Rotational labor mobility is the biggest global economic opportunity

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Abstract. The next 30 years will see historically unprecedented demographic differences between rich countries, with shrinking labor forces but an increasing number of elderly people, and (some) poorer countries—particularly in Africa and South Asia--where demographic momentum will create. These differences create a massive win-win-win opportunity for demographic arbitrage in which ageing, labor scarce, high productivity, countries to create expanded legal pathways for movers increased opportunities for rotational mobility. Win: helps ageing countries cope with the economic, employment, and fiscal strains of ageing. Win: this helps movers from poor countries dramatically increase their earnings and life prospects. Win: this helps youth bulge countries expand employment opportunities and foreign exchange earnings while gaining from remittances, savings, and returnees with enhanced skills. Expanding legal pathways for rotational labor mobility in core skill occupations to meet the demographic labor force gaps in the ageing, democratic, rich industrial countries could add 6 trillion dollars in additional wages to the global economy by 2050 (over and above the gains from expanding standard migration channels). The net present value over the years 2020 to 2050 of increased rotational labor mobility could be 35 trillion dollars, which makes it the biggest development opportunity by far.

Introduction[1]

Over the next 30 years the thirty-one democratic, rich, industries (ADRI) countries[2] will experience the demographic combination of growing numbers of older (65+) population and shrinking numbers of younger people. For instance, in the UN Zero Migration (ZM) scenario from 2020 to 2050 the population 65+ in Italy will grow by 5.4 million (39 percent) but the population 15-64 will *fall* by 12.4 million (33 percent). Without migration and without changes in labor force participation rates by 2050 the projected ratio of the labor force to those 65+ will fall from its already historical low of 1.8 to only .9—less than one worker for every person over 65. Italy is just the most dramatic case but similar demographics affect all ADRI countries, in this scenario Europe the average LF/65+ ratio falls to 1.34 and the ADRI median falls to 1.44.

In contrast, Sub-Saharan Africa and South Asia will see their labor force aged population grow by 1.1 billion between 2020 and 2050. The major challenge for these countries is creating adequate productive employment opportunities for their growing labor force aged populations.

Differences of all types (tastes, endowments, production possibilities) create opportunities for mutually beneficial exchange. These radically different medium-term demographic futures create the possibility for mutually beneficial "age arbitrage"—in which the young in youth bulge countries are able to move via multiple legal pathways, including on rotational or time-limited terms contractual arrangements, to augment the labor force in ageing societies.

The obstacle to reaching the full benefits (for movers, sending and host countries) of this potential mutually beneficial exchange is politics. "Politics" is not an obstacle in any negative sense but in the deepest sense that the citizens and voters of the ADRI countries must come to agreement on modalities of movement they find acceptable, which has to date proven difficult. But the size and dire implications of the emerging demographic labor force gaps create the possibility of a new "grand bargain" on mobility and in particular will bring about acceptance of rotational labor mobility as a legitimate and feasible option, which changes completely the current deadlocked host country debate about "immigration" (Pritchett 2023).

A well-regulated and orderly system for rotational labor force mobility threads the three-fold political needle facing ADRI societies by acknowledging citizens three, not just two, questions about who can legally reside and work in their country:

(1) who is the "future of us"—who is to be allowed to live and work in our country on a direct expected pathway to citizenship and hence participate in the shaping of the future of "our" society and culture and politics,

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[1] I would like to thank Archita Misra for her excellent work and Rebekah Smith of LaMP for the continued interaction in shaping this work over more than a decade.

[2] I focus on ageing, democratic, rich industrial countries which excludes from the "rich" countries the oil rich countries (e.g. the Gulf, Brunei) and of rich industrial countries excludes Singapore. Many non-rich countries will also experience rapid ageing, in particular China, which will "get old before it gets rich."

(2) who will we admit as "movers of distress"—how will our country act with respect to refugees, asylum seekers, and those fleeing intolerable conditions (a category which will expand with climate change) and

(3) who will we allow to legally reside and work in our country on a fixed term basis, and under what terms and conditions (including restrictions on occupations, sectors, regions), in order to help us meet our labor force needs?

For the last 100 years or so, since the advent of much stricter legislation limiting immigration in a large number of countries in the 1920s (Timmer and Williamson 1998, Hatton and Williamson 2004, Williamson 2004) effectively ended an era of "open borders" (among certain countries and populations at least), the question of "the future of us" and the question "who is allowed to work here" were, to a very large extent, treated as the same question. While most countries have had a variety of short-term, temporary, and seasonal programs that allow people to work, these have been, in ADRI countries, a small proportion of movers and very small portion of the population. This approach of sharp limitations on migration and limiting legal pathways to work to "permanent" legal migrants worked historically (over the last 100 years) both economically and politically because it was compatible with the historical demography. The modern demographic transition saw death rates fall first, and initially much faster and further than birth rates, and hence population growth first accelerated and then only gradually decelerated as birth rates fell. As the modern demographic transition happened first in the industrializing countries, their rate of natural increase (excess of births over deaths) was initially quite high. The share of the global population in the (now) high-income countries (or, alternatively, in the regions of Europe and North America) *rose* from 1860 to 1960 as population growth in these industrializing regions exceeded (slightly) that of the poorer countries[3]. Moreover, as the health transition lowered the death rates of the very young first, the growing population had demographic pyramid had a thick base: the LF/65+ ratio was near 6 in the ADRI countries as late as 1950.

These underlying demographics of rapid (by long-run historical standards) led industrializing country governments to see their primary challenge as expanding economic growth to provide a good job for every citizen. Moreover, the combination of an increasingly productive economy and growing modern labor force allowed governments to massively increase taxes and fund a generous "social contract" which, among other elements, provided for income support to the elderly and increasing coverage of health care costs (Lindert 1984, Jensen 2022).

But that demographic history is, well, history and the demographic future looks radically different. Fertility rates in ADRI countries have fallen much further, and in some cases much faster, than "expected"[4] and show no "rebound" f fertility from their current very low rates (GBD

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[3] My calculations with Our World in Data population data by region and category.

[4] "Expected" is in scare quotes as while most demographic projections in the 1980s and 1990s assumed that fertility rates would converge to 2.1, as Pritchett and Viarengo (2013) point out, this was more by way of mathematical convenience, as very long-run projections with fertility rates lower than the replacement level obviously asymptote to zero, than an "expectation" based on an empirically validated causal explanation of fertility.

Fertility Collaborators 2024). In the demography of the next 30 years if (i) labor mobility is limited to "pathway" migration and (ii) "pathway" movement is limited by the politics of control of the "future of us" then it will be increasingly impossible for ageing to maintain their existing social contract between young and old. However, if both "pathway" and "rotational" movement are both viable options at scale, then the total labor mobility can be much higher and still compatible with popular (and even, I would argue, "populist") politics.

I estimate that if two-thirds of the demographic labor force gap in 2050 in ADRI countries is met by rotational labor mobility (with the other third met with "pathway" and "movers of distress") this would allow over 200 million additional migrants the opportunity to work (over and above the additional pathway migrants) and this would add 6 trillion dollars to global wages, accruing mostly to movers from poor regions. The wages are additional because the differences in labor productivity between the ADRI countries and the labor force abundant countries imply exactly the same worker creates much higher value added in the high productivity place.

Sustaining such massive flows in a safe, regular, orderly, and rights-respecting way is a significant administrative and regulatory challenge, but the ADRI countries are (by definition) high capability and routinely handle regulatory challenges of similar difficulty.

I)   *Calculations of 2050 demographic labor force gap (DLFG) in ageing, democratic, rich industrial (ADRI) countries*

The first step in estimating the medium-run (to 2050) potential gains from rotational labor mobility is calculating the total ADRI countries demographic labor force gap (DLFG): The empirical question is: "how much bigger than the zero migration forecast would each country's labor force need to be in 2050 to achieve any given LF/65+ ratio?"

I.A) Data and formula

The UN Population Division of the Department of Social and Economic Affairs (DESA) produces estimates and projections of country populations by sex (male, female) and by 21 five-year age brackets (with a top-coded category of 100+) from 2020 at five-year intervals out to 2100[5]. Population estimates are the sum of estimates of the rate of natural increase (cumulated births less deaths) of the existing population (both native born and foreign born) and net migration. The UN DESA provide nine scenarios using different assumptions about future fertility, mortality and migration[6]. I use Zero Migration (ZM) as a conceptually clear baseline scenario with future populations and age structures based only on rate of natural increase. This is not a "prediction" of future populations in 2050 as there will be some level of net migration and this is embedded in the other UN scenarios but in calculating the demographic "need" for

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[5] This structure of the data leads to the awkwardness of eliding between "next 30 years" (which is to 2054 as it is 2024) because the last real estimate is 2020.

[6] The nine scenarios are: medium variant, high variant, low variant, constant fertility, instant replacement, momentum, zero migration, constant mortality, and no change.

migration it is clearer to talk about the total need rather than the incremental need over and above whatever levels of net mobility already embedded in UN scenarios.

This scenario allows the calculation of "young" (ages 0-14), "labor force aged" (ages 15-64), and "65+".[7] The accelerating ageing of ADRI countries is well documented, widely discussed, and, at least to 2050, largely inevitable. While forecasting economic or political or social changes thirty years ahead is largely a mug's game, projections of a country's population over 65 in 2050 is relatively certain as everyone over 65 in 2050 is already 35 or over in 2020 and death rates are (gratefully) quite stable. Moreover, the labor force aged population is also predictable as most people who will be labor force aged (15-64) in 2050 are already born by 2020 (all of those who will be 30 plus).   Even quite drastic increases in fertility rates (which are currently regarded as highly unlikely (GBD, 2024)[8]) starting today (2024) would produce only modest changes in the labor force aged by 2050.

Not all "labor force aged" are in the labor force or "economically active" and many "65+" are still in the labor force. To estimate the 2020 labor force I use ILO data on economically active population, or labor force participation rates (LFPR) by sex and five-year ages in 2020. I estimate the labor force in 2050 using the ZM estimates of the age-sex structure of the ZM population and assumptions about LFPR by age and sex in 2050.

