Falling Fertility, Rising Ageing, and Global Labor Mobility

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Abstract. Falling fertility and improved mortality create powerful and inexorable demographic arithmetic of ageing in the coming decades around the world, with three patterns. The richest countries, China, and the Former Soviet Union, will see absolute declines in the labor force aged (15-64) population and absolute rises in those 65 plus. In zero migration scenarios and constant labor force participation rates by age and sex all these regions will have less than two workers for every person 65+, with Spain and Italy projected to have less than one worker per person 65+. Developing country regions besides Africa (Latin America, South-East Asia and Pacific, South Asia, West Asia/Middle East) have experienced rapidly falling fertility and total fertility rates are nearing 2.1 (replacement level). To 2050 these regions will experience modest growth (less than 30 percent) of their labor force aged combined with rapid growth of those over 65 (doubling or tripling). While fertility in Africa (SSA and North) has been falling, this fall started later and has been less rapid than other regions, and in standard scenarios for 2050 there will be 800 million additional labor force aged (15-64) in Africa. Africa accounts for 80 percent of all global *net* growth in the labor force aged. A fundamental feature of the global economy over the medium-run to 2050 is that that highest labor productivity countries will have absolutely fewer native born workers and Africa, home to many of the world's lowest productivity countries, will have 800 million more labor force aged. Economics says there are win-win-win gains on the order of trillions of dollars to policies that creating legal pathways to allow people, particularly youth, to move from low productivity, labor abundance places to high productivity, labor scarcity places. But, so far, the politics has not found the way to "yes" and just says "no, no, no."

Introduction

In 1977 Robert McNamara, then president of the World Bank stoked "population bomb" fears saying: "Short of thermonuclear war itself, population growth is the gravest issue the world faces over the decades immediately ahead." (McNamara 1977) [1]. In 2025 the total fertility rate (TFR) in most countries is already below or rapidly nearing replacement, this seems quaint. The rapid growth of populations was, in the long view, a short phase of the demographic transition and, the question is what happens to human populations *After the Spike* (Spears and Geruso 2025) as if the knife edged properties of long-run demographic projections now produce projections of human populations falling to zero. Perhaps the new threat to humankind's long-run prosperity (Jones 2022) and even long-run survival could be a "de-population bomb" (Eberstadt and Robinson 2022).

Whether de-population is a bomb or a dud, there are important implications of falling fertility for the medium-run (defined, per Keynes, as the period over which the median reader is not dead).

The first implication of the combination of falling fertility and falling mortality rates is population ageing, pretty much everywhere. In the advanced, democratic, rich industrial (ADRI) countries in North America, Europe, and Asia the major demographic phenomena to 2050 is not be declines in total population but a large change in the age composition of the population. There will be a large *increase* in the absolute number of people 65+ and a large *decrease* in the number labor force aged. In the absence of migration or very large increases in age specific labor force participation, ADRI countries will have fewer than 2 workers per person over 65 (and people over 65 working are in numerator and denominator)—with the ratio in Italy and Spain falling below 1. Absolute falls in the number of labor force aged combined with very rapid rises in the elderly is also the future of China.

The second implication of the global patterns of fertility is that to 2050 more than 100 percent of the net increase in the global labor force aged will be in just two regions: Africa and South Asia. Africa alone will have 800 million more labor force aged, 80 percent of the global increase of 1 billion to 2050. These differing demographic destinies to 2050 imply that, while the ADRI countries and China will not yet have a "de-population bomb" they will have a "grat bomb" and a massive "youth dearth" while Africa and South Asia, while also ageing rapidly, will have a "youth bulge" (ending much sooner in South Asia than in Africa).

The third implication is that, with labor forced aged falling in high labor productivity planes and rising in low productivity places, the gains from allowing workers to move from low-productivity, youth bulge, regions to high productivity, labor scarcity regions are in the trillions

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[1] The doomsday-ism of Paul Ehrlich's 1968 *The Population Bomb* was even more dramatic, specific, and wrong: *"The battle to feed all of humanity is over. In the 1970s and 1980s hundreds of millions of people will starve to death in spite of any crash programs embarked upon now."*

of dollars. This is, by far, the largest policy-based economic opportunity for improving human well-being, but for this potential to become a policy reality will require the adoption of more politically acceptable modalities of labor mobility.

I) Fertility has fallen and can't get up

I.A) Trajectory of fertility by geographic region

There are three major sources of country specific data on recent and projected fertility. The UN Population Division, whose World Population Projections, for all their past faults, have been the standard source. The Institute for Applied Systems Analysis (IIASA) as part of their Shared Socioeconomic Pathways (SSP) scenarios produces forecasts of fertility and population by age and by level of schooling (Samir *et al* 2024). The Global Burden of Disease (GBD) project, as part of its effort to estimate future health conditions, produces estimates of fertility and population by age (GBD 2024).   As they all rely on roughly the same original country sources, the cross-national correlations of their estimates of levels, past changes, and medium-run projections of TFR are quite high[2] and for description of past fertility changes and projections I use the simple average of these three sources.

Figure 1 shows the annual TFR for 10 geographic regions (weighted by country population within each region), from 1950 to 2025 and forecasts for 2050 and 2100.

Figure 1a shows five regions where TFR fell below the replacement rate of 2.1 early (1991 or before). The three geographic regions of the Advanced, Democratic and Rich Industrial (ADRI) countries are: *Asia and Pacific* (Japan, Korea, Australia, New Zealand), *Europe* (26 countries), *North America* (USA and Canada)[3]. *China* is its own region. The fifth region is an amalgam of the Former Soviet Union, Eastern Europe (those not in the ADRI category), and Mongolia and North Korea (included here so China is its own region). Figure 1b shows the five developing regions which transitioned to lower fertility more recently: *Latin America and the Caribbean* (LAC), *South Asia*, *South East Asia and Pacific* (excluding the four ADRI countries), and *Africa* (both Sub-Saharan and North, including Morocco to Egypt), and the region the UN refers to as *West Asia* whereas the World Bank calls it the Middle East (which includes Israel, Syria, Lebanon as well as Turkey and Iran)). Together Figure 1a and 1b illustrate four facts about the history and consensus projections of fertility.

First, TFR in all three ADRI regions (and in each of the 32 countries individually): (i) fell below 2.1 before 1980 (more than 45 years ago), (ii) none of these countries have rebounded

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[2] The bivariate correlations of 2025 TFR estimated levels are all above .91. The bivariate correlations of country TFR changes from 1950 to 2025 are all .8 or above. There are large differences in the projections to 2100, as the IIASA has nearly all countries converging on a similar TFR, and hence their projections have a weak correlation with either the UN or GBD data.

[3] This classification, by adding "democratic" and "industrial" distinguishes, among the countries with high GDP per capita, between the oil rich and Singapore and the more traditional "developed" economies as these two sets of countries have distinct demographic patterns and stance on labor mobility.

significantly from their lowest point and all are still well below replacement and (iii) the average of the three projections (and each source of projections individually) show the regions remaining at least half a birth per woman below 2.1 into the far future of 2100[4]. Projections of anything in 75 years into necessarily have large Knightian uncertainty but either simple extrapolations of the recent past (rates have been low and stable or declining for over 30 years) or the methods of the three sources (UN, IIASA, GBD) tell the same basic story.

Second, China is an important and distinctive story. Important because it is a population behemoth. Distinctive because of its rapid trajectory from very high (5.42 as late as 1970, double the ADRI regions) to very low (its 2025 TFR of 1.21 below that of any ADRI region). The common phrase that "China will get old before it gets rich" is the result of hitting replacement fertility at levels of income much lower than the ADRI countries: China's PPP GDP per capita in the first year it hit TFR of 2.1 was only P$2,600. Also distinctive are the waves in the decline: TFR fell very rapidly from 1970s to 1980s, plateaued in the 1980s, then declined again, plateaued again from late 1990s to late 2010s (TFR was 1.56 in 1995 and 1.62 in 2017) and then fell again to its 2025 level of 1.21. The speed of TFR decline makes ageing to 2050 much more rapid in China.

Third, outside of Africa, all regions (and nearly all countries in those regions) have both experienced large declines and are at or nearing TFR of 2.1 (standard replacement rate). This fall in fertility does not appear to be tapering off to stop at 2.1. The similarity in the pace in TFR decline and the convergence to similar levels in 2025 across these four developing country regions is striking.

Fourth, Africa's fertility is globally distinctive. The TFR decline started later (around 1980), from higher levels (around 6.5), and was more gradual. Hence TFR in 2025 is 3.82, well above the next highest region (South Asia at 2.2) and is projected to be at 2.58, well above replacement, in 2050. Not until 2081 is Africa as a region forecast to reach replacement levels: around 100 years later than any ADRI region, 90 years later than China, and 50 years later than any other developing country region (South Aisa's projections reach 2.1 in 2032).

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[4] Goldin (2025) analyzes a phenomenon with the ADRI countries that the "lowest low" fertility countries (e.g. Spain, Italy, Japan, Korea) had a later onset of rapid growth than did the "early below replacement" countries (e.g. France, Germany, Sweden) and hence fell faster to a lower level. In the next section we show these makes a difference to the magnitude of the coming ageing.

