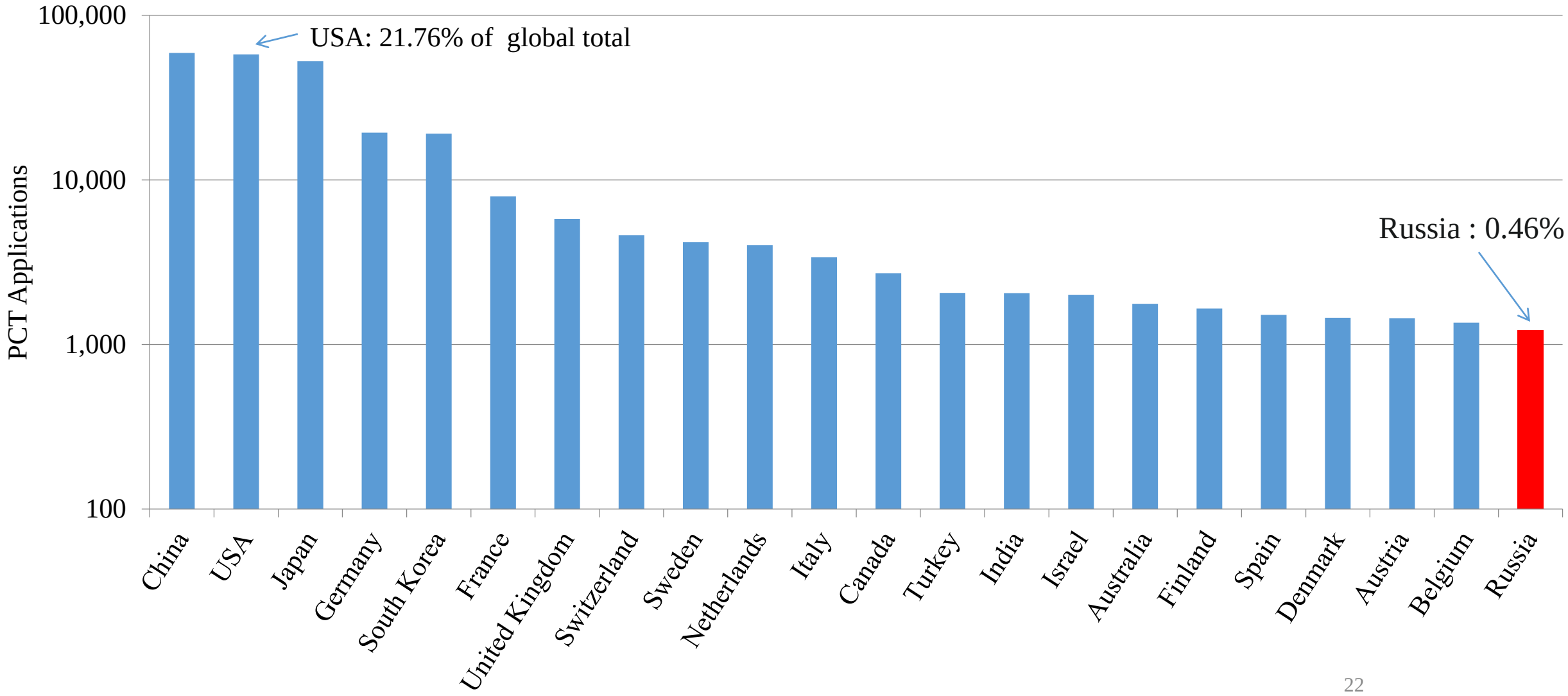
Annual USPTO patents awarded 2001-2020: Select US States and Russia



Sources: 2002-2015: USPTO, "Patents by Country, State, and Year – Utility Patents," (December 2015) https://www.uspto.gov/web/offices/ac/ido/oeip/taf/cst_utl.html Date accessed: October 17, 2016; 2016-2020: USPTO, "Calendar Year Patent Statistics," https://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports_stco.htm, accessed March 17, 2020.

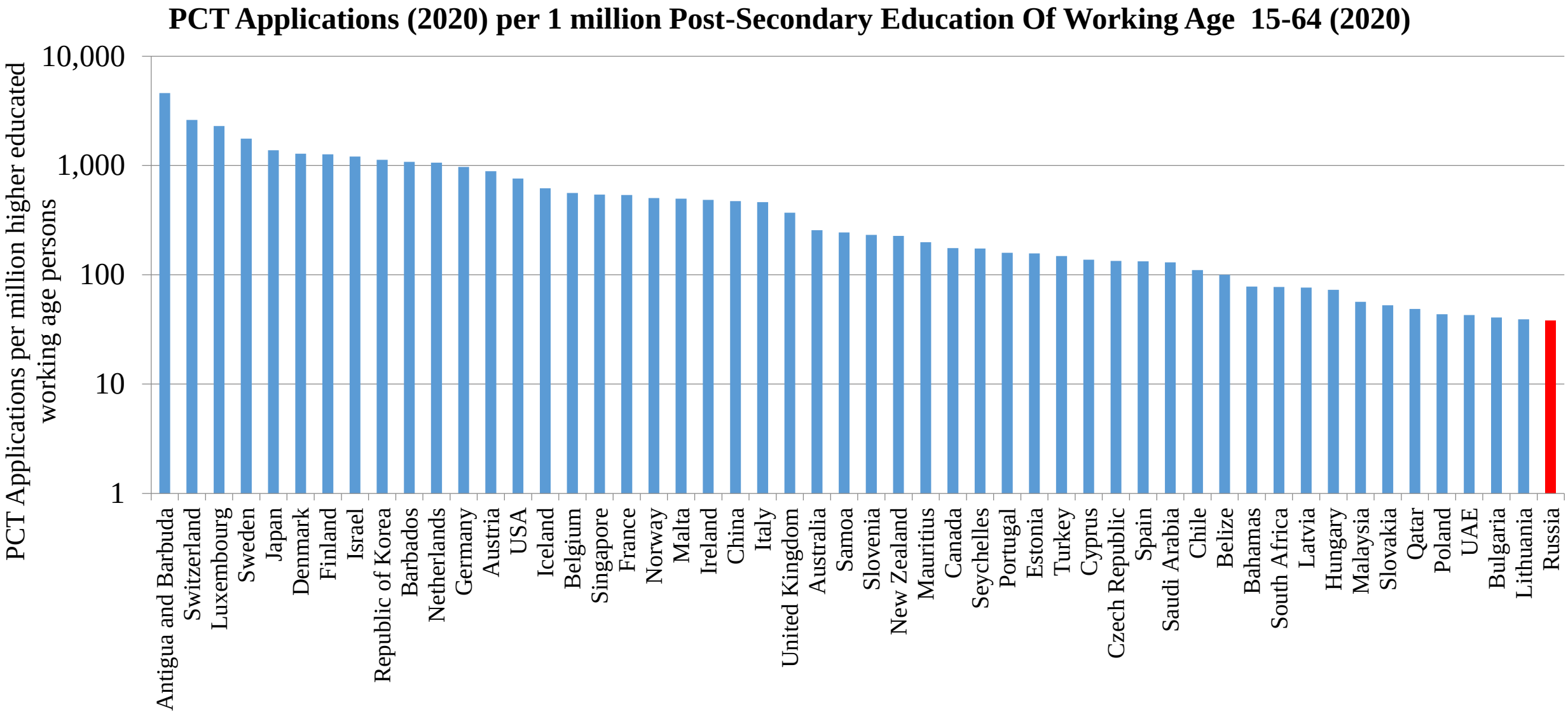
Figure 21

International Patent Applications
Under Patent Cooperation Treaty (PCT) By Country of Origin, 2019



Source: WIPO Statistics Database, "International Applications by Origin" available at: https://www.wipo.int/export/sites/www/pressroom/en/documents/pr_2020_848_annexes.pdf, accessed on March 10, 2022.