The ILO economically active population data provides estimates for the five-year cohorts from 15-69 up to 60-64 but then only a single estimate for all people 65+. But a large component of forecasted ageing between 2020 and 2050 is extensions in longevity. Hence a much larger share of those "65+" in 2050 will be, say, over 80, than in 2020. Therefore, assuming the "65+" labor force participation rate would stay constant between 2020 and 2050 implies (without any particular justification or rationale) large increases in the LFPR of those (much) older than 65.

I estimate the LFPR for each five-year cohort out to 100+ by assuming a structure to the decline in LFPR for those over 65, in particular, that it declines by half over each five-year cohort, e.g. the LFPR rate of those 70-74 is half that of those 65-69.   I then adjust this assumed LFPR structure for those 65+ such that the average LFPR for all those 65+ with this assumed age structure equals the actual OECC LFPR for those 65+ in 2020. With these assumptions I can calculate the LFPR in 2050 assuming, for instance, a constant LFPR for each five year cohort.

Figure 1 shows the average LFPR across all ADRI countries, which displays the well-known features that: (i) LFPR increases from 15-19 to reach its peak at "prime age" (around 25), (ii) for males the LFPR is roughly constant from 25 until starting an accelerating decline at age 55 (the structure beyond age 65 is assumed) and (iii) the age structure of female LFPR is more

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[7] I generally call this category "65+" to avoid labels like "aged" or "elderly" or "retirees" which may carry unnecessary connotations or assumptions.
[8] The Global Burden of Disease 2021 Fertility and Forecasting Collaborators (2024) estimate that the median total fertility rate in these ADRI countries will fall from 1.53 in 2021 to 1.42 in 2050 in their "reference" scenario and estimate that adoption of a package of "pro-natal" policies would increase TFR in these countries by .2 so their 2050 forecast TFR would by 1.62—still far below 2.1--even with full adoption of pro-natal policies and generous assumptions about their impact.

complex as it peaks near 25, declines, then recovers, and then starts to decline again around 50 and declining more steeply than males to up to age 65 (again beyond age 65 the shape of the decline is by assumption).

Figure 1: The average 2020 labor force participation rate/economically active population across the 31 ADRI countries, by age and sex
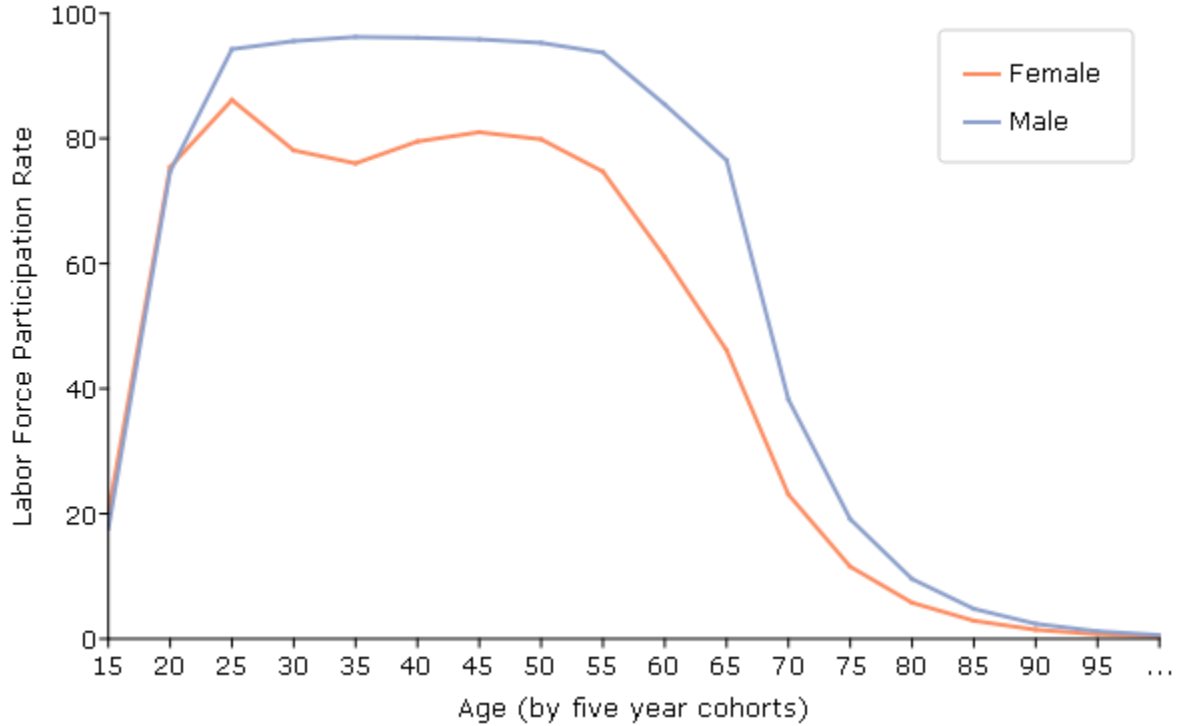
Source: ILO data (with author's extrapolation for ages 65 and above as described in the test).

For each country c and each time period T (2020 and 2050) the labor force aged population is the sum of the male and female (index s for sex) populations by age cohorts (index a for age).

$$labor\ force\ aged_T^c = \sum_{a=15-19}^{a=60-64} \sum_{s=F}^{s=M} population_T^{c,a,s}$$

The labor force at each year is the labor force participation rate (LFPR) for each country, sex, age cell times the population of each cell in that year:

$$Labor\ Force\ in\ labor\ force\ ages_T^c = \sum_{a=15-19}^{a=60-64} \sum_{s=F}^{s=M} population_T^{c,a,s} * LFPR_T^{c,a,s}$$

My calculations of the actual and forecast labor force include the labor force participation of those over 65.

$$Over\ 65_T^c = \sum_{a=65-69}^{a=100+} \sum_{s=F}^{s=M} population_T^{c,a,s}$$

$$Labor\ force\ over\ 65_T^c = \sum_{a=65-69}^{a=100+} \sum_{s=F}^{s=M} population_T^{c,a,s} * LFPR_T^{c,a,s}$$

My "base case" estimates the labor force from 2020 to 2050 assumes the LFPR in 2050 is the same, cell by cell (sex and five year age cohort) as in 2020.

I.B) Country estimates of the labor force and 65+ in 2050

The calculated demographic labor force gap (DLFG(k)) calculation is: "If the LF/65+ ratio in 2050 were to hypothetically reach a specific value k (e.g. the same as in 2020, or 2.11) rather than its base case (ZM, constant cell-by cell 2020 LFPR) forecasted value, how much larger would the labor force need to be?"

Figure 2 illustrate these calculations using Germany (Figure 2), a large population country with typical demographic shifts. The same graph for each ADRI country is available in the Graphical Appendix.

Figure 2 shows the 2020 labor force in Germany is 43.4 million (42.1 million of whom are labor force aged) and the total 65+ population is 18.3 million hence the LF/65+ ratio is 2.36 (=43.4/18.3). By 2050 the base case German labor force will have declined to just 33.1 million (31.6 of which are labor force aged). The assumption of 2020 cell-by-cell LFPR implies the LFPR of the labor force aged remains relatively stable at 80.6 percent so the labor decline is due to demographic decline of labor force aged population from 52.2 million to 39.2 million.

The population 65+ on the other hand will have increased by 5.46 million, from 18.3 to 23.8 million. As longevity is assumed to rise most of that increase in among people over 80 years old. Those 80+ will increase by 4.61 million, 84 percent of total rise of those 65+.

In order for the 2050 LF/65+ ratio to have remained constant at the 2020 value of 2.36, the 5.46 million increase in the 65+ population would require an *increase* in the labor force of about 13 million in the labor force (=5.46*2.36). But, as the base case labor force falls by 10.3 million, the 2050 LF/65+ ratio would fall from 2.36 to just 1.39.

The primary medium-run challenge of the ADRI countries is not that population growth is slowing or even that absolute population is falling. Many people believe that smaller absolute numbers in the long run human populations would be a good thing, making the achievement of sustainable environmental conditions easier, for instance. The challenge is *ageing*. By 2050 the labor force, which contributes to the economic output (in both public and private sectors) that sustains both private consumption and much of the base for tax revenues to carry out all public purposes, in Germany *falls* by 10.3 million and the population 65+ will *rise* by 5.5 million--and those aged 80 and older will rise by 4.6 million.