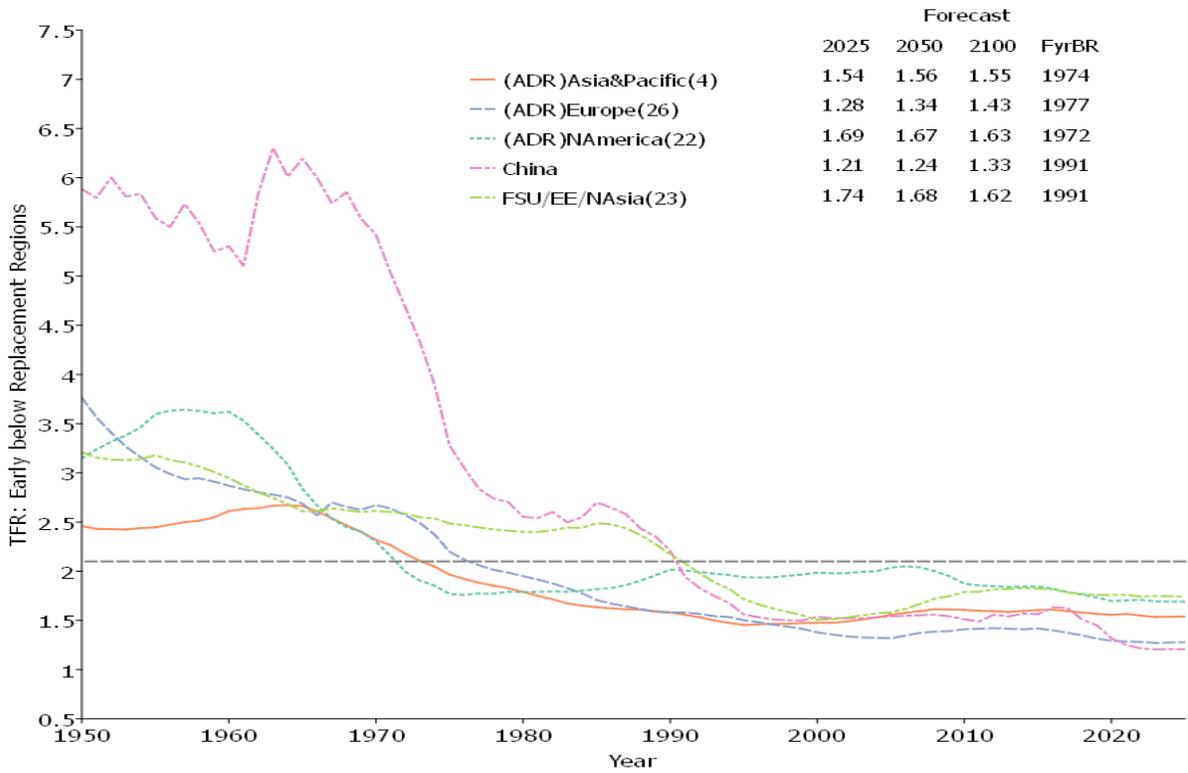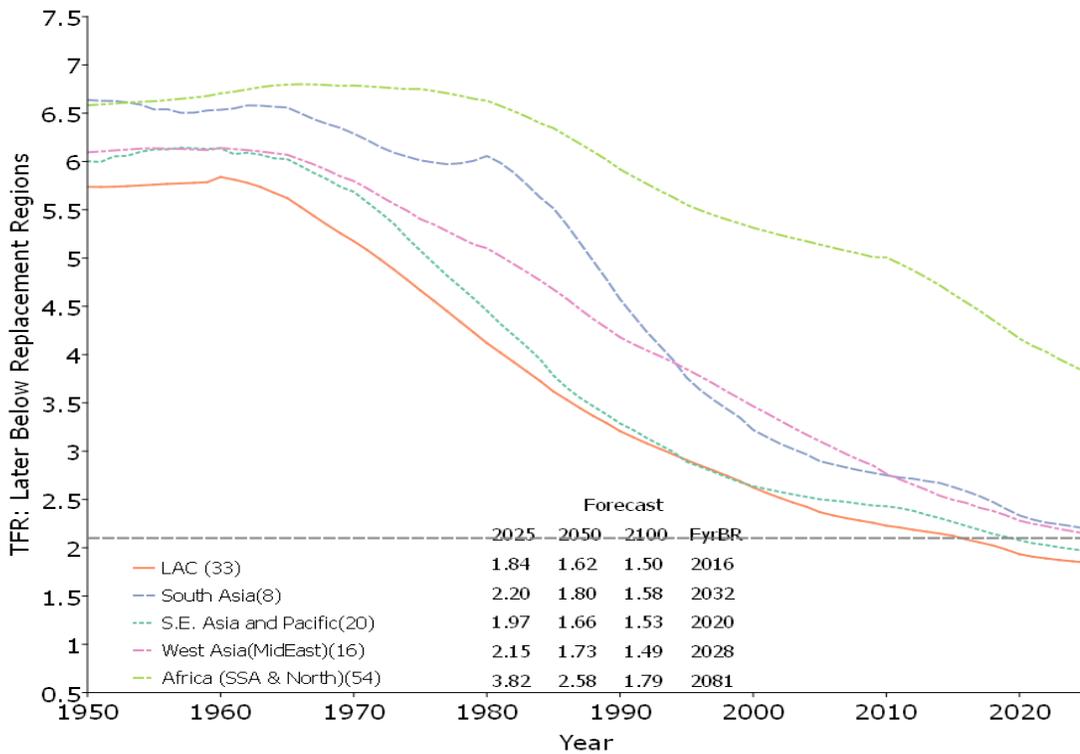**Figure 1a: Trajectory of Total Fertility Rate of Early Transition Regions**

	Forecast			
	2025	2050	2100	FyrBR
(ADR)Asia&Pacific(4)	1.54	1.56	1.55	1974
(ADR)Europe(26)	1.28	1.34	1.43	1977
(ADR)NAmerica(22)	1.69	1.67	1.63	1972
China	1.21	1.24	1.33	1991
FSU/EE/NAsia(23)	1.74	1.68	1.62	1991

Figure 1b: … and of later transition regions

	Forecast			
	2025	2050	2100	FyrBR
LAC (33)	1.84	1.62	1.50	2016
South Asia(8)	2.20	1.80	1.58	2032
S.E. Asia and Pacific(20)	1.97	1.66	1.53	2020
West Asia(MidEast)(16)	2.15	1.73	1.49	2028
Africa (SSA & North)(54)	3.82	2.58	1.79	2081

Note and sources: Author's calculation of population weighted average TFR from data/projections of UNPD, GDB, and IIASA.

I.B) *Correlates of fertility decline, policies to raise fertility*

The Demographic and Health Survey endeavor has used (roughly) the same survey instrument to interview nationally representative samples of women of reproductive age across many countries and over a long period of time. In addition to a rich body of information about the woman and her household (e.g. education levels, household assets, health conditions, etc.), the DHS instrument asks women about their ideal family size and their future fertility preferences: whether they want no more children, another child but later, or a child now. This data on desired fertility has established that nearly all differences in child bearing across countries in levels and over time are associated with the level and changes in how many children women report they want to have (Pritchett 1994, Gunther and Harttgen 2016 (with some caveats about Sub-Saharan Africa)). Understanding fertility decline is therefore, to first order, about understanding why women (and men) want fewer children[5].

Understanding the correlates of the global secular decline in fertility and its regional pattern (e.g. rich countries first, SSA lagging) is important to assessing whether available "policy" levels or other factors are likely to stop or reverse this decline. It is widely accepted that country level fertility changes are almost entirely "accounted for" by changes in GDP per capita, female schooling and child mortality, with most of Sub-Saharan Africa's slow fertility transition accounted for by a different pattern of economic structural transformation (Büttner, et al 2024).

A regression of average TFR across all countries for all five-year intervals from 1950 to 2020 on just four country indicators: GDP per capita, female years of schooling, and U5MR, using a modestly flexible functional form (cubic in GDPPC, quadratic in female years of schooling and the under 5 mortality rate) plus a Sub-Sharan Africa dummy produces an R-Squared of .854. Figure 2 shows the actual TFR, predicted TFR based on constant regression

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[5] This claim is not uncontroversial as family planning advocates have often claimed an important independent and causal role for contraception and claimed the policies that reduced "unmet need" to contraception would lead to substantial fertility reductions. Three quick points. One, "correlation is not causation" is widely understood, but demographers and family planning advocates have often inferred from the relatively strong correlation (at country and individual level) between contraceptive use and fertility that this represents a strong causal relationship from contraceptive "access" (low cost, in a broad definition of cost) to reduced births. Surprisingly, this is not just past history, the GBD (2024) scenarios for future fertility assume that "unmet need satisfied" is a *causal* policy driver of fertility. Two, the idea that measures of "unmet need" primarily represent "supply side" or "lack of access" rather than "demand side" reasons for not using contraception has been shown to be completely false (Senderowicz and Maloney 2022). Three, a recent large randomized control trial study of providing individuals with vouchers covering 100 percent of contraceptive costs in a high fertility country, Burkina Faso, found zero impact (with small standard errors so even modest effects could be ruled out) on live births, pregnancies, or even the use of medical contraception over three years (and this zero impact was found even among women measured as having "unmet need" at the baseline) (Dupas, Jayachandran, Lleras-Muney, Rossi 2025).

coefficients over the entire period with just GDPPC, FYS and U5MR (and a time-invariant dummy for SSA). The figure also shows the TFR predicted by the coefficients from a regression at each five year interval and the 1985 values for GDPPC, FYS and U5MR for three super-regions: ADRI, SSA, and developing countries outside of SSA to show how much of the fall in TFR was due to changes in either the constant or coefficients.

This is not a review of the massive literature, both theory and empirics, on correlates and causes of fertility and its decline, but four quick points relevant to the next two sections.