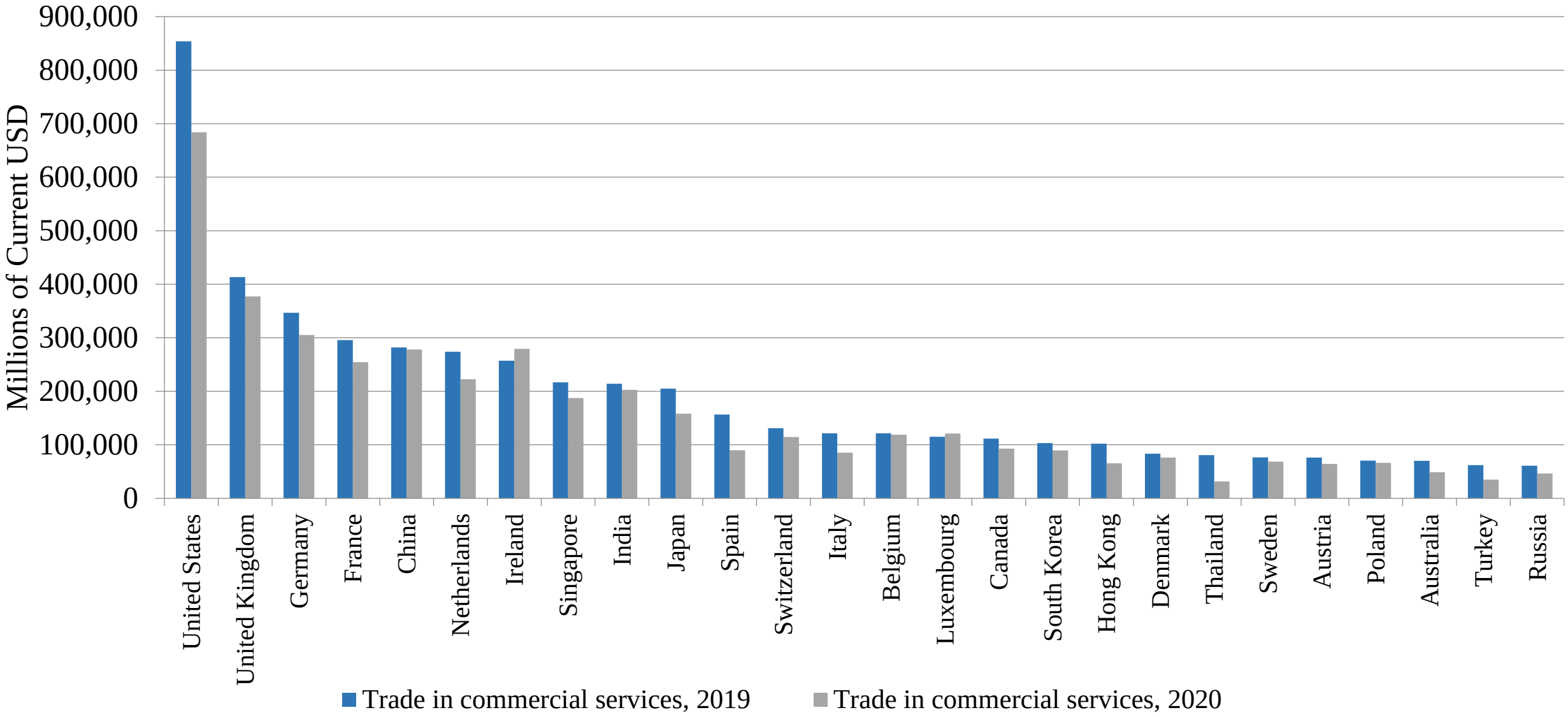
Figure 22



Source: WIPO Statistics Database, "1 – PCT Applications by filing date," (Total PCT Applications selected for shown countries) March 2022, available at: http://www.wipo.int/ipstats/en/statistics/pct/, accessed on March 15, 2022. Education Data: Wittgenstein Centre for Demography and Global Human Capital, (2018). *Wittgenstein Centre Data Explorer Version 2.0.* Available at: http://www.wittgensteincentre.org/dataexplorer, accessed March 15, 2022.

Figure 23

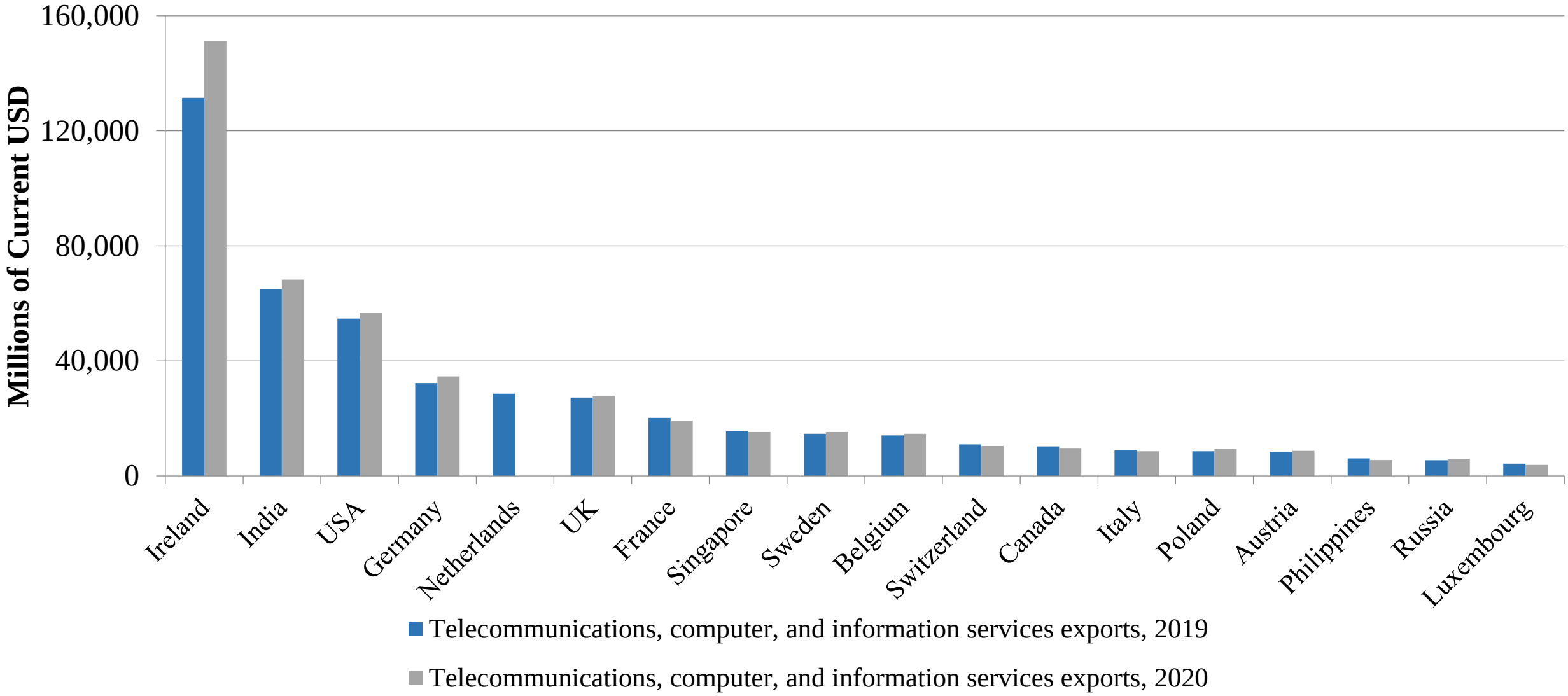
Top Global Commercial Service Exporters, 2019 & 2020 (Current $US Millions)



Source: World Trade Organization, Statistics Database-Time Series of International Trade "Trade in commercial export services – Commercial services exports by main sector – BOP6 SOX," available at: http://stats.wto.org/StatisticalProgram/WSDBViewData.aspx?Language=E, accessed on March 15, 2022.