Figure 2: Illustration of calculations of the demographically driven gap in the future labor force, Germany's labor force, 65+ population and labor force gap in 2050
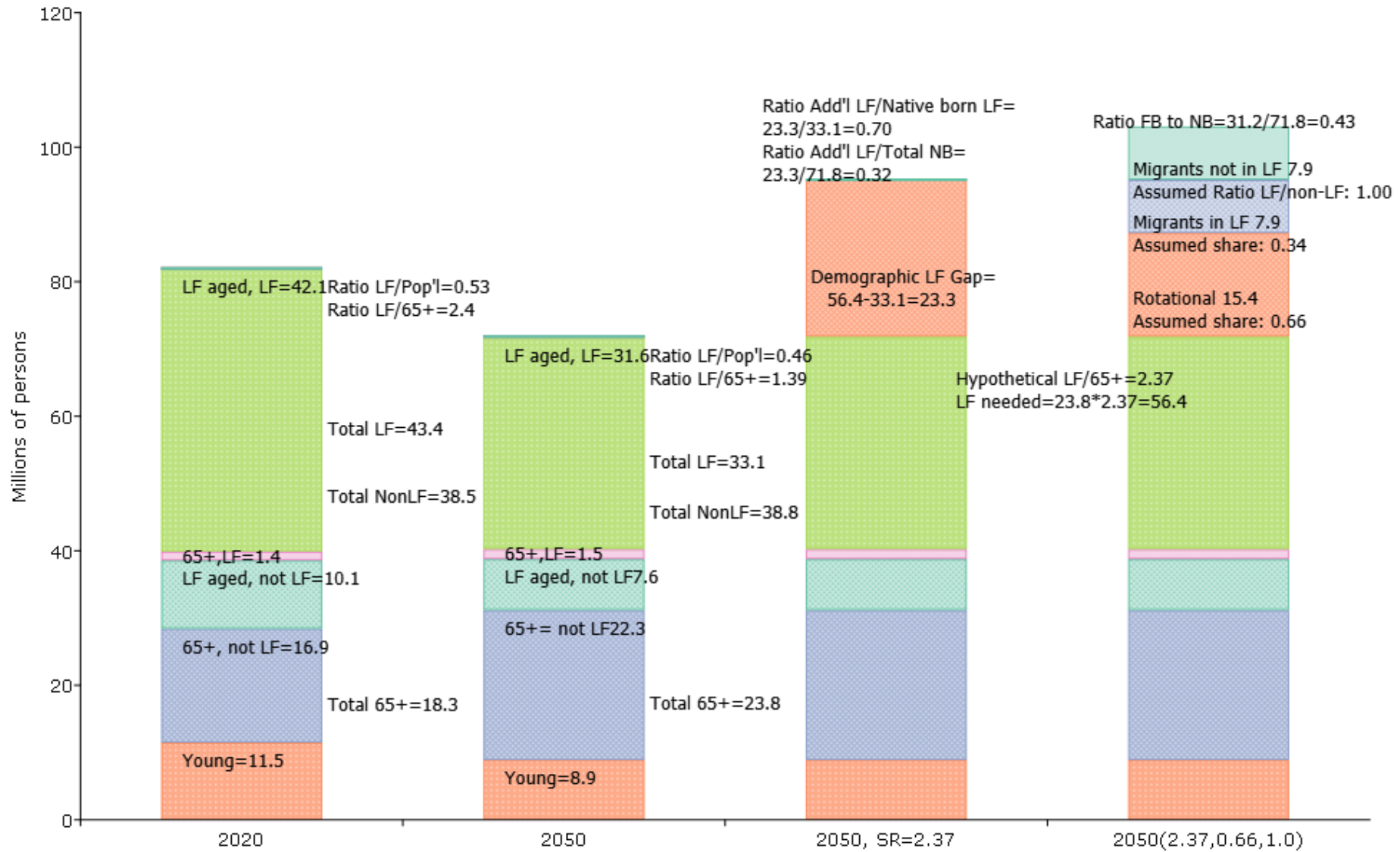

Source: Author's calculations as described in text.

I.C) Estimating the demographic labor force gap (DLFG)

The first two columns of Figure 2 are just arithmetic using the base case assumptions. To calculate the DLFG(k) I need to make assumptions about a "target" LF/65+ ratio, k. Figure 3 illustrates the demographic changes by calculating the "2020 cell by cell LFPR constant" historical LF/65+ ratios to parse out shifts in the LFPR (e.g. the rise in LFPR for women). The ADRI countries median "2020 constant LFPR" LF/65+ ratio fell from just under 6 in 1950 to around 4 by the 1980s to 2.62 in 2020.

The right side of Figure 3 shows the base case scenario 2050 estimates of the LF/65+ ratios: Italy falls to.88, Japan to 1.25, Germany 1.39 (as above in Figure 2) and the USA to 1.83. This illustrates that there is no historical experience of *any* country *ever* with LR/65+ ratios this low (the USA value is at roughly the current Japanese ratio). The 2020 ratios of Japan and Italy 1.8 are the lowest ever observed. We cannot know yet whether those ratios are economically and fiscally sustainable. The existing "social contract" embodied in the programs for old age security and health insurance and elder care come into existence and were built in ADRI countries when the LF/65+ ratios in ADRI countries were two to three times their 2020 level.

Figure 3: Evolution of the median ADRI countries ratio of "2020 cell by cell constant LFPR" labor force to 65+ and selected countries contrasted with 2050 Zero Migration scenario
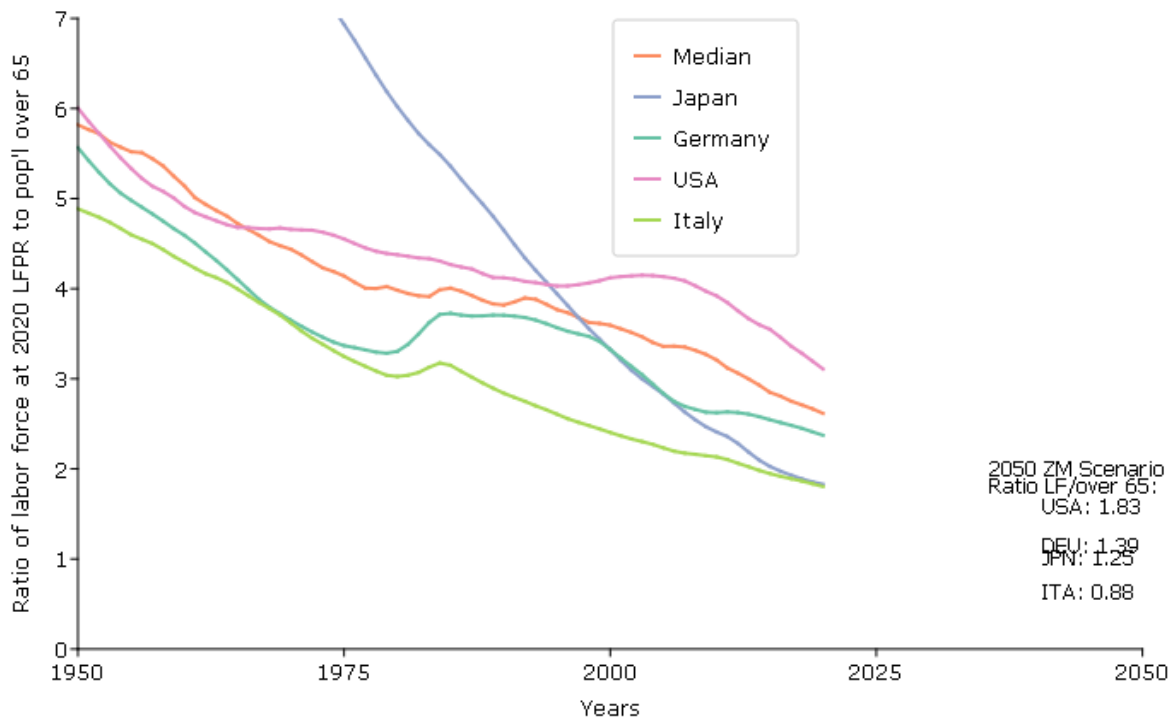
Source: Author's calculations.

In Germany the base case 2050 LF/65+ ratio is 1.39. Figure 3 shows this ratio was above 3.5 during the 1990s and still over 2.8 as late as 2005. The absolute magnitude of the fall in the

LF/65+ ratio from 1990 to 2020 from 3.4 to 2.36 is repeated in the base case in the thirty years from 2020 to 2050, falling around 2.36 to 1.39. Again, there is nothing in Germany's—or any other country's--historical experience to suggest that anything like current configurations of taxes and benefits for pension and health care coverage (and other social programs) are feasible (economically, fiscally, or even physically in terms of adequate elder care) at a ratio of LF/65+ of 1.39.

The third bar of Figure 2 shows the hypothetical calculation of the demographic labor force gap (DLFG): "how many additional workers relative to the base case 2050 scenario would Germany need to achieve a give LF/65+ ratio, k?"

$$DLFG(k) = \text{Needed } LF \text{ to achieve } \left(\frac{LF}{over\ 65} = k \right) less\ the\ Zero\ Migration\ LF$$

Suppose Germany were to maintain its current LF/65+ ratio of 2.37 in 2050. Then the calculation (shown in Figure 2, third bar) is:

$$German\ 2050\ DLFG = 2050\ actual\ Over\ 65 * \left(2020\ \tfrac{LF}{over\ 65} \right) - ZM\ labor\ force$$

$$German\ 2050\ DLFG = 23.8 * 2.37 - 33.1 = 56.4 - 33.1 = 23.3\ million$$

Relative to the base case scenario labor force Germany would need an additional 23.3 million people in the labor force to prevent a fall in the LF/65+ ratio. The simple intuition is that to keep the ratio constant, for each additional person over 65 there would need to be 2.37 more people in the labor force and hence, as the population 65+ grew by 5.5 million (from 18.3 to 23.8), the incremental labor force needed would be 5.5*2.37=13.1 million more people in the labor force. But the base case labor force will be 10.2 million *less* (falling from 43.4 to 33.1 million). The gap is the sum of those two: 13.1 million more needed due to the demographics of ageing less 10.2 million less in the labor force due to demographic shrinkage for a total of 23.3 million.

The shrinking labor force only captures a part of the coming demographic challenge. Even if the labor force remained constant from 2020 to 2050 a *constant* labor force and *growing* older population implies a shrinking LF/65+ ratio. In Germany, even if the labor force were kept constant at its 2020 level of 43.4 million the LF/65+ ratio would still decrease from 2.37 to 1.82.

Table 1 shows the DLFG(k=2020 ratio) calculations for all 31 ADRI countries, grouped into three geographic regions (Europe, North America, Asia and Pacific), with countries sorted within each region by the absolute size of the DLFG.

Each ADRI country maintaining their 2020 ratio of LF/65+ would require 356 million more workers than the base case (Zero Migration, 2020 cell-be-cell LFPR) scenario. The total "constant ratio" 2050 labor force would need to be 810.4 million, 355.9 million more than the 2050 base case labor force of 454.5 million, which is 78 percent as large as the estimated labor force (=355.9/454.5). Put another way, if the DLFG were filled by labor movement from other

countries, 44 percent of the ADRI countries 2050 labor force would the result of net labor mobility between 2020 and 2050[9].