First, hovering in the background of discussions of future fertility rates is that long-run population projections are knife-edged around the replacement level. In the past has led UN modelers to just assume that TFR was on a glide path to the replacement level from above, or, when TFR dipped below the replacement level, a rebound towards 2.1. This assumption of TFR rebound, though it was the "conventional wisdom" for a time, was assumed just for modeler convenience, to avoid projecting smaller populations. There never has been any positive behavioral model of the fertility behavior of individuals--from any discipline--suggesting that TFR exactly at replacement rates was an equilibrium (Pritchett and Viarengo 2013). As the title of a recent paper summarizes succinctly: "replacement fertility is neither natural nor optimal nor likely." (Weil (2024) and, as the assumed recovery of TFR never happened the UN projections gave up on forcing this into their projections (Weil 2024).

Second, the descriptive regressions used in Figure 2 are not capable of, nor meant to, identifying the precise causal mechanisms that make higher GDPPC or women's schooling or falling child mortality strongly associated with TFR. Nevertheless, the lack of the need to invoke any secular downward drift in TFR conditional on these variables, such as a secular shift in attitudes or norms over and above that associated with those three variables, is striking.

Third, all three correlates are, independently of their association with TFR, widely regarded as normatively good things, in fact measures of GDPPC, schooling and health were the *only* elements of the original UN Human Development Index. Future progress on those indicators predicts falling fertility and yet few would want to slow the fall in TFR by less progress on these . In the happy case in which the developing world reaches even the levels of GDPPC, FYS and U5MR as the 20th percentile of the ADRI countries in 2020, their predicted TFR would be 1.5 (with not other assumed secular trends).

Fourth, governments attempting to raise fertility come up against the reality that both the "all in" (money, time, psychic, social) costs and benefits of having a child are very large. Hence, it would be very surprising if there were ways for governments to raise fertility conditional on existing socio-economic realities that were both effective and cheap (The Economist, May 24, 2025). Based on the Bergsvik et al 2021 review of the empirical literature about impacts in richer countries of pro-natal policies, the GBD (2024) projections of TFR assume that the adoption of the known effective pro-natal policies (at feasible levels) would raise TFR in 2050

by .2, which would, for instance, raise the projected TFR average in ADRI Europe from 1.34 to 1.54.

Figure 2: Actual TFR and regression predictions with constant coefficients using just GDPPC, Female Years of Schooling, U5MR, (with a SSA specific constant) track quite well across regions and over time
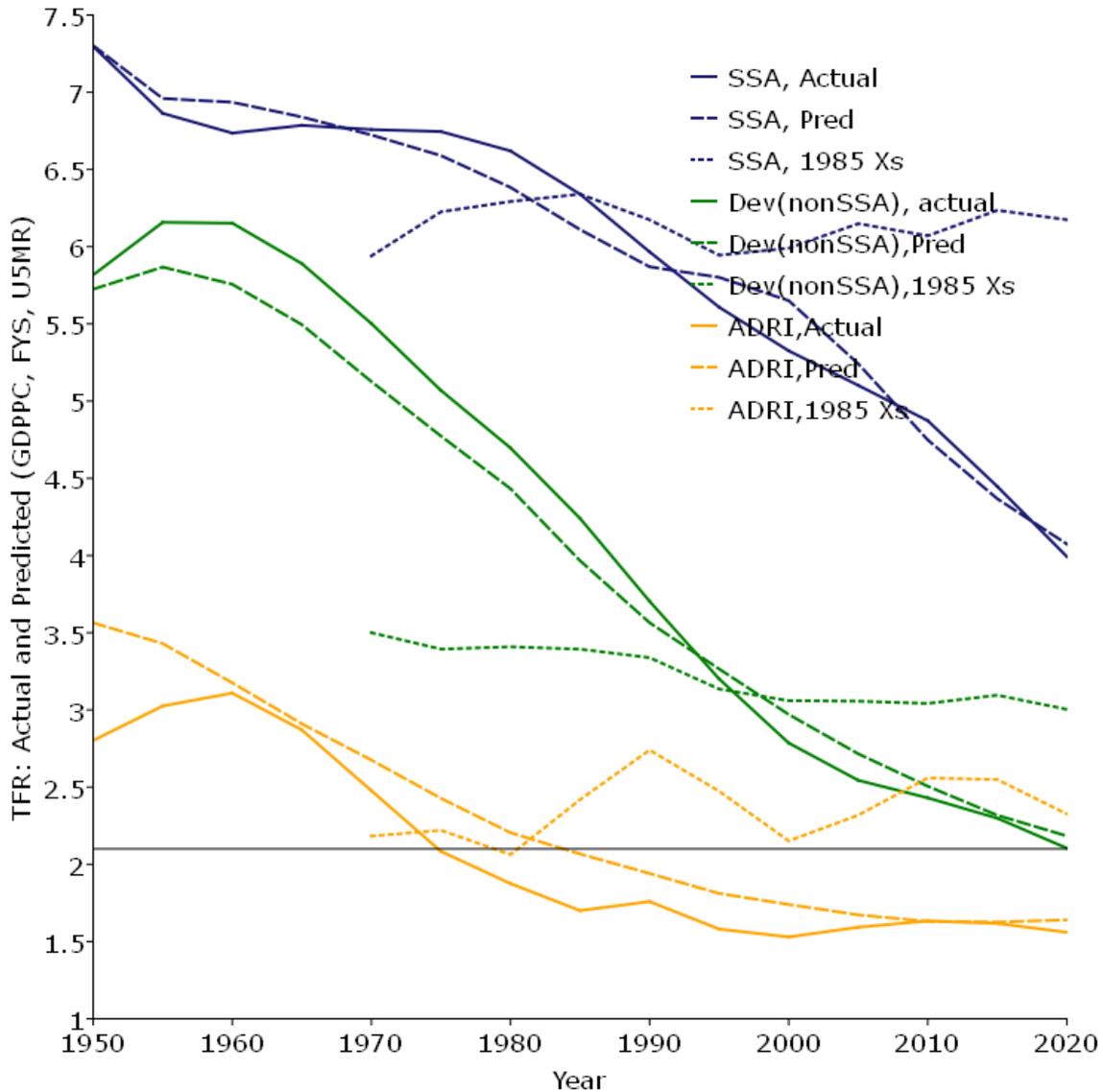
Sources: Author's calculations with GDPPC from PWT10.1, Female Years of Schooling from Barro-Lee, and Under Five Mortality rates from the UN interagency group.

The historical and regional patterns of TFR are important but policies to change future fertility will make very little difference to the ageing and its potential implications for international labor mobility to the year 2050 as the demography of the year 2050 is pretty "baked

in" (Goldstone, forthcoming). Everyone who is going to be in the "prime age" labor force of 25 to 64 in 2050 is already alive.

II)   Demographic divergence: ageing and labor force

As Larry Summers recently pointed out, "The secret sauce of economics is arithmetic" in that not only does economics try and understand the directions of impact ("if X then does Y go up or down?") but by how much and "how much" is often arithmetic. Everyone now knows there will be ageing. The demographic arithmetic tells us how much and I introduce a specific measure of "how much ageing?" which is a counter-factual "gap": How many more people would need to be in the labor force aged or the labor force in order for demographic ratios, like the number of workers to those 65+, constant, or at a target value considered "sustainable" (fiscally) or desirable (economically).

II.a) Growth of the labor force aged (15-64) versus those 65+

I will use two different sources for projections of the ageing, in part to demonstrate the broad conclusions are complete robust to the details of projections.

The International Institute for Applied Systems Analysis (IIASA) produced estimates of world population by age, sex, and educational status for 201 countries with 2020 as the base year and projections to 2050 and 2100 (Samir et al 2024). Their "Middle of-the-Road/Continuation" scenario with zero migration (SSP2-ZM) illustrates cleanly the demographic implications of just natural increase-births and deaths (this is a scenario not a "projection" as there is, and will be, migration). From their five-year age cohorts (e.g. 15-19, 60-64) I calculate the population 15 to 64 (labor force aged) and the population 65+ for each country. Table 1 illustrates three key features about the world's demographic future to 2050.

One, the demographic challenge to 2050 is not absolute declines in population, which is coming, but later, rather ageing. Across all ADRI countries the absolute fall in the population aged over 15 is 9.7 million, a 1.1 percent fall over 30 years (this would be modestly larger including those under 15). But this fall is a combination of the number of labor force aged (LFA) *falling* by 121 million, an 18 percent fall, while people 65+ *rise* by 111 million, a 54 percent increase. In China the 15-64 population falls by 211 million (20 percent) while their 65+ population rises by 210 million (119 percent). These changes are about offsetting for total population. But the combination of rapidly rising 65+ and falling LFA causes the LFA/65+ ratio to fall substantially. In the ADRI countries from 3.5 to 1.8 while in China the ratio falls spectacularly: from 5.3 in 2020 to 1.5 in 2050 (Table 2).

Two, more than 100 percent of the *net* increase in the labor force aged population happens in just two regions: South Asia and Africa. From 2020 to 2050 the global net LFA population rises by 1 billion, but with dramatic differences between shrinking and expanding regions. The LFA in ADRI countries, China, and the FSU (56 total countries) *falls* by a

combined 355 million. The three regions LAC, West Asia (Middle East), and South East Asia and Pacific (76 total countries)--have a combined rise in LFA of 190 million. South Asia's LFA grows 30.1 percent (about the same as West Asia) but, as its 2020 LFA population is 1.2 billion, this adds 370 million. Africa is the fertility anomaly (Figure 1b) with its LFA growing by 798 million. Africa alone accounts for nearly 80 percent of the 1 billion net growth in the world's labor force to 2050, hence Africa and South Asia account for more than 100 percent of the growth. Put another way, the combined of a loss of 355 million in the three early fertility transition regions (ADRI, China, FSU plus) and a gain of 190 million in three slowing fertility developing regions (LAC, S.E Asia, West Asia) leaves the world outside of Africa and South Asia with absolutely fewer labor force aged in 2050 than in 2020.