Figure 24

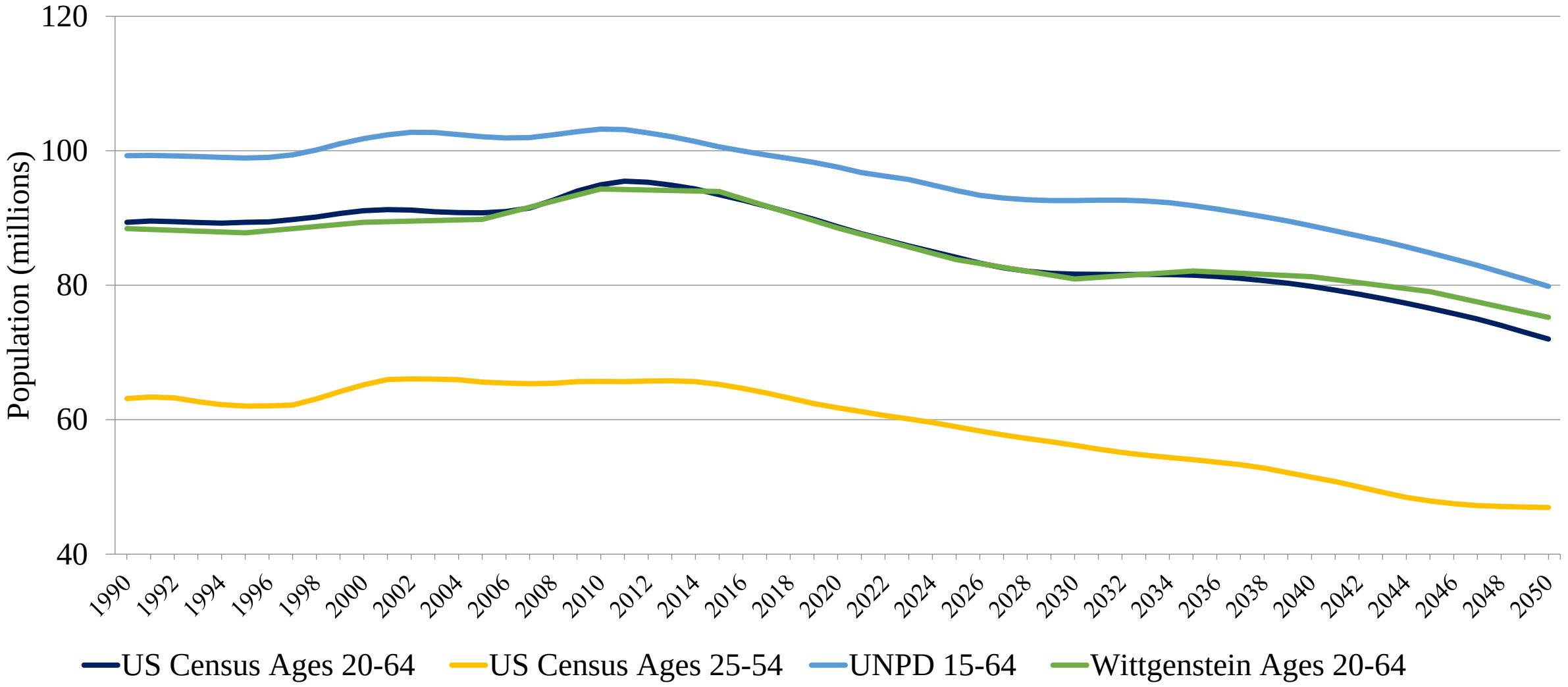
Top Global Computer and Information Service Exporters, 2019 & 2020 (Current US$ Billions)



Source: World Trade Organization, Statistics Database-Time Series of International Trade "BOP6 – SI – Telecommunications, computer, and information services," available at: http://stat.wto.org/StatisticalProgram/WSDBViewData.aspx?Language=E, accessed on March 15, 2022.

Figures 25

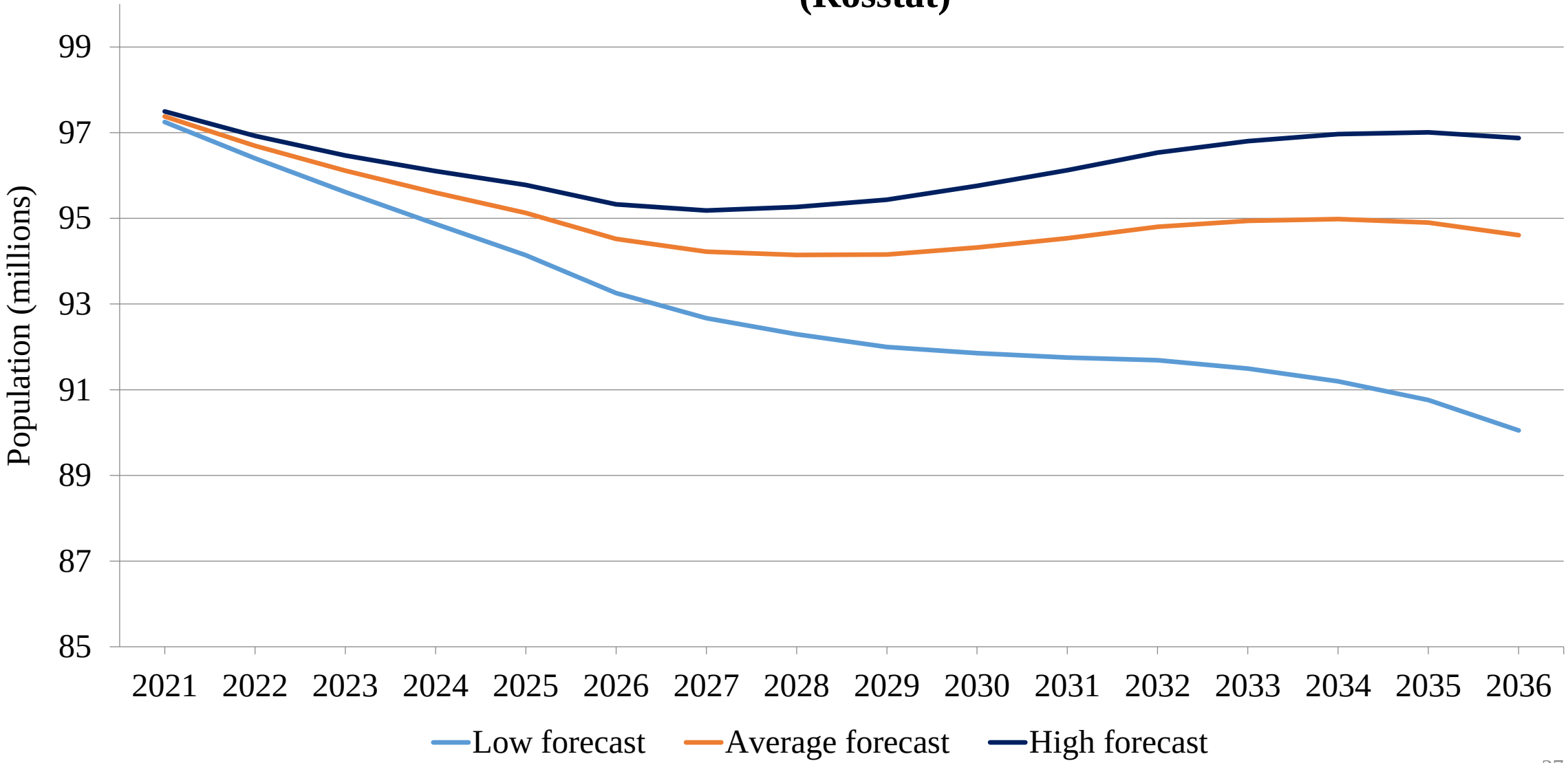
Estimated and Projected Russian Manpower, Selected Measures, 1990-2050
US Census Bureau, UN Population Division and Wittgenstein Centre



Source: US Census Bureau International Database, https://www.census.gov/data-tools/demo/idb/ (Date Accessed: March 17, 2022); United Nations, Department of Economic and Social Affairs, Population Division (2022), World Population Prospects 2022, "Population aged 15-64," *World Population Prospects: The 2022 Revision*, https://population.un.org/wpp/Download/Standard/Population/, (accessed on July 11, 2022); Wittgenstein Centre for Demography and Global Human Capital, (2018). *Wittgenstein Centre Data Explorer Version 2.0.* Available at: http://www.wittgensteincentre.org/dataexplorer, accessed May 4, 2022.