The differences across regions in the aggregate DLFG/Base Case Labor Force are not very large: .44 in Europe, .42 in North America and .47 in Asia and Pacific. Hence the absolute magnitude of the demographic labor force gap is mainly driven by population size and of the global figure of a DLFG of 355.9 million, 152.3 would be in Europe, 126.8 in North America (110.7 in the USA), and 76.8 in Asia and Pacific.

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[9] "Result of net labor mobility" is more accurate than "migrants" or "foreign born" as movers in 2021 who stayed until 2050 could would still be "foreign born" and would be included as "migrants" as the "zero migration" is zero net migrant, and potentially could have contributed children who could be in the "zero migration" labor force by 2050 as "native born" non-migrants.

Table 1: Changing demographics of population 65+ and labor force imply that the additional labor force over the Zero Migration scenario needed to keep ratios of labor force to 65+ stable is massive, 356 million additional workers, 44 percent of the total labor force in 2050

Country	Actual labor force, 2020	Population 65+, 2020	LF/65+ ratio, 2020	Estimated labor force 2050 (ZM base case scenario)	Population 65+ 2050 (at ZM)	LF/65+ ratio, (ZM base case scenario)	Demographic gap in labor force in 2050 (k=LF/65+ at 2020 level)	Ratio of gap to total labor force, 2050
Column:	I	II	III	IV	V	VI	VII (sorted on, by region)	VIII
Spain	22.8	9.3	2.45	16.1	16.1	1.00	23.3	0.59
Germany	43.4	18.3	2.37	33.1	23.8	1.39	23.3	0.41
United Kingdom	34.5	12.6	2.75	31.2	18.4	1.69	19.5	0.38
Italy	25.0	13.9	1.80	17.0	19.3	0.88	17.7	0.51
Poland	18.5	7.1	2.62	13.7	10.3	1.33	13.3	0.49
France	28.7	13.5	2.12	25.9	18.4	1.41	13.1	0.34
Netherlands	9.5	3.4	2.76	8.2	4.8	1.71	5.1	0.38
Switzerland	5.0	1.6	3.09	4.0	2.8	1.45	4.5	0.53
Austria	4.6	1.7	2.70	3.5	2.7	1.30	3.7	0.52
Eight moderate sized countries	35.7	14.6	2.44	28.9	20.7	1.40	22.1	0.43
Eight smaller countries	13.1	5.1	2.56	11.0	6.8	1.62	6.7	0.38
Europe	**240.9**	**101.2**	**2.38**	**192.7**	**144.1**	**1.34**	**152.3**	**0.44**
USA	169.2	54.5	3.10	158.8	86.8	1.83	110.7	0.41
Canada	20.4	6.8	2.99	17.4	11.2	1.56	16.1	0.48
North America	**189.6**	**61.3**	**3.05**	**176.3**	**98.0**	**1.69**	**126.8**	**0.42**
S. Korea	28.4	8.2	3.46	21.0	18.0	1.17	41.2	0.66
Japan	67.8	37.1	1.83	48.6	38.7	1.25	22.3	0.31
Australia	13.6	4.2	3.27	13.2	7.4	1.78	11.0	0.46
New Zealand	2.9	0.8	3.63	2.9	1.4	2.04	2.3	0.44
Asia and Pacific	**112.7**	**50.2**	**3.05**	**85.6**	**65.5**	**1.56**	**76.8**	**0.47**
Total of 31 Rich Industrial countries	**543.1**	**212.8**	**2.55**	**454.5**	**307.6**	**1.48**	**355.9**	**0.44**

Source: Author's calculations with UN World Population Prospects Zero Migration scenario data on demographics and ILO data on Economically Active Population.
Notes: The eight moderate contribution to demographic gap European countries are: Portugal, Czech Republic, Belgium, Greece, Ireland, Sweden, Slovakia, Hungary. The eight small contribution to demographic gap countries are: Norway, Denmark, Finland, Slovenia, Lithuania, Luxemburg, Estonia, Latvia.

Th differences across the countries in the DLFG/2050 labor force (column VIII) depend primarily on how recently, how quickly, and how far fertility fell. France's ratio is only .38 as its fertility rate has been relatively low for a very long time and has not fallen by much (TFR was 2.09 in 1975 and is 1.83 in 2021) and hence, as much of the ageing transition has already happened, future ageing is less dramatic. In contrast, Spain's fertility was higher and then fell very fast to very low levels quite recently (TFR was 2.77 in 1975 and then fell to 1.13 by 1995 and has stayed at those very low levels and is still 1.19 in 2021). The 2050 base case LF/65+ falls to just 1 worker per person 65+. Similarly, Korea's DLFG/LF in 2050 ratio .66 as Korea's TFR was 3.43 in 1975, fell to 1.08 by 2005 and then fell further still to an astounding level of just .808 in 2021, so the ageing from 2020 to 2050 will be massive versus Japan where, like France, much of the ageing has already happened by 2020.

I.D) Robustness of demographic labor force gap estimates

The estimates of the demographic labor force gap in Table 1 make two strong, if defensible, assumptions. One assumption is that the labor force participation rates in each sex/age cell remain constant from 2020 to 2050. A second assumption is about the level of the ratio of labor force to aged that is to be achieved in 2050. Table 2 provides estimates of the DLFG under a range of assumptions about both, with the details provided in Appendix A.

The default assumption that each country's LFPR will remain constant cell by cell (e.g. the LFPR rate of women aged 35-39, etc.) to 2050 is obviously just a "focal point" assumption and not a prediction as LFPR rates could go either down (as people choose shorter working lives as prosperity increases) or could go up. I explore a wide range of alternatives by assuming that each country's LFPR cell by cell either go to the average of the lowest three ADRI countries cell by cell or to the average of the highest three countries cell by cell. This is pretty extreme as it doesn't assume convergence to country aggregate lows and highs but assumes that every countries LFPR goes to the lowest or highest in each sex/five year age cohort, so that, for instance, this implies in the "high" scenario if some countries have high youth participation and other countries have high participation of the older population the LFPR of all countries and some countries have high female prime age LFPR it goes to the average of the highest three countries in each category.

As expected, the DLFG goes up substantial if LFPR goes to the low scenario, increasing from 356 million to 461 million. Conversely, if LFPR in each countries goes to the high scenario the DLFG is reduced to only 233 million. However, while there is much discussion of addressing the ageing crisis by raising LFPR—say by raising prime age female LFPR or by raising retirement ages and increasing LFPR of those 50 plus from their current levels (for females and males)—even what I regard as implausible upside scenarios for LFPR (e.g. the "high" scenario assumes LFPR of males 65-69 in Germany increases by 51 percentage points by 2050) there is still a quite substantial DLFG.

region	Base case	Labor force participation		LF/65+ in 2050	
		All countries converge to the average of the current **lowest** three countries LFPR, cell by cell	All countries converge to the average of the current **highest** three countries LFPR, cell by cell	All countries converge to the current average ratio (2.62)	All countries converge to the current 10th percentile (2.11)
	I	II	III	IV	V
Europe	152.3	189.8	78.1	191.7	112.4
North America	126.8	166.8	87.6	85.3	31.3
Asia and Pacific	76.8	104.2	67.0	89.2	53.1
ADRI total	355.9	460.8	232.7	366.2	196.7

Table 2: Robustness of estimates of the regional and total demographic labor force gap in 2050

Source: Author's calculations as describe in the text.

The base case assumes each country keeps its LF/65+ ratio constant at its current 2020 value. There is a pretty wide range of this ratio currently (in part because some countries already have higher migration) from a bit over 3 (e.g. USA, New Zealand) to under 2 (e.g. Japan, Italy). As alternatives I assume that either every country converges to the current ADRI median of 2.62 (which implies some go up and others own) or that every country converges to the current 10th percentile of the ADRI countries, which happens to be France's 2020 LF/65+ ratio of 2.11. Convergence to the ADRI median of 2.62, as expected, doesn't change the aggregate much (from 356 to 366 million) but does change the regional distribution as the DLFG in Europe goes up (as these countries are, on average, lower) and that of North America and Asia and Pacific goes down.

If all countries were to converge to 2.11 by 2050 the DLFG would be, as expected, much smaller, but would still be 198 million. Again, 2.11 for all countries is a pretty extreme lower bound as those countries currently at or near that level are taking strong actions (such as President Macron in France taking considerable political heat and resorting to unusual legislative tactics to raise the retirement age, and Japan's actively seeking migrant workers) on the premise their current conditions are not sustainable.

II)   *How big can rotational labor mobility be?*

As the facts about ageing are already widely known and widely discussed, the purpose of the calculations in section I is just to set the stage for a more novel proposal: that ageing in ADRI countries creates a huge win-win-win potential from expanding legal pathways for rotational labor mobility, which creates win for host countries, win for sending countries and win for movers.

An immediate response to any suggestion that substantially increased movement of people could be part of the solution to ADRI country ageing is that the current increasing political backlash against migration and the rise of right (and "far right") politics takes any discussion of "more migration" off the table.

The first draft of this paper was completed in June 2024. This was just after the 2024 European Parliament results and before the US elections in November 2024. The European Parliament elections produced several striking results[10]. In France, the *Reassemblement National* got more votes (31.4 percent) than the next two parties combined (with Macron's party receiving just 14.6 percent). In Germany the AfD (Alternative fur Deutschland) got more votes than Chancellor Scholz's SPD (Social Democrats). In Italy the *Fratelli d'Italia* party of Prime Minister Meloni led in votes. Of the seats allocated, the "Identity and Democracy" group became the fifth largest group, passing the Greens (58 seats to 52 seats) and, in June 2024 it is unclear whether the coalition led by Meloni "European Conservatives and Reformists Group) is the third largest coalition in the European Parliament.