Three, even in regions with continued growth in population there is rapid ageing. While South Asia's LFA population grows by 370 million, a 30 percent rise, the 65+ increase from 115 million to 305 million, a more than doubling (162 percent) that adds 187 million 65+ by 2050. And while Africa's LFA doubles, people 65+ triple. Ratios of LFA/65+ are falling everywhere.

Table 1: The world in 2050 will be much older, with absolutely fewer workers in developed countries, FSU, and China and nearly all labor force aged expansion happens in Africa and South Asia									
Region (number of countries)	2020	2020	2050	2050	Change 2020 to 2050				Region as percent of net increase in pop'l 15-64
	15-64	65+	15-64	65+	15-64		65+		
					Absolute	Percent	Absolute	Percent	
Absolute falls in labor force aged									
ADRIC (32)	667	204	547	315	-121	-18.1%	111	54.4%	-12.0%
o/w Europe (26)	292	94	231	142	-61	-20.8%	48	-6.0%	-6.9%
Asia &ANZ (4)	131	50	94	69	-37	-28.6%	20	-3.7%	-4.2%
N. America (2)	244	60	222	103	-23	-9.3%	43	-2.3%	-2.6%
China (1)	996	177	784	387	-211	-21.2%	210	118.9%	-21.1%
Former USSR (23)	272	56	248	90	-23	-8.6%	34	61.3%	-2.3%
Moderately rising labor force aged									
LAC (38)	437	57	490	144	53	12.1%	88	155.5%	5.3%
W. Asia (ME) (16)	235	20	306	77	71	30.0%	58	293.7%	7.0%
South East Asia and Pacific (22)	458	49	524	135	66	14.3%	86	172.9%	6.6%
South Asia (8)	1230	115	1600	303	370	30.1%	187	162.9%	37.0%
Rapidly rising labor force aged									
Africa (57)	751	46	1549	140	798	106.2%	94	201.6%	79.6%
Total	5,046	724	6,048	1,591	1,003	19.90%	979	105.50%	100.00%
Source: Author's calculations with IIASA data (Semir 2024) downloaded from Wittgenstein Centre Human Capital Explorer.									

II.B) *Country and Regional Demographic Gaps*

The obvious implication of the demographic arithmetic in Table 1 is all regions in the world will experience ageing, in the sense that the LFA/65+ ratios will fall. What makes the early transition regions distinct is that the combination of absolutely more 65+ and absolutely less LFA leads the ratio LFA/65+ in ADRI countries to fall to levels lower than ever seen in human history (Goldstone forthcoming). In 2020 Japan had less than two people 15-64 for each person over 65, the lowest ratio of any country. The average in ADRI countries in 2050 is 1.8. In the IIASA SSP-ZM scenario China's ratio falls to 1.5. ADRI countries with "lowest low" fertility (Kohler, Billari and Ortega 2002, Goldin 2024) had LF/65+ ratios fall even lower than China: Italy at 1.25, Korea at 1.25, Spain at 1.26, Greece at 1.43).

The LF/65+ ratio would fall even if the labor force were to grow. Table 1 shows that the ADRI population 65+ is forecast to increase by 111 million from 2020 to 2050. The average 2020 LFA/65+ ratio was 3.5. To keep that ratio constant the region would need (111 million)*3.5 LFA/65+=388 million more LFA to keep the LFA/65+ ratio constant. Hence even if the LFA were constant, the LF/65+ ratio would fall to 2.12.

"Demographic gaps" in the future population pyramids are another way of expressing the demographic arithmetic. That is, how many more people would need to be added to the middle of the demographic pyramid (labor force aged) in each country to produce any given LFA/65+ ratio in 2050? The formula for the demographic gap as a function of a target ratio is simple:

$$1) \quad Demographic\ Gap(Target\ ratio)_{2050} =$$

$$\left(Target\ \frac{LFA}{65+}\ ratio\right)_{2050} * pop'l_{2050}^{65+} - pop'l_{2050}^{LFA}$$

For the countries with falling LFA populations these numbers are positive. For countries with growing LFA this can be negative as it tells how many LFA people a country could lose and still be above a given LFA/65+ ratio.

The ADRI countries would need to have 365 million more LFA to stay above a low LFA/65+ ratio of 2.9 (which the fourth lowest ADRI 2020 ratio (Greece)). The gap of 365 million is two thirds as large as the scenario level of 547 million LFA in 2050 (Table 1). To maintain the 2020 median ratio of 3.3 the ADRI countries would require half a billion more LFA people, nearly equal to the scenario level of 547 million. To keep the demographic pyramid from inverting would require almost as many *more* people as people expected to be there (with zero migration).

Table 2: The number of additional labor force aged that would be needed to limit the fall in LFA/65+ ratios to achieve even very low ratios (2.9) is massive, Africa and South Asia could have nearly a billion fewer LFA and still have a LFA/65+ ratio over 5

Region		2020 Ratio LF/65+	2050 Ratio LF/65+ (IIASA zero migration scenario, SSP2-ZM)	Hypothetical scenarios for the "demographic gap": The number of additional people of labor force age regions would need (or could shed, negative numbers) to attain a ratio of LFA/65+ in 2050 of a specified value				
				2020 10th percentile of ADRI countries (e.g. Greece)	Percent of 2050 LFA (IIIASA: SSP-ZM)	2020 ADRI median	Percent of 2050 LFA (IIIASA: SSP-ZM)	High LFA/65+ (half of all country 2020 median)
				Hypothetical 2050 LFA/65+ ratio:				
				2.90		3.34		5
ADRI (32)		3.5	1.8	365	66.8%	504	92.2%	
o/w	Europe (26)	3.4	1.8	180	77.7%	242	104.7%	
	Asia &ANZ (4)	3.7	1.7	108	115.0%	138	147.7%	
	N. America (2)	3.9	2.0	78	35.1%	123	55.7%	
China (1)		5.3	1.5	335	42.8%	506	64.5%	
Former USSR (23)		7.1	3.4	13	5.4%	53	21.4%	
Total Demographic Gap, declining LFA				704	44.6%	1,010		
LAC		8.1	3.7	-71		-8		232
W. Asia (Middle East)		21.7	4.4	-81		-47		82
S.E. Asia		11.3	5.6	-133		-74		151
South Asia		13.0	6.7	-724		-591		-87
Africa (SSA and North)		17.1	11.5	-1,144		-1083		-850
Total, countries with growing LFA				-2,154		-1,802		-937
Source: Author's calculations with IIASA (KC 2024) projections of population by age								

But, while there is global ageing, in the sense that LFA/65+ ratios are falling, there is not global LFA scarcity, just local scarcities. YYY

II.C) *Labor Force Gaps in ADRI countries*

For the ADRI countries the purely demographic ratios by broad age groups can be turned into the ratio of the actual labor force to those 65+ using the data on labor force participation (ILO economic active population) rates by sex and five-year age groups. The (actual or estimated) total labor force in country c in period T (2020, 2050) is just the sum of the population of each five-year age/sex group times the country specific labor force participation rate (LFPR) for that group (equation 2).

$$2)\ Labor\ Force_T^C = \sum_{a=15-19}^{a=100+} \sum_{s=F}^{s=M} population_T^{C,a,s} * LFPR_T^{C,a,s}$$

The main challenge with implementing this formula that the "top code" of reported ILO reported LFPRs is 65 and over. This is a severe problem as there is substantial ageing between 2020 and 2050 among those over 65 hence, those over 80 rise as a proportion of those over 65. Assuming LFPR of all those over 65 is not the same as assuming the LFPR by five year cohorts are constant but rather implies increases in the age specific LFPRs. I handle this by assuming that the LFPR for each five-year cohort over is half that of the just younger age group (e.g. 80-84 is half that of 75-79) to create a parametric estimate for each category out to 100+, and then adjusting the level of those LFPRs to match the 2020 reported aggregate 65+ LFPR.

My base case calculation of the 2050 labor force uses the estimates of the 2050 population age/sex structure from the 2024 UN World Population Prospects Zero Migration scenario and each country's 2020 LFPRs by five-year age groups and sex.

The labor force gap, analogous to the demographic gap above, is, for any given target ratio of the LF/65+, the addition to the existing labor force needed to achieve that ratio (equation 3):

$$3)\ Labor\ Force\ Gap\left(\frac{LF}{65+}^{Target}\right)_{2050} = Population_{2020}^{65+} * \left(\frac{LF}{65+}^{Target}\right) - Labor\ Force_{2050}$$

Table 3 shows the changes in the labor force and population 65+, the LF/65+ for 2020 and 2050 and estimates of the labor force gap for Europe, North America, and Asia and Pacific, and total for the 32 ADRI countries.

In Europe the population 65+ grows by 43.3 million. To maintain the already low, LF/65+ ratio of 2.4, Europe would therefore need roughly 2.4*43.3=104 million *more* workers. But, without migration, there are not going to be 104 million more workers, at constant LFPRs there are going to be 45 million *less*. In this zero-migration and constant LFPR scenario there will be less than one worker for every person over 65 in Spain (.99) and Italy (.91). The population weighted ratio for Europe 2050 ratio falls to 1.4. Every single ADRI European

country (including those not separately listed) reaches a LF/65+ ratio in 2050 below that of Japan's 2020 ratio of 1.83.