Figure 26

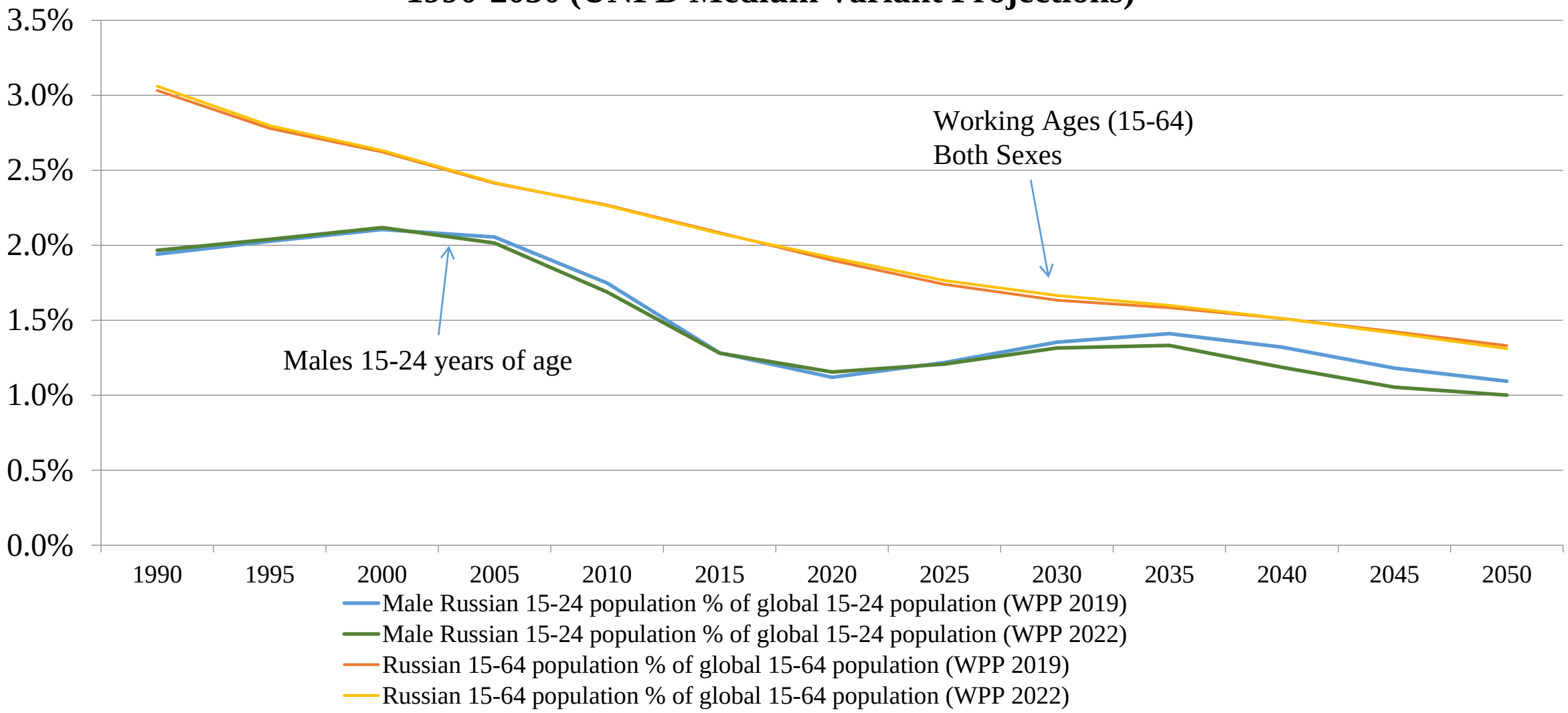
Projected Russian Working Age Population (15-64), 2021-2036 (Rosstat)



Source: Rosstat, "Demographic forecast up to 2036 – Population by individual age groups," https://rosstat.gov.ru/storage/mediabank/progn3a.xls, accessed May 4, 2022.

Figure 27

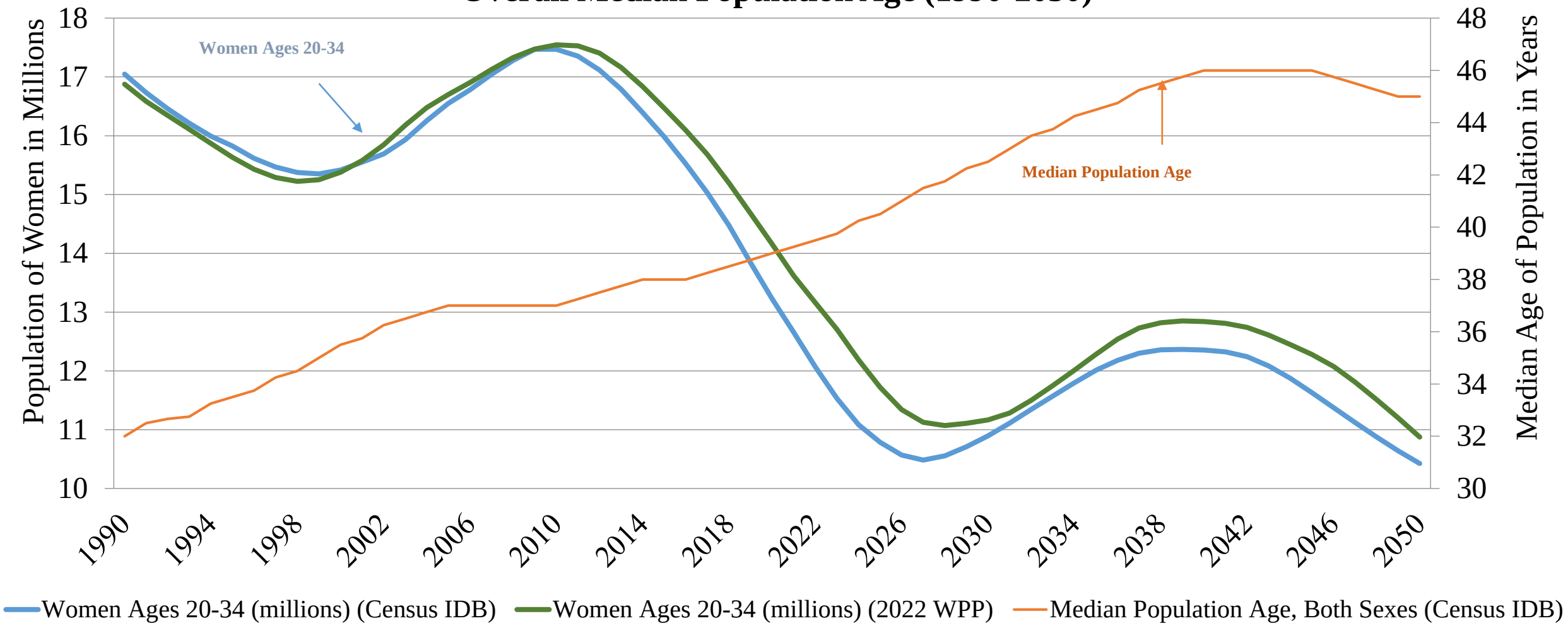
Key Russian Federation Population Groups As Percentage of Total World Population: 1990-2050 (UNPD Medium Variant Projections)



Source: United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 & World Population prospects 2022, "Population aged 15-64,"
World Population Prospects: The 2019 Revision, https://population.un.org/wpp/Download/Archive/Standard/, (accessed on March 17, 2022);
World Population Prospects: The 2022 Revision, https://population.un.org/wpp/, (accessed on July 6, 2022).