In the USA as of June 2024 the election is considered a toss-up between the two major party presidential candidates, Biden and Trump in both polls and prediction markets. According to the Pew Research Center "Dealing with immigration" has become an increasingly important issue among Republican voters with 76 percent naming this as a "top policy priority" versus 39 percent doing so in 2021 (and just 39 percent of Democratic voters naming this as a priority in 2024).

However, my argument is the current discontent with "migration" creates conditions favorable for a new political "grand bargain" on how countries will meet their work force needs in the face of the radically different demographic conditions in the coming decades (Pritchett 2023). I argue there are three elements to this potential "grand bargain."

One, an end to "demographic denialism" that imagines there are other politically acceptable ways to meet country's economic and fiscal social contract needs without much higher levels of labor mobility is a fantasy, not an option (this is addressed, briefly in Appendix 2).

Two, end of the illusion that any one party (or any partisan coalition from any one ideological wing) can impose a sustained, workable, solution to the needed cross-border movement of people within the existing "two question approach" (pathway and movers of distress).

Three, allowing much larger flows of rotational labor mobility, moving to a "three questions" approach to dealing with cross-border movement of people, is the shift that can break the current political log-jam and create a three-fold strategy to cross-border movement of people that addresses the legitimate concerns of all the relevant stake holders (and their resulting political coalitions). People's current attitudes towards "migration" are not a complex mix and not at all determinative of the potential for political movement on "labor mobility."

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[10] https://results.elections.europa.eu/ accessed on June 16, 2024.

II.A) Why add (more) rotational mobility to the mix of legal pathways for movement?

Countries allow citizens of other countries to be in their country for a wide variety of reasons: tourism, transit, visit friends or relatives, students, attend academic or business conferences. Many provisions for legal presence do not allow those visitors to work, but there are also a variety of visas (or other permits) that allow people to perform various economic activities or work of various kinds on a time limited basis.

The United States, for instance, has a visa category (actually six categories) to allow athletes and performers to be in the USA for specific performances or tournaments (along with their support personnel). There are also temporary visas for specific occupations or jobs, such as the H-2A for agricultural workers, the H1-B for specialty occupations (including fashion models). There are visas that allow students to stay and work in the USA after the completion of their studies on the basis this is a continuation of their education and training. There are "exchange visitor" visas that allow students from foreign countries to work during their summer in the USA. Each of these visa categories has specific terms and conditions about qualifications, length of stay, whether family members are allowed to accompany the work authorized person (often on a separate visa category that may not allow work).

The word "migration" is too vague to be useful in describing variety of legal pathways for people to cross international borders to engage in work (renumerated labor). Talking about "migration" or "migrants" is often misleading as it has the connotation (if not actual denotation) of moving for extended periods with the intent (or possibility) of changing one's long-term residence and (perhaps) legal citizenship. I was born in the USA and have lived extended periods in another country on five occasions: Argentina (1978-80), Indonesia (1998-200), India (2004-2007), India (2012-13), UK (2018-2022). These stays were on various visas and legal authorization of residence--in India 2012-2013 my wife was authorized to work and I was a "trailing spouse" without work authorization. While on all those occasions I was "foreign born" and "residing" in the country and hence met most definitions of a "migrant"[11] I did not think of myself as a "migrant" as neither I, nor my host country, had any expectation of long-term or "permanent" change in residence or the acquisition of host country citizenship.

I collapse the granularity into three categories of legal pathways to work, based on a combination of the legal status in the host country and the expectations with which people move.

(Direct) Pathway to citizenship. These are legal pathways to work that are built on the expectation (even if not always realized) that: (a) the person is moving for an extended period (say, longer than 3 years), (b) is allowed to bring their immediate family, (c) the legal authorization has a 'natural' pathway to "permanence" and eventually (if not rapidly, and usually by meeting additional criteria) leading to becoming a citizen of the host country. This pathway often has inter-generational expectations of the mover that their children will be raised and remain in the host country (as citizens).

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[11] The recent World Bank World Development Report (2023) for instance defines a "migrant" as "those who change their country of habitual residence and who are not citizens of their country of residence."

Rotational. These are legal pathways to work that are built on the expectation that: (a) the period of legal authorization is time-limited, which could be from months (seasonal or for specific tasks) to a year or three years (and these could be renewable (perhaps with return to home country between renewals) or extended in increments), (b) family members are not (always) allowed to accompany the mover, (c) while there could be some long-term path to citizenship (e.g. a rotational scheme for, say, 3 year work authorization could allow a person to accumulate "points" through compliance in a points based system for allocating "pathway" visas), permanence is not legally authorized nor the current expectation of mover, host country, or employer.

Movers of distress. Nearly all countries have mechanisms for allowing people to enter and stay in their country (with or without work authorization) based some (but not all) conditions of "distress" for the potential movers in their home country. Most countries are signatories to the 1951 convention on refugees. Many countries have mechanisms for asylum based on whether the specific mover is at risk from specific threats (e.g. political persecution) in their home country. There are people that move due to natural disasters (e.g. floods, famine). There is increasing concern that climate change will require greater movements of people as the physical and/or economic viability of regions shifts (e.g. islands may disappear, rainfall patterns shift, temperatures too hot for traditional agriculture).

II.A.1) The political impossibility of exclusively pathway movers to meet the DLFG

The DLFG is much, much, too big for pathway mobility to be politically feasible as the exclusive (or even dominant) mode of labor mobility.

First, pathway movers are, by my definition above, and in practice, (usually) permitted to bring families and dependents. That is a feature, not a bug, of pathway movement as there are widely shared sentiments that family unification is important and that allowing people to live and work for extended periods (10 years, 20 years at a stretch) in a country while not allowing their families to join them is wrong. The implication of family unification is filling a DLFG of X million workers with pathway movers requires a multiple of X in total population gain. In Table 3 I assume this ratio is one to one and hence 2 people move for every net worker (this is near the 2020 population to labor force ratio in ADRI countries).

Column II of Table 3 shows that if Spain, for instance, were meeting its 23.3 million worker 2050 DLFG with just pathway movers this would imply at total population movement into Spain of 46.6 million people. Column III shows the percent of the population that would be "total pathway movers" (workers plus others) in 2050 if the all of the DLFG were filled by pathway movers. The average across the ADRI countries is 43.7 percent, above 50 percent for Spain, Switzerland and Korea, and below 30 percent only for France (for reasons above).

Second, pathway movers are, again by my definition and in practice, on their way to full citizenship and hence hopefully on their way to fully equal participation in the political and social life of the country. But this makes decisions about the magnitude and composition of pathway movers a social and political debate about the "future of us." While Benedict Anderson (1991) famously refers to national (and sub-national) identities as *Imagined Communities*, the

sense of shared identity and commonality called "nationalism" remains a real, and powerful, political force.

Three points.

One, the hypothetical calculations of 2050 ratios of pathway movers to population in column III of Table 3 are bigger than ratios of foreign born to native born in any modern historical experience in any of these countries—including whose current populations are primarily from (historically recent) immigration[12]. The historical peak ratio of foreign born to native born in the USA was 14.7 percent in 1910, in Canada the historical peak was 22.3 percent in 1921, in Australia the percent foreign born was 17 percent in 1911 (though it had been larger in the past), in Argentina the foreign-born ratio in 1914 peaked at 30 percent. An ADRI average ratio of 2050 "pathway movers" to population of 43 percent is roughly *three times* the historical peak for the migration society of the USA during its (mostly, though with ethnic limitations) "open borders" period.

Two, the movement of people is already a major social and political issue while the current (2020) overall ratios of foreign born to population are, on average, only 16 percent. Moreover, much of the current movement from ADRI countries to other ADRI countries, such as movement among European countries, or from US to Canada (or vice versa), or movement from ADRI countries to Australia. Column V of Table 3 estimates the ratio of foreign born in ADRI countries from non-ADRI countries using the UN DESA estimates of international migrant stock by origin and destination countries[13]. I think this calculation of non-ADRI country migrants is relevant for two reasons. First, the political and social implications of movers from countries that are "close" in both distance and/or social or other politically relevant characteristics is generally considered less fraught that from places that are "far." Germany, for instance, has a very high migrant to population ratio (18.9 percent) but most of that is movement from other European countries and only 7.5 percent is from non-ADRI countries. In contrast, the USA (on these figures) has a lower total migrant to population ratio than Germany (15.1 percent versus 18.9) but a much higher non-ADRI countries migrant to population ratio (11.8 percent to 7.5 percent). Second, all ADRI countries are experiencing similar demographic shifts and declining labor force aged populations and there is no scenario in which, on net, movement within these countries plays a large gap in filling the aggregate ADRI DLFG so net movement has to be from non-ADRI countries.

Three, Column III of Table 3 is just the *additional* foreign-born workers to meet the growing labor force gaps from 2020 to 2050 and does not take into account that the Zero Migration 2050 scenario already takes into account the existing 2020 migrants (and their fertility and hence descendants) in their population projects. Column VI adds the (i) 2050 increment to population via assumed pathway movers to (ii) the 2020 share of non-ADRI foreign born. The

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[12] Of course, in the long historical view all countries, outside of some few countries in Africa, consist *entirely* of migrants.

[13] I take the total foreign-born from six UN defined regions (Sub-Saharan Africa, North Africa and West Asia, Central and South Asia, Eastern and Southeastern Asia, Latin America and Caribbean, and Oceania) I subtract out Japan and Korea from the Asia region total and Australia and New Zealand from the Oceania region total.

2050 combined total of non-ADRI foreign born is over 50 percent on average for ADRI countries. Spain, Switzerland, Austria, USA, Canada, Korea, Australia and New Zealand (of the large population countries listed) are all over 50 percent. Only two countries, France and Japan are below 40 percent (Japan is so low because existing non-ADRI migration is so low (only 1.5 percent) and because much of the ageing has already happened and its 2020 LF/65+ ratio is very low).