I calculate the labor force gap for two different assumptions about the "target" 2050 LF/65+ ratio. One is that each country maintains its 2020 ratio. The other is that each country has a LF/65+ ratio of at least 2.12, which is the 12.4[th] percentile the 2020 ratios across all ADRI countries (which is the value of the 4th of the 32, which is France).

For each country in Europe to sustain its own 2020 LF/65+ ratio Europe would need 150.6 million more workers in 2050. In the ZM scenario Europe's 2050 labor force is only 195.9 million (having fallen by 45.2 million from 241.1 in 2020). This implies the "additional workers" needed (coming from either higher LFPRs or movers from other countries) would be 77 percent (=150.6/195.9) ZM labor force and hence the "additional workers" to fill the labor force gap would be 43 percent of the 2050 labor force.

Even allowing for LF/65+ ratios in all countries to fall to 2.12 (France's 2020 level) Europe would still need 112 million additional workers. In "lowest low" fertility countries like Spain and Italy to reach even this low level would require more than half of their labor force to be "additional workers." There is substantial heterogeneity, as countries like the UK or the Netherlands whose 2050 base case ratio is "high" (around 1.75) need proportionately fewer additional workers (around 20 percent) versus "moderate" Europe (Germany, Switzerland, France) where the additional workers needed in 2050 to reach 2.12 is around 30 percent of the labor force.

The labor force and ageing dynamics of the USA and Canada are quite different from Europe as their LF/65+ ratio is higher in 2020 (around 3) and their fall in the labor force to 2050 is proportionately much smaller (e.g. the USA has 8 million fewer workers from a base of 220 million 2020 or only a 6 percent fall, versus a loss of 7.7 million in Italy from a base of only 38 million in 2020, a 32 percent all). The USA base case LF/65+ ratio falls to only 1.86. Hence the additional workers to keep the ratio constant is very large, 123 million, whereas to achieve a ratio of 2.12 requires only 31 million additional workers.

The four ADRI Asia and Pacific countries have completely different experiences of Japan and Korea versus Australia and New Zealand. South Korea has become globally famous for its extremely low fertility rates, reaching .72 in 2023 and with deaths exceeding births in 2023 by over 100,000. The LF/65+ falls from 3.46 to 1.16 and hence the additional workers to reach even a ratio of 2.12 would be 45 percent of the 2050 labor force. Japan is the canary in the mine has been a global leader in ageing, with very low fertility and (until recently) very little labor mobility. Their fall in the LF/65+ ratio is therefore modest in absolute levels (from 1.83 to 1.24 is only .6, versus a fall of 1 on average in Europe and 1.3 in North America) but reaches the very low level of 1.24 and hence the magnitude of additional workers to reach 2.12 is large absolutely (33 million) and as proportion of 2050 hypothetical labor force (41 percent).

Table 3: Keeping LF/65+ ratios constant at 2020 values would require an additional 350 million workers, equal to 47 percent of the total 2050 labor force

Country	Demographic change in Labor Force (2020 LFPRs by five-year age group and sex used to estimate 2050 LF)	Change in population 65+	Ratio LF/65+		Additional workers needed in 2050 to keep country's LF/65+ ratio at its 2020 level		Additional workers needed in each country in 2050 to reach a ratio of LF/65+ of 2.12 (4th lowest of 32 ADRI countries 2020 ratio)	
			2020	2050	Total (millions)	Percent of 2050 ZM LF	Total (millions)	Percent of 2050 LF
	I	II	III	IV	V	VI	VII	VIII
Spain	-6.8	6.9	2.45	0.99	23.6	0.59	18.0	0.53
Germany	-10.0	5.4	2.37	1.41	22.8	0.41	17.2	0.34
United Kingdom	-2.6	5.6	2.75	1.76	18.1	0.36	7.8	0.20
Italy	-7.7	5.2	1.80	0.91	17.1	0.50	23.8	0.58
Poland	-4.6	3.4	2.62	1.32	13.6	0.50	8.1	0.37
France	-2.0	5.2	2.12	1.42	13.0	0.33	13.1	0.33
Netherlands	-1.0	1.5	2.76	1.73	5.1	0.37	2.0	0.19
Switzerland	-0.9	1.2	3.09	1.47	4.5	0.52	1.9	0.31
Austria	-1.1	1.0	2.70	1.31	3.7	0.51	2.2	0.38
Eight moderate sized	-6.7	6.1	2.44	1.40	22.2	0.43	14.9	0.34
Nine smaller countries	-1.9	1.8	2.58	1.64	6.9	0.37	3.4	0.23
Europe, totals/average	**-45.2**	**43.3**	**2.38**	**1.4**	**150.6**	**0.43**	**112.4**	**0.36**
USA	-8.0	31.9	3.10	1.86	107.1	0.40	25.0	0.13
Canada	-2.5	4.4	2.99	1.60	15.7	0.47	6.3	0.26
North America	**-10.4**	**36.3**	**3.09**	**1.8**	**122.8**	**0.41**	**31.3**	**0.15**
S. Korea	-7.5	9.8	3.46	1.16	41.3	0.66	17.1	0.45
Japan	-18.7	2.4	1.83	1.24	23.1	0.32	33.4	0.41
Australia	-0.3	3.3	3.27	1.78	11.2	0.46	2.5	0.16
New Zealand	0.0	0.6	3.63	2.08	2.1	0.43	0.1	0.03
ADRI Asia and Pacific	**-26.6**	**16.1**	**2.24**	**1.3**	**77.8**	**0.47**	**53.1**	**0.38**
ADRI Totals (32)	**-82.2**	**95.7**	**2.55**	**1.49**	**351.1**	**0.43**	**196.7**	**0.30**

*Source: Calculations described in Pritchett (2024), updated.*
The eight moderate sized European countries are: Portugal, Belgium, Czech Republic, Greece, Ireland, Sweden, Slovak Republic, Hungary. The nine smaller European countries are: Norway, Denmark, Finland, Slovenia, Lithuania, Luxembourg, Estonia, Latvia, Iceland.

The population and its age structure in 2050 are, in the absence of horrific events that could affect mortality, well predicted and cannot be influenced much by policy. As it takes exactly 25 years to produce a 25 year-old worker, even the most optimistic changes in fertility would have little impact by 2050.

Table 3 assumes that the LFPR are constant by age and sex from 2020 to 2050. Labor force participation rates are the result of individual decisions and, in the absence of policies to change incentives to induce higher participation rates, there are secular factors working for both lower and higher LFPR at different ages and for different sexes and it is not obvious the "business as usual" scenario is increasing LFPR. Moreover, there is just not that much scope for increasing LFPR among some demographic groups: in the ADRI countries the LFPR for people aged 40-44 is 93 percent for males and 84 percent for females. Pritchett (2023) does a robustness exercise of a high and low LFPR scenario for 2050. In the "high LFPR" scenario the LFPR for each country is assumed to be the average of the highest three ADRI countries for each age and sex category and, conversely, the low scenario the LFPR is the median of the lowest LFPR among ADRI countries by age and sex.

Figure 3 shows the estimates of the needed additional workers for different assumptions about the "target" LF/65+ ratio and assumptions about LFPR. The "high LFPR" scenario lowers substantially the needed additional workers, from 150 million to 75 million in Europe for instance. But the "high LFPR" scenario is hypothetical as it implies truly radical rises in the LFPR of those over 65, for instance the LFPR of those 65-69 in Germany is assumed to rise from 21 percent to 72 percent, and it is not obvious there is a set of politically feasible policies that could cause a rise of this magnitude by 2050.

Figure 3: Even very (implausibly?) high 2050 labor force participation rates or very (infeasibly) low LF/65+ ratios do not drive estimates of additional workers to low levels
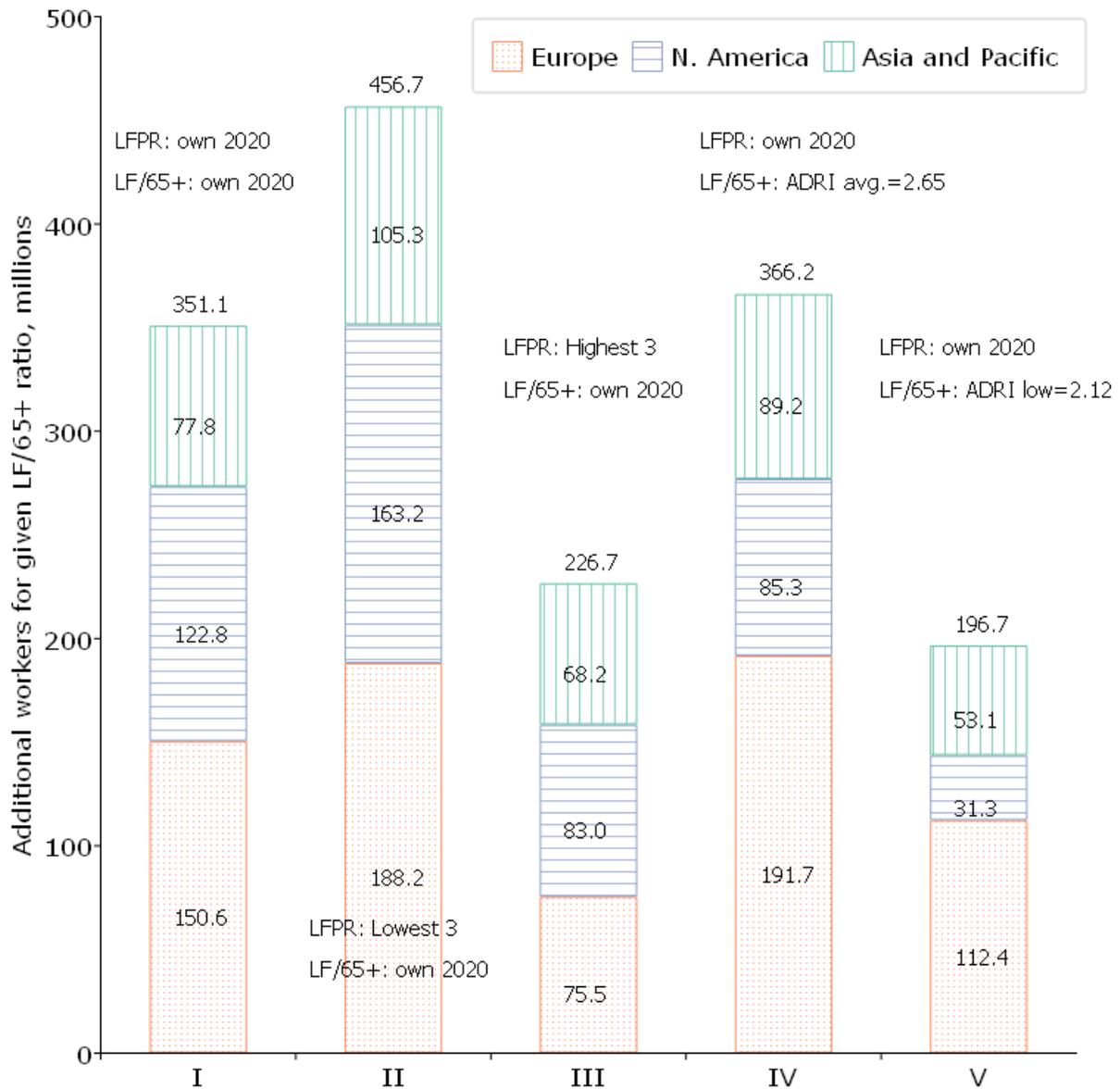
Source: Adapted from Pritchett (2023)