Figure 28

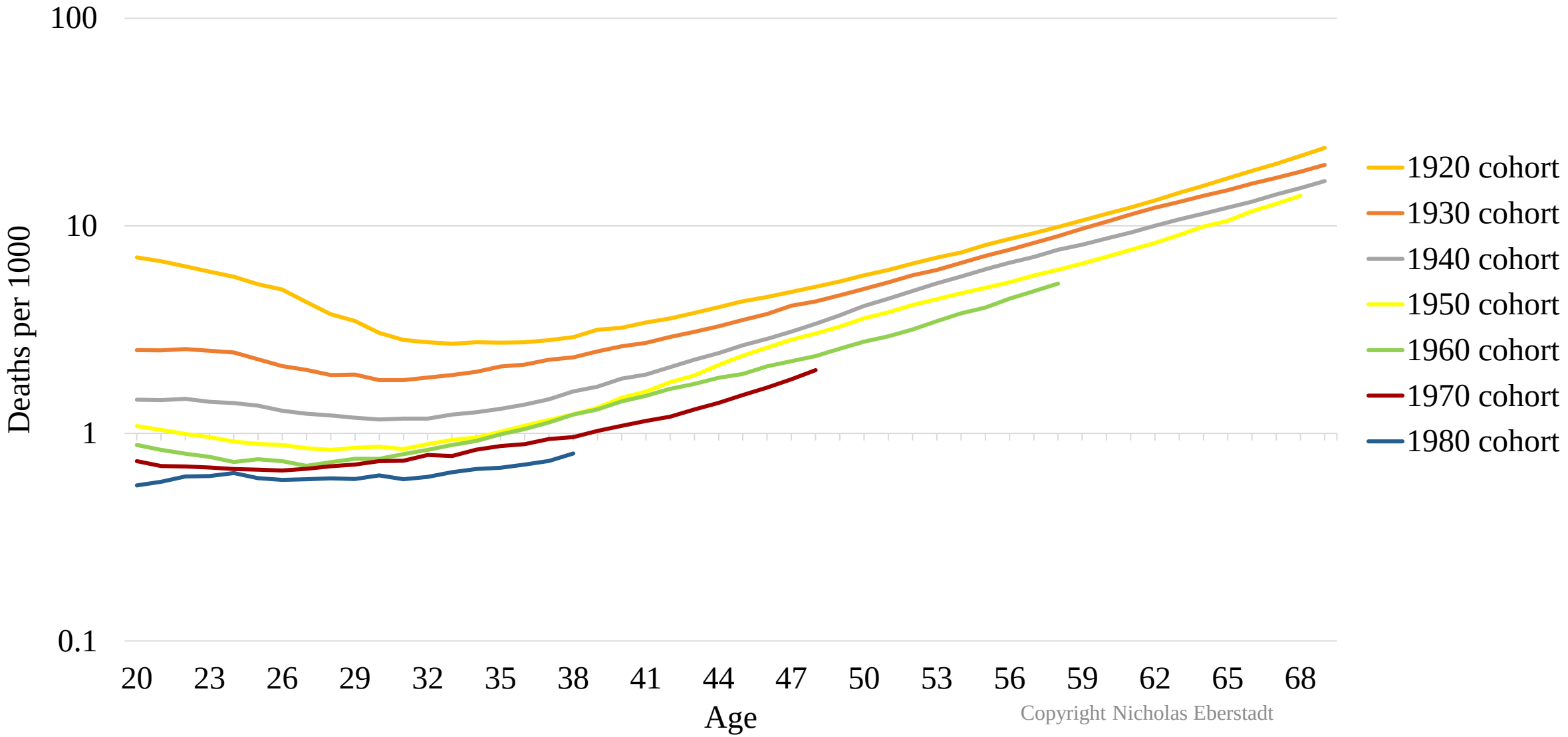
Projected Russian Female Population Ages 20-34 and Overall Median Population Age (1990-2050)



Source: US Census Bureau International Database, https://www.census.gov/data-tools/demo/idb/ (Date Accessed: March 14, 2022); United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition. Rev. 1, Medium Variant https://population.un.org/wpp/Download/Archive/Standard/, (Date Accessed: March 17, 2022); United Nations, Department of Economic and Social Affairs, Population Division (2022). World Population Prospects 2022, Online Edition., Medium Variant, (Date Accessed: July 13, 2022), https://population.un.org/wpp/Download/Standard/Population/.

Figure 29

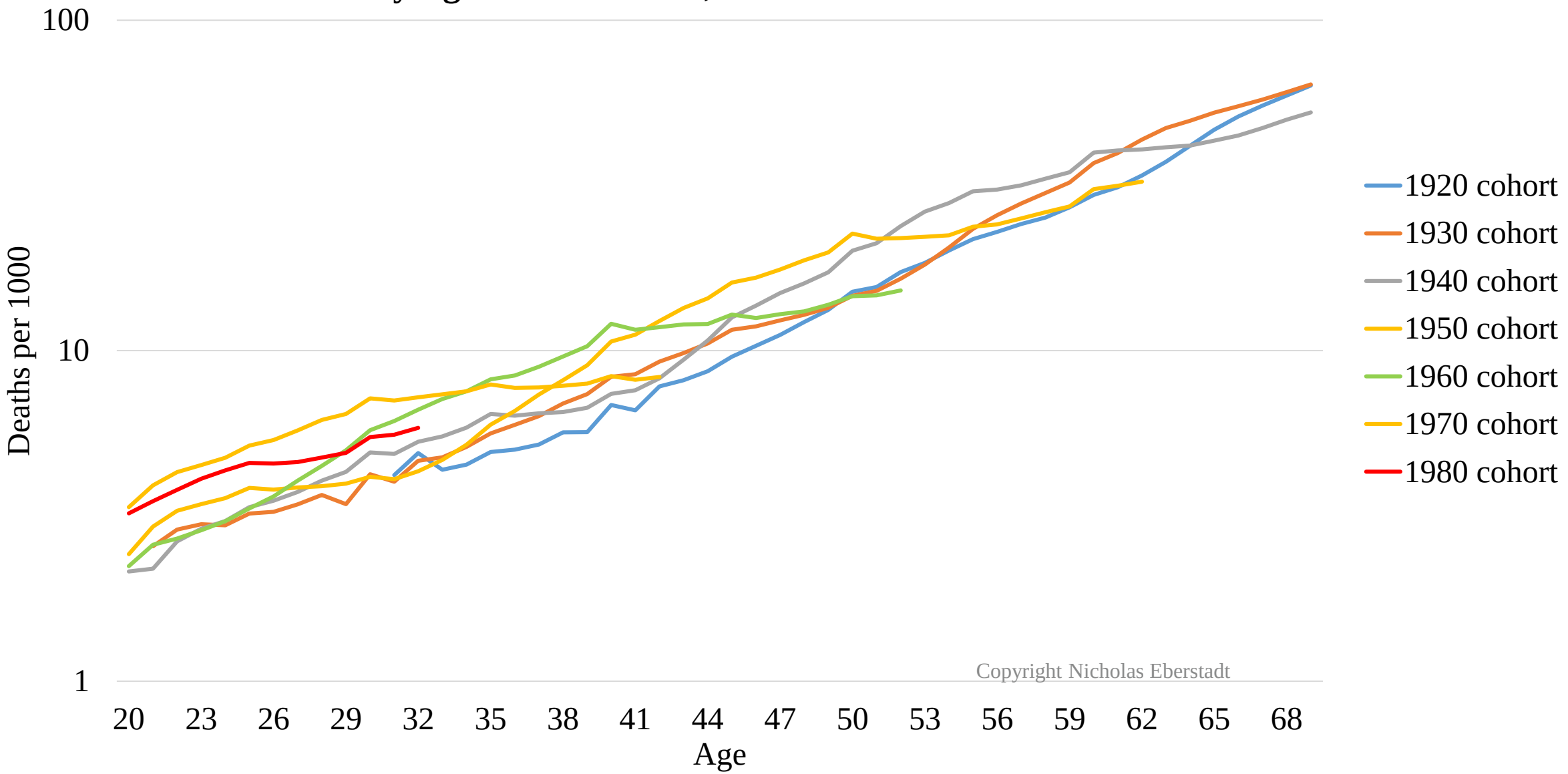
Male Mortality Ages 20-69: Japan, Selected Birth Cohorts 1920–1980



Source: Human Mortality Database, University of California, Berkeley and Max Planck Institute for Demographic Research, http://www.mortality.org. Accessed March 16, 2022.