According to the UN data on bi-lateral (origin and host) migration, the 2020 total foreign born from non-ADRI countries in Europe is only 31.4 million people. If the 2050 DLFG were met by pathway movers, implying host countries allowed on average two movers for each worker added to the LF, Europe countries would have 305 million additional pathway movers by 2050, about 10 times the current non-ADRI countries stock.   Similarly, Asia and Pacific (Japan, Korea, Australia and New Zealand) have 8.3 million non-ADRI country foreign born and would need 153 million total movers. Even the USA and Canada, with relatively high non-ADRI country foreign born, currently have "only" 44 million and would need an additional 253 million.

Table 3: The demographic labor force gap is so big that if the gap were filled entirely by 'pathway' migration then over half the population would be migrants by 2050. If pathway migration is politically capped at an upper threshold then between 2/3 and ¾ of movers would need to been rotational

Country	DLFG 20250 (at ZM, 2020 LFPR) (=col VII of Table 1)	Total pathway movers if all DLFG met from pathway movers (=col I*2.1)	Percent of population that would be pathway movers in 2050 if DLFG met by all pathway movement	Migrant (foreign born) as a percent of population, 2020		Pathway movers in 2050 (col III) plus non-ADRI countries foreign born 2020 (col V)	If total migrants (LF plus others) are capped as a percent of the total population at an upper bound, how much of the DLFG would need to be met through rotational labor mobility	
				Total	Non-ADRI country origin		25 percent	35 percent
	I	II	III	IV	V	VI	VII	VIII
Spain	23.3	46.7	52.2%	14.4%	9.2%	61.4%	85.5%	76.4%
Germany	23.3	46.6	38.9%	18.9%	7.5%	46.4%	72.5%	56.8%
United Kingdom	19.5	39.0	37.2%	14.0%	7.5%	44.7%	70.5%	53.6%
Italy	17.7	35.4	41.3%	10.7%	5.0%	46.4%	71.7%	57.5%
Poland	13.3	26.6	44.1%	2.1%	0.1%	44.2%	68.4%	55.7%
France	13.1	26.2	29.2%	13.2%	9.0%	38.2%	61.2%	36.9%
Netherlands	5.1	10.1	37.6%	13.5%	8.0%	45.6%	71.8%	55.3%
Switzerland	4.5	9.1	52.3%	28.8%	7.4%	59.7%	83.9%	74.8%
Austria	3.7	7.5	47.6%	19.5%	5.4%	53.0%	78.4%	67.4%
8 moderate size	22.1	44.1	40.2%	11.4%	4.3%	44.5%	68.8%	53.3%
8 small size	6.7	13.4	37.3%	16.0%	3.2%	40.5%	58.7%	40.1%
Europe	**152.3**	**304.7**	**41.6%**	**14.8%**	**6.1%**	**47.7%**	**71.9%**	**57.1%**
USA	110.7	221.4	39.5%	15.1%	11.8%	51.4%	79.83%	64.54%
Canada	16.1	32.1	46.6%	21.2%	14.1%	60.7%	87.49%	76.04%
North America	**126.8**	**253.5**	**43.1%**	**18.2%**	**12.9%**	**56.0%**	**83.7%**	**70.3%**
S. Korea	41.2	82.5	64.8%	3.3%	3.0%	67.8%	88.0%	82.6%
Japan	22.3	44.5	30.8%	2.2%	1.5%	32.3%	47.1%	24.6%
Australia	11.0	22.0	44.8%	29.9%	16.0%	60.8%	88.9%	76.6%
New Zealand	2.3	4.5	45.1%	27.3%	14.7%	59.8%	87.5%	75.3%
Asia and Pacific	**76.8**	**153.5**	**46.4%**	**15.7%**	**8.8%**	**55.2%**	**77.9%**	**64.8%**
Ageing, Democratic, Rich Industrial Countries	355.89	711.78	43.7%	16.2%	9.3%	53.0%	77.8%	64.1%

Source: Author's calculations, as described in text.

The magnitudes of the DLFG create a reaction: "these levels of pathway movement are far beyond the politically possible levels of pathway migration, therefore migration cannot be *the* (or even perhaps much of a) solution to ageing."

Even though this puts me at odds with friends, co-authors, colleagues and many advocates for "migration", I agree[14]. One, there is currently *de facto* globally almost complete *normative* acceptance that sovereign states can *legitimately* control their borders and hence that existing voters have (near) complete discretion over who they allow to enter their country, and on what terms. Two, in no ADRI country do anything close to a majority of people express a view of wanting "more" migration, and in most ADRI countries those favoring "less" or "the same" outnumber those wanting "more" by a factor multiple. In the Pew Global Attitude Surveys in 2018 the median for the 10 countries in Europe surveyed was 51 percent wanting "fewer" versus only 10 percent wanting "more". Three, reviews of the evidence about attitudes toward "migration" suggest concerns are more "sociotropic" (based on social and national level concerns) than "self-interested" around narrow economic concerns (Hainmueller and Hopkins 2014). Four, one interpretation of these sociotropic attitudes towards wanting "less" or "the same" migration are social and cultural (Dempster, Leave and Hargrave 2020) and are consistent with a widespread sense among existing citizens that allowing "too much" pathway migration leads societies to "lose control" of the "future of us" (e.g. Collier 2013) and current voters worry that current migration is committing their society to paths of social change they may later regret. Five, dismissing these concerns by labeling the desire to preserve a sense of national identity or cultural heritage as "xenophobic" or "racist" has been, to 2024 at least, a losing proposition politically. Many citizens in ADRI countries believe there is something unique and valuable in their national history, culture, heritage. Any proposal to current voters in ADRI countries of the type: "in order to cope with current or future economic challenges (like ageing) you need to currently support/vote for actions that will cause a loss of control over the future of the social, cultural, and national identity of the country you live in" is, in my view, a political non-starter.

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[14] I want to stress that I *agree* with the *descriptive* judgment that with "business as usual" approaches to migration very much higher levels of movement from non-ADRI countries is political unlikely in the near to medium-term in ADRI countries. I do so even while I *disagree* with normative judgments about its desirability. That is, I can (and do) disagree with many/most/all statements about the lack of *desirability* of much more pathway migration (economically, socially, and politically) while acknowledging that my views on desirability almost certainly will not win the political day in (nearly all) ADRI countries. While it is easy to make a powerful case for ADRI countries to have open borders (or at least allow much larger flows of migration to be allowed), either on ethical grounds (Carens 2013) or purely economic grounds (particularly from a "cosmopolitan" view that gives equal weight to gains to all people irrespective of country of birth), or a combination of economic and ethical (Caplan and Weinersmith 2019), and these arguments are mostly persuasive to *me*, so far it has not been possible to make this case broadly *persuasive*.

II.A.2) Pathway versus rotational pathways and occupational composition of jobs

The second big issue with meeting the challenge of ageing exclusively or predominantly with pathway migration is that, by and large, the politics of pathway migration is most easily amenable to allowing migrants that are (i) highly educated or (ii) bring immediate and obvious economic benefits (like investments or entrepreneurship or (iii) are seen as socially or culturally "close" to the host country (e.g. already share a language). However, while the demographic changes of ageing are going to make labor scarcity throughout the economy, where it is going to make future labor scarcities the largest are going to be in occupations that require *little* formal education and which make *lower* relative wages in the host countries, for simple reasons of supply and demand.

The supply of native-born work force is going to shrink overall and the native-born with low formal education will shrink even more. The schooling levels of native-born (or first-generation mover) youth will continue to improve relative to full-age retirees (a person retiring at 65 in 2030 was born in 1965 whereas a person reaching "prime work force age" of 25 in 2030 was born in 2005) and hence average schooling levels of the labor force are likely to continue to increase. As labor scarcity increases, these more schooled youth will naturally seek to fill higher wage and higher status occupations.

And, perhaps contrary to popular belief, the *relative* number of low formal education, low wage, jobs has *grown* in nearly every ADRI economy over recent decades. The structure of employment across occupations arrayed by "skill" has, over the last 40 years, been "U-shaped" (Author 2015). Employment growth has been larger for highest wage and lowest wage occupations and employment growth has been weakest for occupations in the middle range of wages (20th to 80th). So, while it is the case that the "skill premia" has increased and the returns to higher education (particularly education beyond an undergraduate degree) increased (the upper half of the employment-skill relationship is upward sloping on the "right"), this increase in demand for highly skilled workers has been matched by a similar (if not larger) increase in the jobs in lower wage occupations (so the "left" side is also upward sloping, with lower skill jobs increasing more than medium skill).

Table 4 reports an analysis of the US Bureau of Labor Statistics forecasts of employment changes between 2021 and 2031 for over 800 five-digit occupations. I focus on those occupations for which the median wage was US$35,000 or less (which is below the first quartile of median wage across all occupations) and for which the "typical education needed for entry" was less than a bachelor's degree. The BLS outlook was that in 2031 the US economy would have over 50 million such jobs and that between 2021 and 2031, while some occupations would contract and others expand, the *net* employment growth in these jobs would be 3.22 million. This expansion of 3.22 million in jobs in low wage, low formal education, occupations is forecast to be 39 percent of the net job growth over this period.