II.C) The many consequences of low LF/65+ ratios

[I am not sure what to put here, there are many issues (e.g. health expenditures and the fisc, sustainability of PAYG pensions, labor scarcity across many industries, etc. But all these are well covered elsewhere and better then me and I only have limited words]

III) Ageing and labor mobility, economics and politics

The movement of people across national borders to work is a domain in which the economics is pretty simple but the existing politics "migration" is hard. Many dismiss the idea of substantially *more* movement of people as a response to the coming shifts in the world's demography as not worth discussing as it is far outside the political Overton window. I argue that expansion in legal pathways for time-limited labor mobility can shift the ADRI countries politics sufficiently to create massive win-win gains for both labor scarce high productivity countries and youth abundant low productivity countries.

III.A) *Economics of movement*

The simplest parts of the economics of cross-border movement from poor to rich countries are the wage gains and the supply of labor.

One, researchers find real wage gains of factor multiples, varying across countries but from 3 to 10, with a modal value around 5, of a typical person (moving from low productivity to high productivity country. The obvious concern is to adjust for potential selection effects, which are potentially huge for a "super-star" worker (e.g. Lionel Messi's immigration premium) but for workers in "core skill" occupations and modest levels of school the results are robust across a wide variety of methods: RCTs (McKenzie, Stillman, Gibson 2010), natural experiments due to migration possibility selection mechanisms (Mobarak, Sharif, Shrestha 2023, Clemens 2013), econometric methods (Oster 2019) to estimate bounds on selection effects (Clemens, Montenegro, Pritchett 2019), wages for the same jobs in the same firms (Ashenfelter and Jurajda 2001), real wage differences of workers across countries in the same detailed low-skill occupations (Pritchett and Hani 2020)). These microeconomic estimates are consistent with (nearly all[6]) aggregate estimates of total factor productivity differences across countries and their estimates of wage differentials for human capital equivalent labor (Pritchett and Hani 2020).

Two, the relevant supply of people willing to move to the ADRI countries to work and be paid their ADRI country productivity, either permanently or for just a period, is highly elastic. As part of their international polling Gallup asked people: "*Ideally, if you had the opportunity, would you like to move permanently to another country, or would you prefer to continue living in this country?*" and then, of those who express a desire to move, "*To which country would you love to move?*" Gallup calculated the youth population in each country if everyone's migration preferences were met. The median expansion of youth population in the countries in the top third of labor compensation per hour was 111 percent (a rough doubling), with the USA at almost exactly the median and some smaller, attractive, destinations (e.g. Canada, Switzerland, Australia) more than tripling. The argument that because there is some movement in spite of the restrictive laws, therefore borders are "essentially" open and that the allocation of people across countries even remotely reflects anything like an "unconstrained" equilibrium is both false and

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[6] The exception is, sigh, a very bad paper published in a very good journal.

obscene, given the almost 9000 deaths in 2024 of people attempting to migrate (IOM) and evade border control[7]. The willingness of workers to move across borders when the wage gains are much smaller, such as inter-regional movements within Africa or Latin America or movements to the Gulf is also consistent with an enormous willingness to move at the existing wage differentials between potential sending regions and ADRI countries.

The questions of the economic impacts of immigrants on the receiving countries is complex, as, since every ADRI country legally tightly controls who can live and work in their country. Given the extensive controls over migration the true answer to "what is the economic impact of an immigrant?" is "what would you like it to be?" As the foreign born in any given country is the endogenous aggregation of those who are allowed by the receiving country to be there, either *de jure* or *de facto* (through enforcement, which is itself a host country policy decision), which results in immigrants from different countries, with different motivations, with different levels of human capital, there is no reason to expect a homogenous answer to a question like "what is the impact on the wages of the native born of an increase in the total foreign born?" or "what is the fiscal impact of a larger number of foreign born?"

Without disputing that demand curves slope down, the impact on wages on the native born depends on whether those admitted to work are substitutes or complements with the native-born workers, and that composition of new movers as substitutes or complements is endogenous to the process by which movers are chosen. The evidence from the 1980 Mariel boatlift (Card 1990) suggests that a sudden relaxation of restraints on the movement of Cubans (by both countries, exit and entrance) resulted in the arrival of a group of workers who were sufficiently complements to native-born workers at all levels of school that, together with the aggregate impact on the local (Miami) economy, their real wages did not all[8].   Similarly, using a reduction instead of expansion of workers, the end of the Bracero program, with eliminated a legal pathway and reduced the availability of foreign-born agricultural workers had zero impact on either employment or wages of workers in agriculture (Clemens, Lewis, and Postel 2018), again consistent with the view that workers arriving via the Bracero program were not effective substitutes for native born workers.

The debate over the impact of immigration on average wages in the USA actually demonstrated striking consensus, as the debate is whether total impact on immigration on average wages of native-born workers is a very small positive number or a very small negative

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[7] One field lab experiment provided assessed the reported willingness of youth in rural West Africa to attempt migration to Europe where the "intervention" was providing accurate information about the probability of dying in route. When provided the "correct" information that the probability of dying was 1 in 4 the youths self-reported willingness to take the risk *increased.*

[8] While Borjas (2017) has attempted to dispute this conclusion, arguing that the influx had negative impacts on the native born with less than a high school degree there are counter-arguments that, even for this small group of workers, those findings are (i) the result of massive data mining and the opposite of robust (Peri and Yasenov 2019) and (ii) an artefact of changes in pre and post boatlift sampling (Clemens and Hunt 2019).

number. That plausible alternative estimates are on either side of zero should not obscure the consensus that the magnitude in the USA of the very large expansions in the ratio of foreign born to native born is quite small.

The same answer "what do you want it to be?" applies to the "fiscal impact" of an "immigrant." People can be present and working in a country on a wide variety of legal pathways, which can stipulate not only the duration of legal residence but also the spending to which a person present on which visa is entitled. The fiscal impact of a tourist is very different from the fiscal impact of a foreign seasonal worker present in the country to work in the tourist industry is very different from an immigrant who changes residence (and then nationality) permanently and each of these categories will pay different taxes and be entitled to different types of spending.

III.B) *Instruments to targets: "migration" versus "mobility"*

The idea that rich countries could use "immigration" to augment their labor force in response to ageing seems a political non-starter, and is often dismissed as such. One would have to be politically obtuse, even for an economist, to not notice by 2025 that questions about migration are changing the landscape of electoral politics. And not just in the USA. In the Netherlands the party winning the most seats in the 2023 national election was PVV (*Partij voor de Vrijheid, Party of Freedom)*, long considered an extreme party that other parties committed to not form a coalition with, yet was part of the coalition government. But in June 2025 Geert Wilders withdrew the PVV from the coalition over his frustration with the coalition partners not moving ahead with the "strictest migration policy ever seen." In the first- round results of the 2024 French legislative elections National Rally and its allies received the most votes, at a third of the voters. In Germany's 2025 elections the AfD (*Alternative für Deutschland*) received 20.8 percent of the vote, outstripping the former governing SPD's 16.4 percent. On the district based second ballot votes the AfD won nearly every constituency in the former East Germany. The UK 2016 referendum to leave the EU hinged, among other concerns, on questions of the commitment to full mobility within the EU.

A key insight of economics is "instruments to targets": if there are many goals, attempting to use just one policy instrument to achieve those goals will be less efficient (and potentially effective) that matching instruments to targets. A useful historical analogy for thinking about the politics of migration (especially in the USA) is Prohibition. The were many very real social ills resulting from alcohol that advocates, like the Women's Christian Temperance Union could point to in their advocacy to make the production, transportation and sale of "intoxicating liquors" illegal. After the 18th constitutional amendment was passed the implementing legislation, the Volstead Act, to the surprise of many, included in the definition of "intoxicating liquors" both beer and wine. Ultimately the American public decided the negative consequences of attempting to enforce Prohibition, particularly the rise of organized crime and related public and police corruption, exceeded the benefits and the 21st amendment in 1933

repealed the 18ᵗʰ and ended Prohibition. What took the place on a ban of all types of "intoxicating liquors" were state specific regulations that taxed alcohol beverages, had different legal age requirements for the retail purchase and consumption, regulations of on-site consumption, and different regulations for beer and wine versus "hard" liquor.