Figure 30

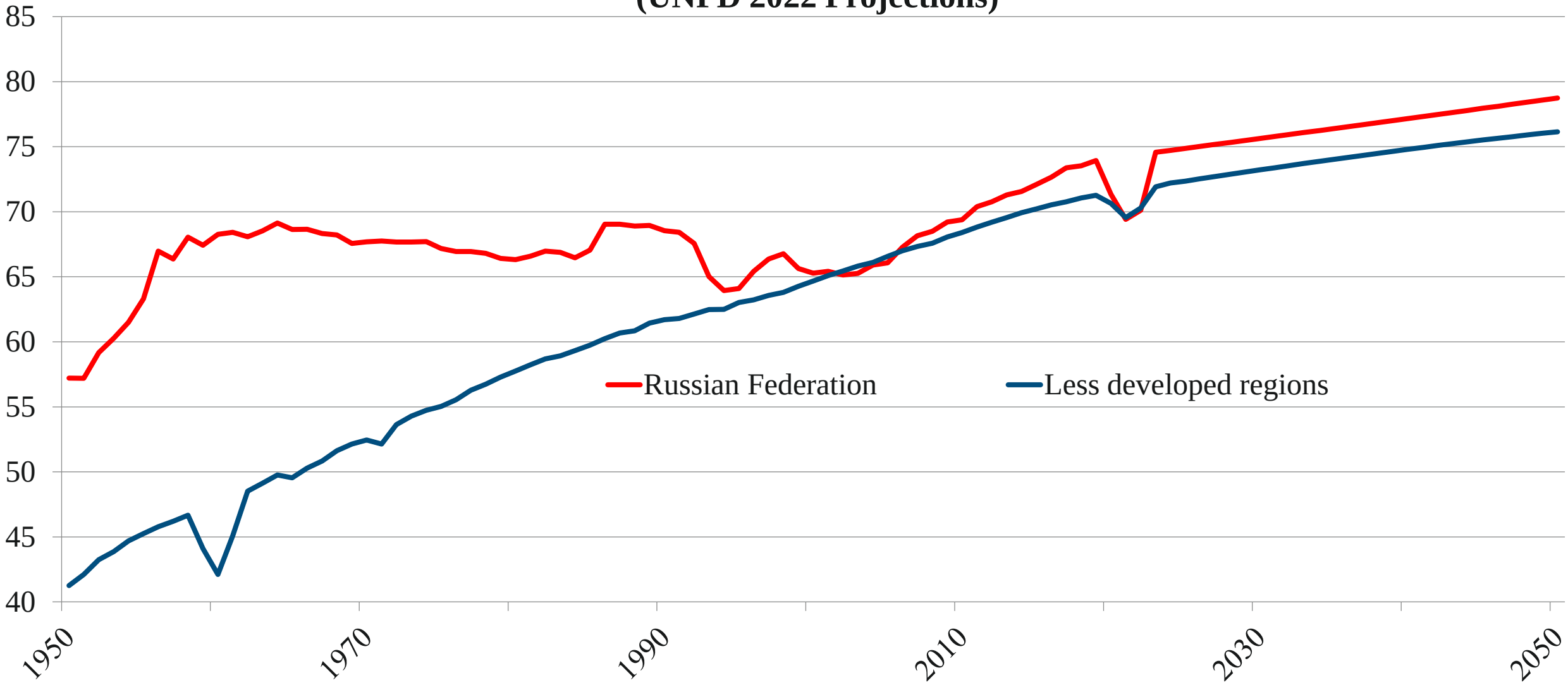
Male Mortality Ages 20-69: Russia, Selected Birth Cohorts 1920–1980



Source: Human Mortality Database, University of California, Berkeley and Max Planck Institute for Demographic Research, http://www.mortality.org. Accessed March 16, 2022.
Note: 1980 cohort is from 1980-1984, while the other cohorts include 10 years.

Figure 31

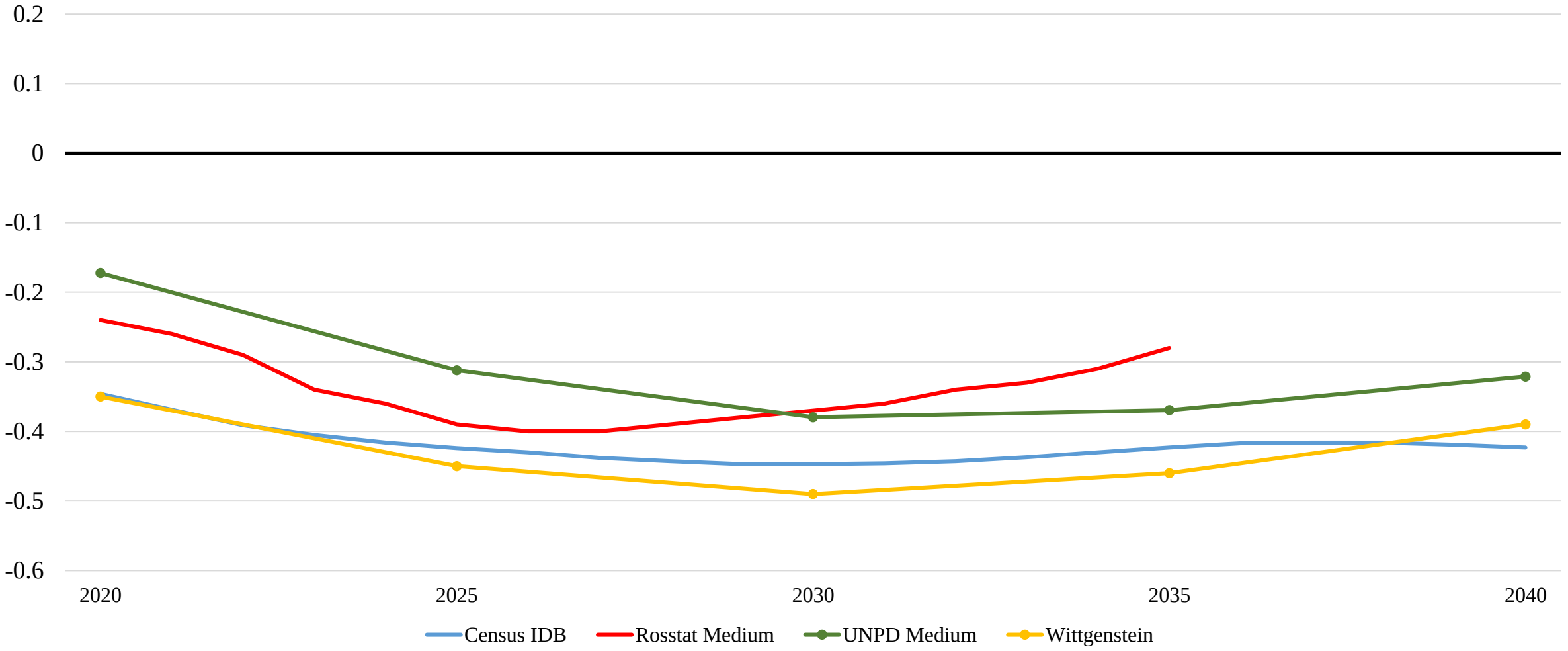
Expectation of Life at Birth, Males plus Females: Russia vs. Less Developed Regions, 1950-2050 (UNPD 2022 Projections)



Source: United Nations, Department of Economic and Social Affairs, Population Division (2022), World Population Prospects 2022, https://population.un.org/wpp/Download/Standard/Mortality/, (accessed on July 13, 2022).