Two-digit occupation code and name	Five-digit code	Five-digit occupation name	Forecasted gain in employment 2021 to 2031	Total Employment 2031
35: Food preparation and serving related occupations			**1,220.4**	**10,902.7**
Of which, five-digit occupations with gain >50K	35-2014	Cooks, restaurant	459.9	1,715.6
	35-3023	Fast food and counter workers	243.2	3,438.8
	35-3031	Waiters and waitresses	197.0	2,101.4
	35-3011	Bartenders	92.0	606.0
	35-9011	Dining room and cafeteria attendants and bartender helpers	59.9	415.1
	35-9031	Hosts and hostesses, restaurant, lounge, and coffee shop	52.6	400.3
31: Healthcare support occupations			**1,019.6**	**6,238.6**
Of which, five-digit occupations with gain >50K	31-1120	Home health and personal care aides	924.0	4,560.9
	31-1131	Nursing assistants	62.7	1,406.4
53: Transportation and material moving			**486.2**	**7,191.6**
Of which, five-digit occupations with gain >50K	53-7062	Laborers and freight, stock, and material movers, hand	168.4	2,974.8
	53-7065	Stockers and order fillers	157.9	2,630.6
	53-3031	Driver/sales workers	63.5	594.5
39: Personal care and service occupations			**427.0**	**3,551.2**
Of which, five-digit occupations with gain >50K	39-2021	Animal caretakers	86.9	377.6
	39-9011	Childcare workers	61.6	1,010.6
	39-5012	Hairdressers, hairstylists, and cosmetologists	60.8	619.5
37: Building and grounds cleaning and maintenance operations			259.4	5,005.9
	37-2012	Maids and housekeeping cleaners	116.4	1,353.8
	37-2011	Janitors and cleaners, except maids and housekeeping cleaners	85.5	2,383.9
	37-3011	Landscaping and groundskeeping workers	56.9	1,248.5
			Net gain in employment	Total
Tota for all five digit occupations with 2021 wages<$35,000 and "typical entry education" less than bachelor's degree			**3,235.9**	**50,101.6**
Total, economy wide			**8,317.8**	**166453.1**
Percent of total			38.9%	30.1%
UN ZM population change, 2020-2030, ages 20-65			-4,570	
UN ZM change in population, 2020-2030, aged 20-40			-3.230	
Sources: Author's calculations with [BLS Occupational Outlook](#) data.				

Table 4: The projected growth in employment by occupation in the USA from 2021-2031 shows strong growth in occupations with low requirements of formal education (less than a bachelor's degree) and for which median wages are in the bottom quartile, while at the same time the labor force aged population will be shrinking (especially the young)

Table 4 lists the two-digit occupations and, within those, the detailed (five-digit) job categories that are both (i) low relative wage, low formal education jobs and (ii) expected to grow by more than 50,000 jobs.   There will an additional 1.2 million jobs in the two-digit category (35) of "food preparation and serving" including 460,000 just in the five-digit category "cooks for restaurants."   There is a forecast 924,000 additional jobs in just the category "home health and personal care aides."   There will a more than 50,000 net increase in employment for drivers/sales workers, child care workers, hairdressers, hair stylists and cosmetologists, nursing assistants, janitors and cleaners, landscaping and groundskeepers, and animal care workers.

The ageing challenge is that during (roughly) this same period the UN forecast Zero Migration scenario is that the total labor force aged population in the USA would *fall* by 4.5 million people and the young labor force aged, those 20-40 will fall by 3.2 million. There are expected to be roughly 5 million new jobs in occupations with median wages over $35,000, including 1.1 million net new jobs in occupations with both (i) median occupation wages over $35,000 and (ii) do *not* require a four-year college degree. Obviously, these jobs are going to be more attractive to the native-born youth than the lower paying occupations.

The idea that these jobs "low wage" jobs could be filled with native born workers, if only wages were higher, ignores the increasing overall scarcity of non-migrant labor due to the demographic shifts. While yes, in principle, one could fill the 60,000 increase in the number of available hairdresser jobs if wages for hairdressers were higher, but this is only by either (a) attracting workers from other jobs, which requires the *relative* wage of hairdressers to be higher and hence this just fills one occupational job by attracting a worker from another occupation or (b) drawing workers into the labor force. As Figure 1 and Appendix 1 show, the employment of prime age labor force for both men and women is already quite high and there just isn't enough feasible scope for labor force participation rates to offset the demographic shifts.

The idea that the labor scarcity in specific occupations is just a function of "low wages" is belied by the fact that even relatively high wage occupations, like "Heavy and tractor-trailer drivers" (53-3032) with a median 2021 wage of $48,310 are facing difficulty recruiting sufficient numbers of new drivers.

I call these low wage, low formal education occupations "core skill" jobs as they do rely on a large number of skills that human being routinely possess but which are very difficult to replicate with machines. That is, many of these jobs, like home health care, are quintessentially about human-to-human interaction which requires concern, care, kindness, empathy, communication which are important socio-emotional skills that human beings normally possess. Moreover, as Author (2015) points out, those jobs which consist of tasks which are "routine"—either manually (e.g. tasks in factory assembly line work) or mentally (e.g. filing, sorting)—have mostly *already* been replaced by automation. Many remaining and expanding jobs are "manual" but are non-routine and require human judgment to respond to the huge variety of unique physical circumstances and human interaction. Calling these jobs "low skill" implies that the only relevant skills are a narrow range of cognitive skills (a frequent, self-serving, bias among those with very high level of formal education) whereas, while these can be important skills, and

the evidence these formal education investments are rewarded in the labor market is strong, these are not the only, or even the most relevant job skills.

Therefore the challenge for the ADRI countries is who, and under what terms and conditions, should be allowed into their countries to perform essential, core skill jobs like "home health care"? Neither of the two traditional options of pathway to citizenship nor movers of distress are well adapted to meet the growing need for people to carry out these jobs that the demographics will create.

Three issues.

First, high immigration economies like Canada and Australia and New Zealand (see Table 4 above, columns IV and V showing their ratios of foreign born, particularly from non-ADRI countries, are more than twice that of Europe or Asia (Japan or Korea)) have adopted "points based" systems to choose who will be eligible for pathway mobility. Points based systems can address political concerns about the contribution of migrants by granting points for formal skills and education levels or resources to invest and concerns about the integration of migrants based on points for speaking the language. As they are seen as attracting "high quality" migrants and part of the country's edge in the "war for talent" (Devesh and McHale 2005) they have been able to generate high levels of mobility with reasonably high political consensus. However, "points based" approaches can only be a rationing mechanism for the opportunity to work in a country if the points are awarded based on characteristics that are relatively scarce among potential applicants, and which could therefore be raised to match points to allowed migrants. But, as detailed more below, given the massive wage differentials in core skill jobs a points-based system cannot ration the opportunity to work as a truck driver or hairdresser or home health care worker.

Second, using mobility to supply people to do essential core skill jobs puts the economic logic of *mobility* of people across borders to perform valued work and the political logic of *migration* as a political and social process of constructing "the future of us" in their starkest tension. For societies whose sense of national identity is deeply entangled with place and with histories (and narratives of history) that go back thousands of years, the idea that "the future of us" is to be determined by the economic need for core skill workers has, so far, proven a political non-starter.

Third, the more narrowly economic objection is that one reason why a society would accept workers is because they would be a benefit to the fiscal situation. The net fiscal contribution is an inverse-U in which people use more than contribute when young and old and the difference is made up by paying more when labor force aged. This raises the very difficult question of whether those allowed to live and work in a country are also allowed to bring dependents, particularly children, who are entitled to the same benefits as citizens (or long-term residents). Clearly pathway migrants—who are expected to be "permanent" residents and to "integrate" socially and politically—are entitled to bring dependents. But economic studies in the USA suggest that core skill pathway migrants are, at best, a fiscal wash, in large part due to

the costs of education of children, and that only over the very long term are a positive fiscal contribution (NAS 2017).

II.B)   Rotational labor mobility as the feasible legal pathway

A quite general principle of economics, known as the Tinbergen Rule (Tinbergen 1952), is the need for multiple instruments to reach multiple policy targets efficiently (if not even effectively).   Policy making has multiple goals it needs to have multiple policy levers. Attempting to hit multiple targets using only a single policy instrument will inevitably lead to trade-offs and tensions between the targets.   By having multiple legal pathways for people to live and work, one can more easily meet both the important targets of meeting political and social goals of control of "the future of us" and, at the same time, maintain a thriving economy that provides the foundation to meet the social contract with the ageing.

In this section I assume, based on arguments in the previous sections, there is a politically determined upper bound to the magnitude of cumulative non-ADRI countries *pathway migration.* I then work backwards and estimate: "If the demographic labor force gap is met by movers but pathway movement is politically capped, how much of the total labor mobility would need to be rotational?"

Column VII of Table 3 shows that if non-ADRI countries pathway movers are politically capped at 25 percent of the population in 2050, then, on average, 78 percent of the labor movement needed to fill the labor force gaps in ADRI countries would need to be rotational.

Alternatively, if the share of pathway movers plus the 2020 existing non-ADRI country foreign born in 2050 is politically capped at 35 percent (which, as shown above, is higher than the ratio of foreign born to native born in *any* ADRI countries country at *any* stage of their modern history) then the fraction of movement would be, on average, 64.1 percent of all movement.

Figure 4 shows the consequences for the magnitude of rotational labor mobility of various combinations of (a) the LF/65+ ratio to be maintained in 2050, (b) the evolution of labor force participation, and (c) the fraction of total additional LF from mobility that is rotational.

The first bar in Figure 4 is my base case estimate of potential rotational labor mobility in 2050.   The elements of this base case simulation of the DLFG with the assumption that 66 percent (two-thirds is a nice "focal" number near 64 percent and is "conservative" as it assumes a larger amount of pathway migration, 35 percent of population, than I personally think is plausible) of the labor mobility to fill the resulting DLFG gap is rotational. In this case by 2050 there could be 237 million people living and working in ADRI countries on this legal pathway to residence and work (this is over and above the pathway migrants, both labor force and others).