Debate about "immigration" can generate lots of heat and little light by not differentiating among various types of movement of people across borders. The fundamental question for the movement of people across borders is: "Under what terms and conditions (e.g. duration of stay, purposes, allowed activities) does our country allow citizens of other countries to be legally present?" A subset of that question is "Under what terms and conditions are citizens of other countries allowed to be legally present and work?" There are three distinct types of legal movers.

One type of mover, and which is often what is meant by an "immigrant", are people who are allowed to be present and work because in long term residence and on a pathway (which may be long and contingent) to citizenship. The paradigm idea is that these people's stay will be of long duration, that in the course of events these people may acquire citizenship in their new country, that they are going to bring their immediate families, and that they will be become full participants in the political and social life of their new country.   When countries allow pathway to citizenship immigration a key question that the existing citizens must decide upon is "What, and who, is the future of us?"

Nationalism may be an "imagined community" (Anderson 1991) but the idea of national identity and a "sense of us" (Hausmann) has proven a powerful force (for good and ill). If the dominant means of acquiring legal authorization to work is pathway to citizenship then the "cost" of an "immigrant" to existing citizens is not only economic (what impacts would this person have on wages, rents, prices, fiscal balance, innovation, etc.) but also social and political.

A second type of people allowed entry are "movers of distress" people who leave their home country for another place out of necessity. The concept of "mover of distress" is broader than the concepts "refugee" or "asylum seeker" as these terms tend to be pinned down by specific national or international agreements. A legal mechanism through which many movers of distress are admitted by home countries is as a "refugee" as specified in the 1951 Convention on Refugees which both hinges on the "principle of non-refoulement" that refugees must not be forced to return and also specifies in a large number of articles the specifics of how lawfully residing refugees must be treated (residence, wage and self-employment, right of association, family reunification, naturalization, etc.). Again, this implies that the social and political consequences of people accepted as "mover of distress" are, once that legal status has been granted, are beyond further control.

A third type of mover are people who move to work on legal authorization that is explicitly time limited and for which the terms and conditions are narrow, such as limited to a specific occupation. For these movers there is no expectation on either side that this move will be "permanent" or that the mover is on a direct path to citizenship (though it may be a stepping stone). The USA for instance has a number of visa categories of this type: for skilled workers (H-1B), for workers in agriculture (H-2A), that allow people to work as part of "cultural exchange" (au pairs with J-1 visa), for students to work in the USA after a master's degree (OPT, an extension of F-1). I refer to this type of mover as "labor mobility" to distinguish it from either "immigration" or "movers of distress."

III.C) *The biggest policy opportunity*

What is the scope for the ADRI countries to maintain higher ratios of labor force to 65+ by creating legal pathways that allow "additional workers" to come from labor abundant countries? Based on the demographic arithmetic in Table 3 I argue two things.

One, however pro-immigration you personally might be (and I personally am quite pro-immigration) the demographic consequences of ageing in ADRI countries produce labor force gaps that are too large for "pathway to citizenship" immigration to feasibly fill all of the gap. If citizenship movement alone fills the labor force gaps the magnitudes are so big the existing citizens lose their control of the "future of us."

Two, if there are separate political allowances for "immigrants" and "labor mobility" then there is huge scope for rotational or temporary labor mobility to add to the ability of labor abundant countries to benefit from rotational workers to help labor scarce countries address their labor force gaps.

The first column of Table 3 shows the total labor force gap in the UN zero migration scenario, when LFPR are constant, and countries want to maintain their 2020 LF/65+ ratios. The second column just estimates the stock of additional pathway migrants it would take to fill that labor force gap if all movement was from pathway to citizenship migrants. Since pathway to citizenship migrants move entirely families, the data is consistent with there being 1.1 additional people resident for every migrant working. Column 2, the total movers needed, is column 1 times 2.1. Spain, with a labor force gap in 2050 of 23.6 million people would need, over and above their existing migrant stock in 2020, 49.6 million migrants. Column 3 shows the percent of incremental migrants from 2020 to 2050 in the total population in 2050. In Germany's case, this would imply 47.8 million incremental migrants to 2050, which would constitute 39.5 percent of the total 2050 population.

There are two additional considerations to the political implications of this level of pathway to citizenship migration. One, the total *net* gain from pathway to citizenship migration to any ADRI country from other ADRI countries across all ADRI countries has to be less than zero. As LF/65+ is falling in every ADRI country if one country (Germany, say) attracts

migrants from another ADRI country (Italy, say) then this is a wash across ADRI countries. Therefore, a reasonable assumption is that the additional workers from pathway to citizenship migration will be from non-ADRI countries.

The second consideration is that all ADRI countries in 2020 have already have a stock of non-ADRI migration. Column 4 shows the 2020 of non-ADRI country migrants as a percent of the population, calculated from UN estimates of existing bilateral migration stocks. This gives a more nuanced picture than the total foreign born to native born. For instance, Switzerland has 28.8 percent of its population that are migrants, but only 7.4 percent of the population (about one fourth of migrants) are from non-ADRI countries. Switzerland attracts migrants from other parts of Europe and other rich countries. In contrast, France has only 13.2 percent of its population that are migrants, so, on one level, more "closed" but 9 percent of the 2020 population of France are non-ADRI migrants, higher than Switzerland.

Column V adds column 3, incremental 2020 to 2050 migration to fill the labor force gap of non-ADRI origin and the 2020 stock of non-ADRI migrants[9]. This implication of this hypothetical scenario is in 2050 Europe nearly half (48.7 percent) of the population would be of non-ADRI country origin. In North America it would be 56.4 percent, in East Asia and Pacific it would be 56.5 percent.

This is not a "projection" or even a "scenario" it is just the arithmetical calculation. But the outcomes pose the question: "Is it likely that existing voters in the ADRI countries would choose policies for pathway to citizenship migration from now until 2050 such that the majority (or near majority) of the citizens in their country in 2050 were from (or first-generation descendants of) non-ADRI countries?" In spite of my own pro-migrant tendencies and my many "open borders" friends, I think the answer is "No, nothing remotely like that is going to happen."

The places where it might happen are those countries where migration and openness to migration is an integral part of the history of the national identity: USA, Australia, New Zealand, Canda. These are the four countries with the highest fraction of population from non-ADRI origin migrants (ranging from 12 percent (USA) to 16 percent (Australia)). Even during the late 19th/early 20th century period of "open borders" the ratio of all foreign born to native born was low. And that period ended in the 1920s with the erection of much tighter controls on immigration across not just the USA but a number of countries, which Williamson (2004) attributes in part to expanded democracy.

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[9] This isn't very conceptually clean as, on the one hand, from 2020 to 2050 many of the current non-ADRI migrants will have died, or returned to their home country and on the other hand by 2050 there will be children of non-ADRI migrants born and living in the host country and also, on another hand, this is a ratio to the 2020 population not the 2050 population.

	Labor Force Gap 2050 (at ZM, 2020 LFPR (millions) (Col V of Table 3)	Additional foreign-born in 2050 population if all labor force gap is filled by all pathway migration (millions)	Percent of pathway migrants in 2050 population	Current (2020) percent of migrants from non-ADRIC countries as percent of population	Current migrant stock from non-ADRIC countries plus pathway movers in 2050 (cols III+IV)	Total rotational mobility to meet the labor force gap if previous stock plus pathway migration is capped at X of population in 2050 (millions)	
Country						25 percent	35 percent
Column:	I	II	III	IV	V	VI	VII
Spain	23.6	49.5	53.8%	9.2%	63.0%	20.37	18.34
Germany	22.8	47.8	39.5%	7.5%	47.0%	16.68	13.19
United Kingdom	18.1	38.0	36.5%	7.5%	44.0%	12.59	9.44
Italy	17.1	35.9	41.8%	5.0%	46.8%	12.35	9.97
Poland	13.6	28.6	45.9%	0.1%	46.0%	9.64	8.03
France	13.0	27.4	29.8%	9.0%	38.8%	8.12	5.05
Netherlands	5.1	10.6	38.3%	8.0%	46.4%	3.67	2.86
Switzerland	4.5	9.5	53.1%	7.4%	60.5%	3.80	3.41
Austria	3.7	7.8	48.8%	5.4%	54.2%	2.94	2.56
Eight mid-sized	22.2	46.7	41.7%	4.3%	45.9%	15.8	12.6
Nine smallest	6.9	14.4	39.7%	3.2%	42.9%	4.4	11.7
Europe	150.6	316.2	42.6%	6.1%	48.7%	110.4	97.1
USA	107.1	224.9	39.9%	11.8%	51.7%	85.76	69.60
Canada	15.7	32.9	47.0%	14.1%	61.1%	13.74	11.98
North America	122.8	257.8	43.4%	12.9%	56.4%	99.50	81.58
S. Korea	41.3	86.7	66.4%	3.0%	69.3%	36.67	34.57
Japan	23.1	48.6	32.6%	1.5%	34.1%	11.88	7.09
Australia	11.2	23.6	46.2%	16.0%	62.2%	10.06	8.75
New Zealand	2.1	4.4	45.6%	14.7%	60.3%	1.86	1.60
Asia and Pacific	77.8	163.3	47.7%	8.8%	56.5%	60.5	52.0
Total (32 countries)	351.07	737.24	44.6%	9.3%	53.8%	270.31	230.73

Table 4: Even with the most "optimistic" (pro-migration) assumptions about the political feasibility of the magnitude of pathway to citizenship immigration, there is very large scope for rotational labor mobility to meet labor force gaps

Source: Author's calculations, Pritchett (2024).