Figure 32

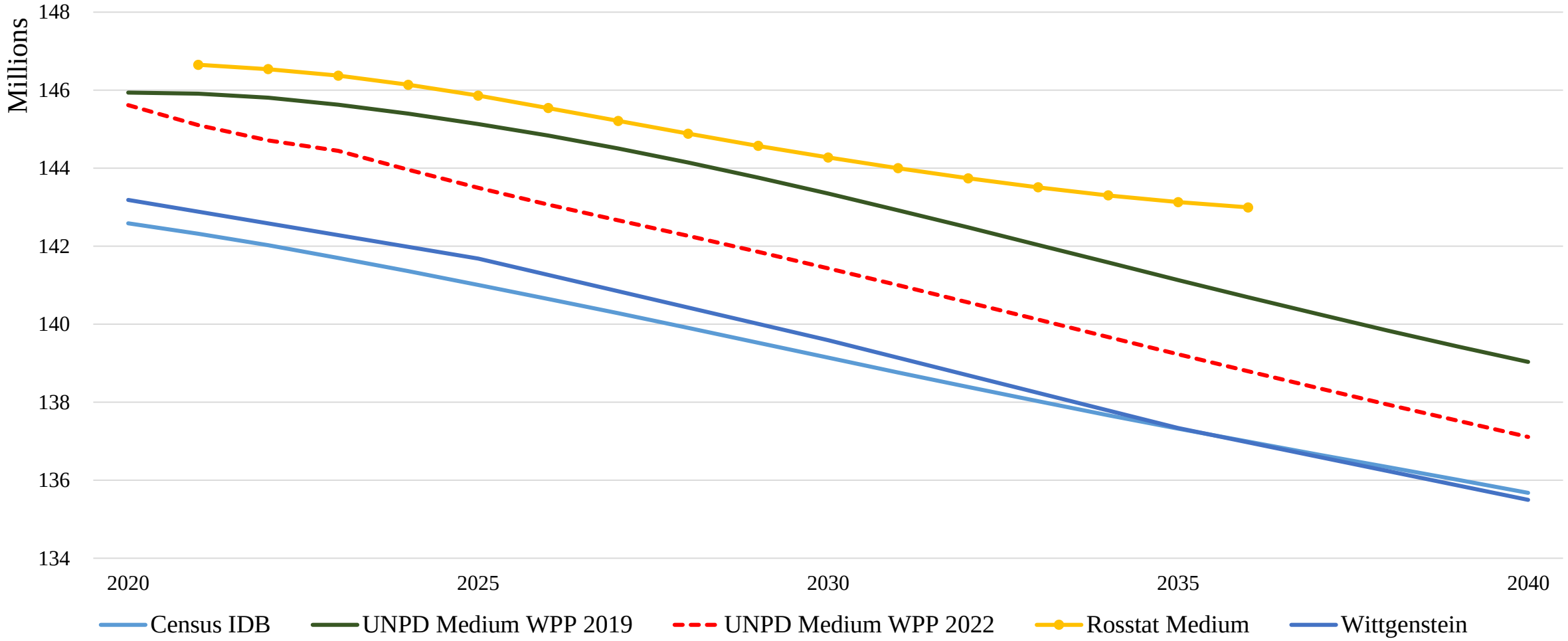
Projected Rates of Natural Population Increase in Russia from Census IDB, Rosstat, UNPD and the Wittgenstein Centre



Source: US Census Bureau International Database, https://www.census.gov/data-tools/demo/idb/ (Date Accessed: March 14, 2022); United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition. Rev. 1, Medium Variant https://population.un.org/wpp/Download/Files/1_Indicators%20(Standard)/EXCEL_FILES/1_Population/WPP2019_POP_F03_RATE_OF_NATURAL_INCREASE.xlsx, (Date Accessed: March 17, 2022); Rosstat, "Births, deaths and natural population growth," March 26, 2020, https://rosstat.gov.ru/storage/mediabank/progn5.xls; Wittgenstein Centre for Demography and Global Human Capital, (2018). *Wittgenstein Centre Data Explorer Version 2.0.* Available at: http://www.wittgensteincentre.org/dataexplorer, accessed March 17, 2022.

Figure 33

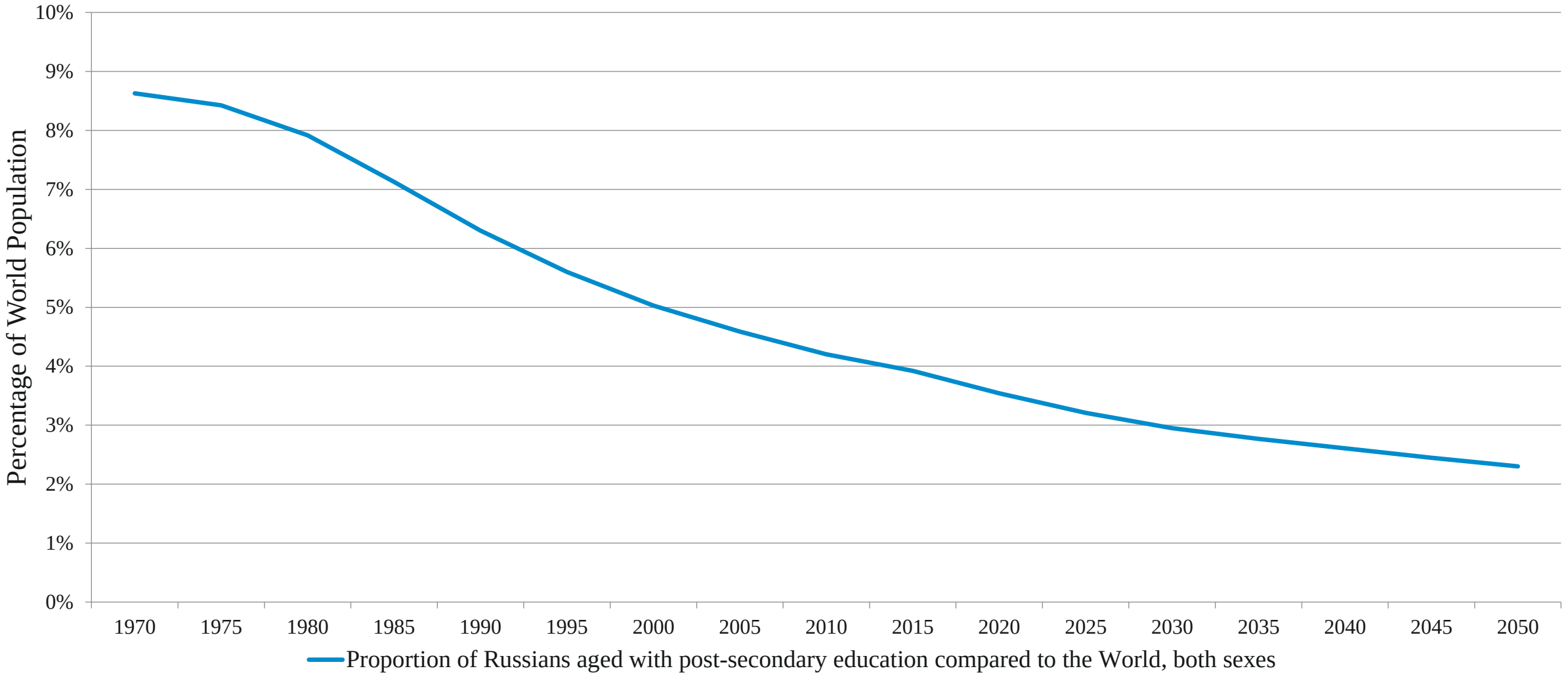
Pre-Covid Projections of Russian Federation Population, 2020-40: Census IDB, Rosstat, UNPD and the Wittgenstein Centre



Source: US Census Bureau International Database, https://www.census.gov/data-tools/demo/idb/ (Date Accessed: March 14, 2022); United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition. Rev. 1, Medium Variant https://population.un.org/wpp/Download/Archive/Standard/, (Date Accessed: March 17, 2022); Rosstat, "Population Change by forecast options," March 26, 2020, https://rosstat.gov.ru/storage/mediabank/progn1.xls;Wittgenstein Centre for Demography and Global Human Capital, (2018). *Wittgenstein Centre Data Explorer Version 2.0.* Available at: http://www.wittgensteincentre.org/dataexplorer, accessed March 17, 2022; Department of Economic and Social Affairs, Population Division (2022). World Population Prospects 2022, Online Edition., Medium Variant, (Date Accessed: July 13, 2022), https://population.un.org/wpp/Download/Standard/Population/.