In other ADRI countries, Europe, Japan, Korea the scenario of very high levels of pathway to citizenship migration of people from the labor abundant places (Africa and South Asia) seems even less political likely.

The last bit of (hypothetical) demographic arithmetic is to add to the assumptions about the target LF/65+ ratio and constant age and sex LFPRs a politically driven upper limit of how much of the labor force gap could be met by pathway to citizenship immigration and, as the residual, how much could be met by time-limited labor mobility. Column VI and Column VII are calculations of the total labor force gap in 2050 less the additional workers derived from the stock of non-ADRI immigrants in 2020 plus the incremental pathway to citizenship immigrants when the total immigrants (which is workers times 2.1 to account for non-labor force participants among immigrants) is limited to either 25 percent of the total population (column VI) or 35 percent of the population.

Illustrating this arithmetic with the case of Germany gives the intuition. The 2050 labor force gap is 22.8 million workers. If 100 percent of this is met with pathway to citizenship immigration, then this requires 47.8 million immigrants (22.8*2.1). The total UN 2020 Zero Migration scenario population of Germany in 2050 is 73.4 million so this would make incremental immigrants to be 39.4 percent of the population (=47.8/(47.8+73.4)). But suppose that the maximum politically feasible ratio of non-ADRI population in Germany in 2050 is 25 percent (which is very high as this is twice as high as the current ratios in North America (12.9 percent) and more then 3 times as high as its 2020 level of 7.2 in Germany (keeping in mind migrants from FSU (Ukraine) and some Eastern European countries (e.g. Bulgaria, Romania) are included in the 2020 stock of non-ADRI migrants). In this case, the maximum incremental immigrants from non-ADRI countries in 2050 is 25 percent less 7.2 percent of the 2050 population, which is an upper bound of 13 million additional pathway to citizenship migrants by 2050. This is movers so needs to be divided by 2.1 to reach 6.2 million addition workers. This leaves a labor force gap 22.8 million less 6.2, 16.7 million.

This implies that, even under very optimistic (from a pro-migration view) assumptions of the levels of pathway to citizenship migration (or more broadly "permanent" movers including "movers of distress") there is still enormous scope for an instrument that with different political tolerances to facilitate additional, very large, flows of workers. Table 4 suggests that even if non-ADRI migrants (previous stock plus increment to 2050) reached 25 percent of the population (which implies the total foreign born to native born in 2050 is higher than that, given substantial inter-ADRI country flows) the ADRI countries would still need 270 million additional people in the labor force to keep their LF/65+ ratio constant. Even assuming the implausible scenario in which the ratio of non-ADRI migrants to native born reaches 35 percent by 2050, the scope for rotational labor mobility is 230 million in 2050. This is larger than the current total estimated stock of all non-ADRI migrants in ADRI countries in 2020 of [check].

These totals imply massive potential economic gain. Even assuming that all rotational labor mobility was of people with low formal schooling (high school and below) the typical estimated wage gain of a mover from low productivity to high productivity country is around P$25,000 (in 2017 PPP) (Pritchett and Hani 2020). The idea that the gains from "open borders" are very large relative to any other global policy actions in widely accepted (as the "low" estimates are still fractions of world GDP). That barriers to the mobility of people in a world of large place specific differences in the productivity of the same person produces "trillion-dollar bills on the sidewalk" (Clemens 2011) is also hard to gainsay. But, just the gains from high productivity countries creating legal pathways for workers on a time-limited basis in just the magnitude that prevents falling LF/65+ ratios, the gains are still on the order of 5 to 6 trillion per year. Allowing these magnitudes of mobility would add to the world GDP by 2050 an economy bigger than Germany's.

III.D) *Can rotational add to the total stock of movers?*

The argument is not that countries should replace immigration of future citizens or movers of distress with rotational labor mobility. The argument is that the ageing of ADRI countries is going to be so large that there is scope for much more of all types and, even then, given the falling labor force and rising 65+ population still not keeping these ratios constant at their already low levels.

But, these does hinge on the idea that countries would politically be able to have much larger stocks of foreign born allowed to live and work in their countries if they had multiple modalities for movement. Let me briefly outline four reasons why this might be the case.

First, a large part of the perceived "costs" of immigrants by existing voters are political and social, not purely economic. These costs are not due to mere physical presence (e.g. tourists, students) but by the implications they are perceived to have on political outcomes and social norms. The implications of a program, like an H-2EC (a temporary mechanism for workers in elder care) in the USA (or "au pairs for grannies") are very different from allowing additional permanent residents and citizens.

Second, anti-immigrant politics can be driven by a sense of a loss of control over the "future of us" (e.g. Collier 2013). The political and social implications of pathway to citizenship immigrants and time-limited movers are very different.

Third, another source of concern about the movement of people is that it is not under current control and threatens "order." During Prohibition in the USA there were people who did not want alcohol legalized but also disliked the lawlessness induced by the inability to enforce the law. The mismatch between legal pathways and employment needs creates pressures for movement across borders that is informal and unauthorized. There is a potentially a constituency that would prefer "safe, orderly, and regular" movement of people of much larger magnitude

than current flows than the combination of restrictions that implied a smaller total but which led to "disorder."

Fourth, if one is creating legal pathways for work then, as indicator above, the "wage impact" on native born workers is a question of design. With increasing labor force scarcities it will be more and more widely accepted that there are many needed core-skill jobs that there are just enough native workers to do (and relative changes of wages cannot create new native-born workers, just reallocate across sectors). While even admitting more people into a country who are allowed to participate in existing labor markets has low wage impacts, a program of sector (and region?) specific visas could be tailored that creates even lower wage impacts and higher price gains in key industries for the native born.

Fifth, similarly, the fiscal costs and benefits of movers depend on the design of the conditions for their legal presence. It is true, almost be definition, that in any country with a net redistributive fiscal system that admitting lower skill foreign workers will have a higher total fiscal cost than high skill workers and can be quite negative (e.g. van de Beek et al 2024). But if each worker is only present for a short period (months to at most a few years per stint) then they will not have the same fiscal profile of net taxes versus expenditures as a citizen or permanent migrant.

Conclusion

While "demography is destiny" is too strong, it is not completely wrong. One, the simple arithmetic of demography, with births and deaths and everyone between those two events ageing by exactly one year every year, makes demographic predictions of population and the age structure of population decades ahead quite reliable. Unlike economic or political or social changes, which can happen fast with unpredicted timing (e.g. the collapse of the Soviet Union, the 2008 global financial crisis) our demographic destiny is written decades ahead. Two, demography is an important part of any country's political, economic, and social destiny.

Fertility has fallen pretty much everywhere and to very low levels. Most rich countries have been below replacement fertility for a long time (forty to fifty years). This fall in fertility is the result of changes in the choices people make about how many children they want. At the country level, the fall in fertility rates is strongly associated with (nearly entirely "accounted for") normatively desirable changes in economic (rising GDP per capita and structural transformation), educational (expanded female schooling), and health (lower child mortality) outcomes that are themselves normatively good. As no one (sensible) wants any of these improvements in these (and other) fundamentals that affect individual's fertility choices to slow or stop, it is hard to see a future in which governments can (or should?) make policy choices that will raise and sustain fertility to or above replacement.

The implications of fallen fertility over the next few decades for the future age structure of the population are pretty much already destiny (we hope, as only something truly catastrophic

could change it). Ageing is going to happen everywhere, but quite differently in three different groups.

In one group, which includes all of the world's richest economies, China, and (most of the) former Soviet Union, the *absolute* number of youth is going to fall and the *absolute* number of those over 65 is going to rise, and hence population growth is going to gradually fall and become negative. In the absence of migration this will push all these countries into demographic *terra incognita* as no human society has even seen the degree of inverted demographic pyramids, the high ratios of those 65+ to labor force aged, these countries will experience. In the second group, which includes the rest of the world less Africa, the falls in fertility are more recent and hence momentum with cause absolute increases in youth, but at a slow and slowing pace and large increases in those 65+. In Africa the fall in fertility has come later and has not been as rapid and hence the absolute number of labor force aged is going to more than double to 2050 and yet there will be population ageing in that those 65+ will triple.

A basic fact about the global economic future is that nearly all of the expansion in the labor force aged population will happen in countries with low levels of GDP per worker and in all the industrial countries with very high GDP per worker the growth rate of the labor force will be negative. Maintaining even the currently very low ratio of labor force to 65+ population requires massive numbers of additional workers relative to "business as usual" scenarios of constant labor force participation rates and no additional migration.

The implication of this largely uncontested demographic arithmetic is that the largest, and growing, opportunity for policy driven economic gains is the creation of legal pathways for "safe, regular, orderly" and large-scale movement of labor force aged people from the low productivity countries where they are going to be born to the high productivity (and hence high wage) countries with expanding numbers of old and shrinking labor forces.

Achieving these potential gains requires policies consistent with the politics of recipient countries. What seems to be political impossible is meeting the labor force needs of the ageing economies with exclusively "pathway to citizenship" and "mover of distress" movers. Even if these "permanent" migration pathways are expanded to their likely political limit these leaves lots of scope for vastly expanded legal temporary and rotational pathways for legally authorized workers.

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