Figure 34

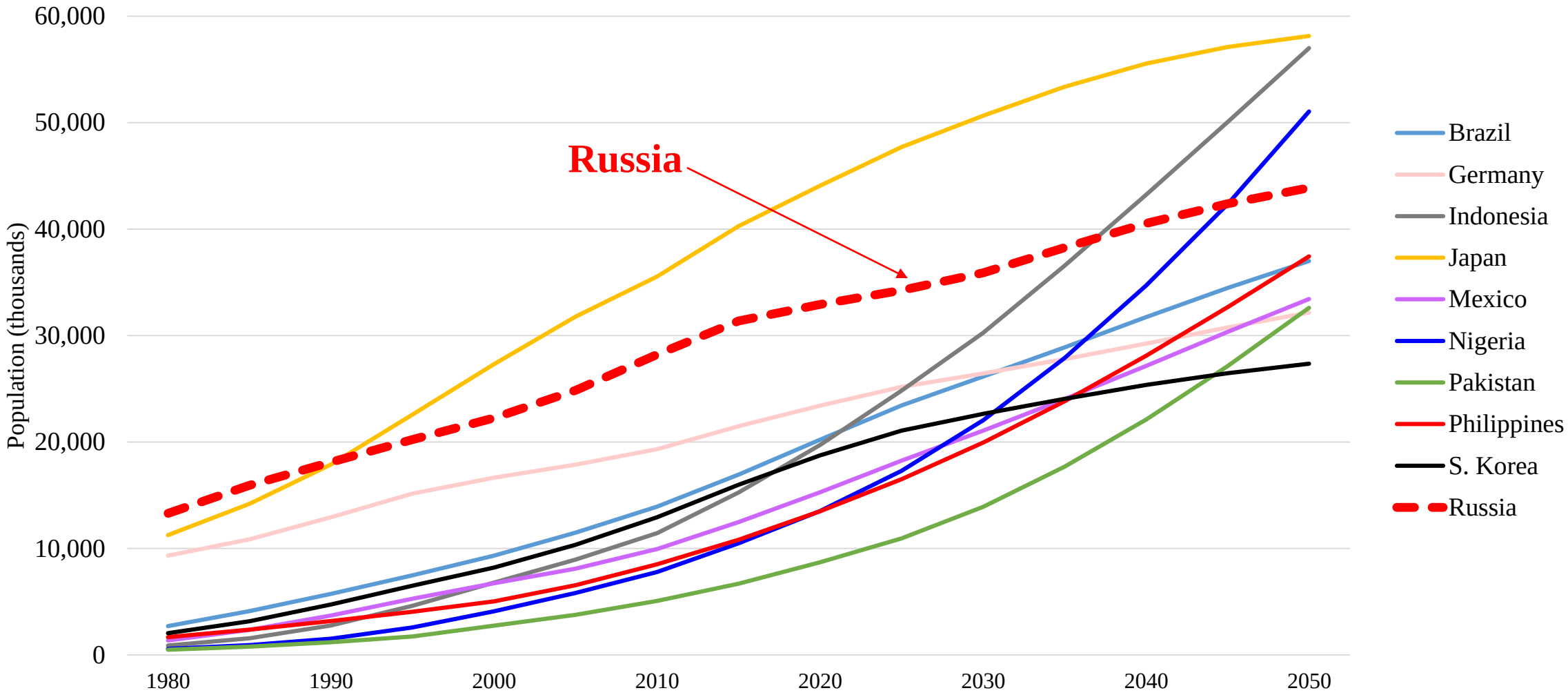
Population With Post-Secondary Education: Russia As Percentage of World Total, 1990-2050 (Wittgenstein Centre Estimates and Projections)



Source: Wittgenstein Centre for Demography and Global Human Capital, (2018). *Wittgenstein Centre Data Explorer Version 2.0*. Available at: http://www.wittgensteincentre.org/dataexplorer, accessed March 17, 2022.

Figure 35

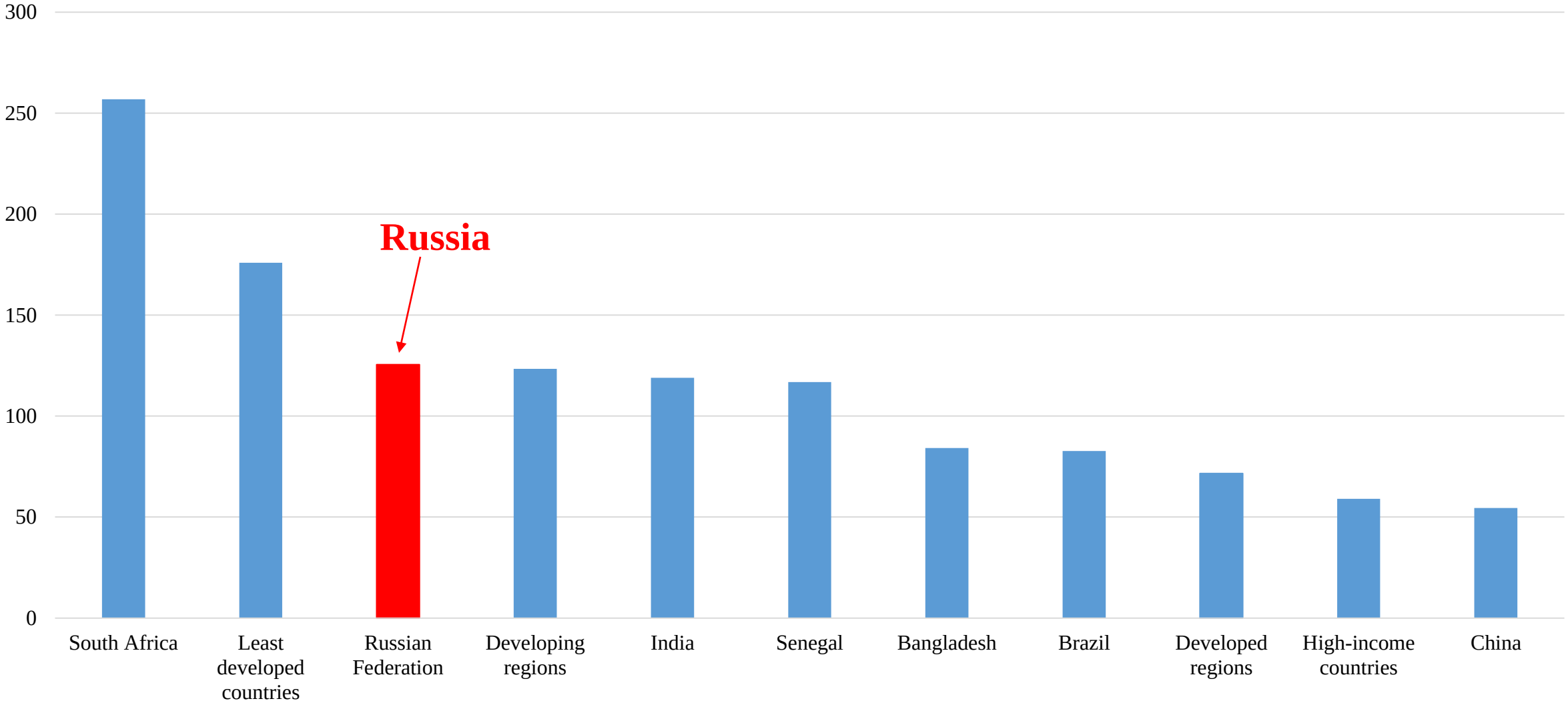
Post-Secondary Education in Select "Middle Sized" Countries (Wittgenstein Centre Estimates and Projections, Total Population 1980-2050)



Source: Wittgenstein Centre for Demography and Global Human Capital, (2018). *Wittgenstein Centre Data Explorer Version 2.0*. Available at: http://www.wittgensteincentre.org/dataexplorer, accessed March 16, 2022.

Figure 36

Probability of Dying between Ages 15 and 60 in 2040: Selected Countries and Regions, UNPD Projections



Source: United Nations, Department of Economic and Social Affairs, Population Division (2022), World Population Prospects 2022, https://population.un.org/dataportal/data/indicators/63/locations/643,901,156,356,76,710,1503,941,902,686,50/start/2040/end/2040/table/pivotbylocation, (accessed on August 18, 2022).