Figure 4: Estimates of the total potential for rotational labor mobility to fill the labor force gaps in the ADRI countries by 2050 under various assumptions about 2050 LF/65+ ratios, fraction of labor force gap from rotational and 2050 labor force participation rates
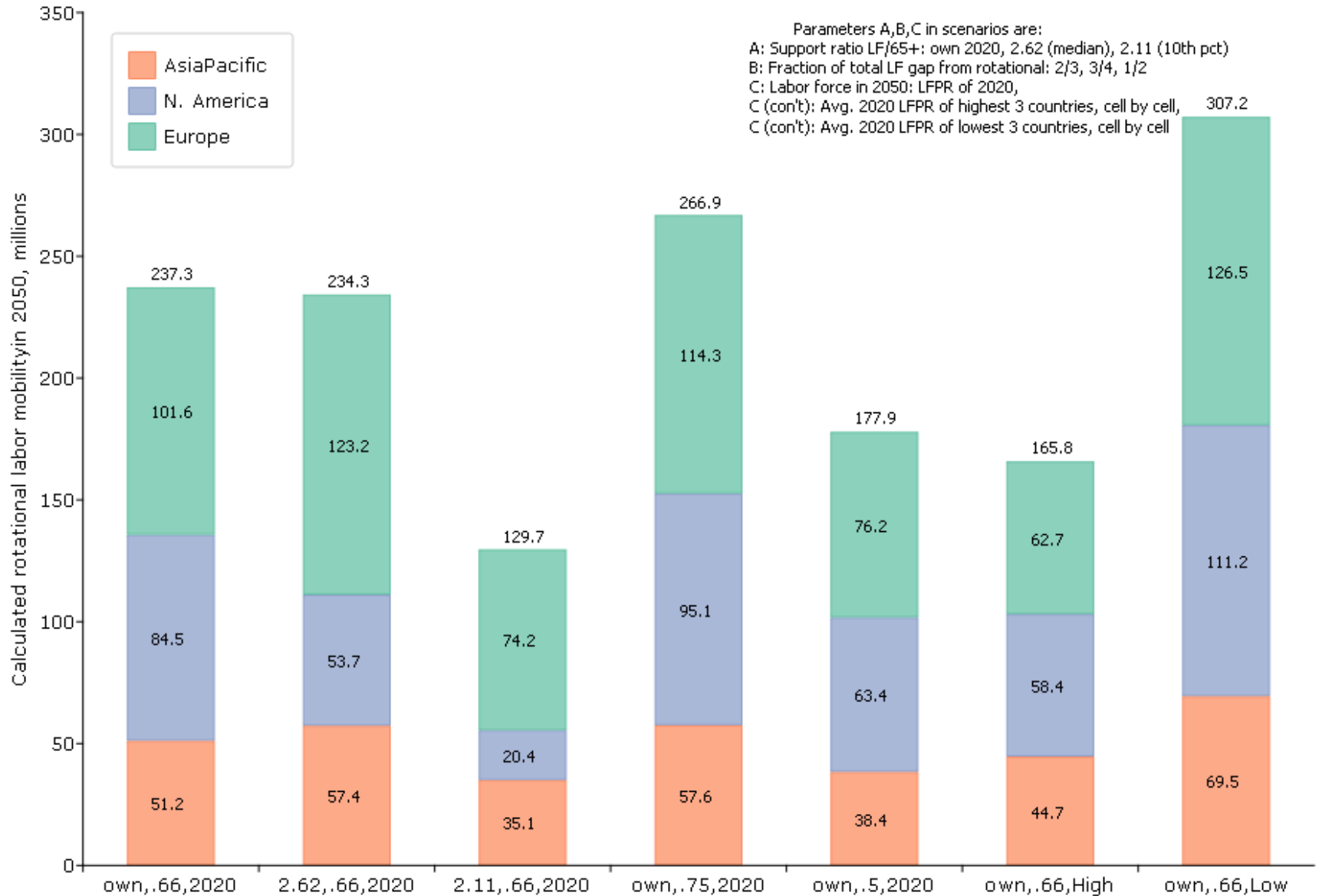
Source: Author's calculations.

The other six bars of Figure 4 explore the implication of the potential 2050 size of rotational mobility under different assumptions. The second and third bars assume the 2050 LF/65+ ratio is either 2.62 for all countries (second bar), which gives about the same total as each country maintaining its 2020 ratio, or that all countries reach 2.11 (the current 10th percentile of ADRI countries) which produces as rotational total of 129.7 million in 2050.

The fourth and fifth bars explore differences in the share of all movement which is rotational. The fourth bar assumes that three quarters of all movement is rotational (which is roughly what emerges from an assumption that total pathway movement plus existing non-ADRI country foreign born do not exceed 25 percent of the population in 205). In this case the rotational movement is substantially higher, 266.7 million. Alternatively, even if only half of all movement to fill the DLFG were rotational (which implies very high levels of pathway movement and hence high total pathway/citizen foreign born to native born) there is still 177.9 million rotational movers.

The sixth and seventh columns explore variations in 2050 LFPR (of non-movers). Under the assumption all countries have very high LFPR (cell by cell as high as the highest three 2020 countries) the total 2050 rotational falls to 165.8 whereas in the scenario of low LFPR (cell by cell the average of the lowest three country LFPR) the total rotational is over 300 million.

The estimated magnitudes of rotational mobility, even under some pretty extreme assumptions about raising LFPR or about the political absorptive capacity for pathway migrants are large. The estimates are that there are only about 84 million people born in non-ADRI countries living in ADRI countries in 2020 for all reasons: work, study, dependents/family of others, etc. Even in the low assumptions there could be about twice (160 million) and plausibly three times that many (over 240 million) that many people living in ADRI countries just working on a rotational basis.

III)   Potential magnitude of win-win-win gains from rotational labor mobility

Figure 4 shows that the potential for rotational labor mobility—over and above the pathway migrants—range from 130 to 300 million people by 2050. This section addresses three questions:

i)   What are the wage gains per movers?
ii)   Is there an adequate supply of willing movers?
iii)   Is rotational labor mobility feasible in ADRI countries?
iv)   What are the total potential economic gains?

First, the rich industrial countries are rich is that they have created economies in which all factors—capital, labor, human capital, resources—are highly productive. Employers in ADRI countries could pay movers (roughly) the existing wages earned by native born workers because the movers would, once in these countries, be sufficiently productive to justify those wages. And these ADRI country wages would be factor multiples of their home country wage and hence would be sufficient to attract whatever number of people the ADRI countries wish to attract.

Second, there are still regions of the world, particularly South Asia and Africa, in which the young labor force is growing and these regions could easily meet both their own labor force needs and those of the ADRI countries. In fact, the main challenge facing countries in South Asia and Africa is finding adequate employment opportunities for their youth so labor mobility is increasingly seen as an attractive "safety valve" for youth employment. And surveys suggest more than enough willingness to move at existing wage differentials between labor bulge and birth dearth countries.

Third, In the domain of labor mobility most of the purely economic questions are pretty well worked out and all of the hard questions are political, administrative, and social. The hard questions are: "Can politically supportable and administratively feasible arrangements be found that can handle a much larger scale of movement in the three broad categories (pathway, rotational, and distress)?

Fourth, the combination of movers times wage gains gives estimates of the economic gains to the magnitudes of rotational labor mobility that the demographics of ADRI countries ageing make possible, and as the gains depend on productivity differences are gains from additional global labor value added and are not, to first order, redistribution.

III.A) Productivity differentials between hosts and senders imply huge potential gains from labor mobility

Rotational labor mobility has massive potential economic benefits as the ADRI countries have high productivity (that is built into the category of "rich and industrial"). This high productivity is "in the air" as a feature of the *place* and affects all factors, including labor, and affects all labor, including "core skill" labor, engaged in occupations and tasks that require few formal academic qualifications. Clemens, Montenegro and Pritchett (2019) use data from over 40 countries and from the USA to estimate the magnitude of the "place premium." We compare earnings of workers with less than high school complete (hence "core skill" workers) working in their home country versus in the USA, and out estimates are that workers with identical productivity (including correcting for the selection effects of being migrants) make much higher wages (on average a factor of 4 higher) working in the USA.

While differences in personal human capital (the skills and capabilities individuals have which raise their wages over "raw" labor) do account for some of cross-national wage differentials, Pritchett and Hani (2020) review a variety of approaches to estimating differences in purchasing power parity (PPP) wages (nominal wages adjusted for the costs of living) for people with the same personal productivity: comparing wages across countries of individuals with same education levels, people in the same skill category, people in the same (narrow) occupations and comparisons of wage gains of movers correcting for selectivity, including studies using randomization to estimate causal impacts. We find robustly large differences in wages of quite similar magnitude across all approaches.   The evidence is consistent with the view that when the same core skilled individuals (e.g. with low levels of formal education) move from a less productive/lower wage country to a more productive/higher wage country they make

higher wages because their labor is more productive in that they create more economic value in the higher productivity place.

To fix magnitudes of the potential gains in wages from core skill labor mobility, Table 5 shows results using the International Labor Organization (ILO) data on wages in 2017 PPP units, for the ILO's two lowest skill levels[15] and for two single digit occupation categories using all countries from the various regions with available data.

Table 5: The wage differentials (in PPP) in "core skill" levels and occupations between ADRI countries and potential labor sending regions are between P$20,000 and P$30,00 per year				
Region/Country	Skill level 1	Skill level 2	ISCO-08, Group 5: Services and Sales	ISCO-08 Group 9: Elementary occupations
Sub-Saharan Africa	$3,034	$4,727	$4,146	$3,011
South Asia	$4,803	$6,726	$6,554	$5,968
Unweighted average of two sending regions	$3,918	$5,727	$5,350	$4,490
Europe	$25,259	$35,538	$28,732	$25,365
USA	$33,577	$40,010	$33,463	$33,577
Australia	$24,157	$32,373	$24,521	$29,196
Median, all ADRI countries	$25,259	$35,538	$30,565	$26,401
Difference between median all ADRI countries and average of SSA and South Asia	$21,341	$29,811	$25,214	$21,911
Source: Author's calculations with ILO wage data.				

The median wage across South Asian countries is generally higher than SSA with the average of the two regions for Skill Level 1 is around P$4,000. In the ADRI countries the average wages for Skill Level 1 are around P$25,000, a difference between potential senders and

[15] The ILO (2012) defines skill level 1 as: *Occupations at Skill Level 1 typically involve the performance of simple and routine physical or manual tasks….For some jobs basic skills in literacy and numeracy may be required…[but] would not be a major part of the work….completion of primary education or first state of basic education may be required….Occupations classified at Skill Level1 include office cleaners, freight handlers, garden laborers, and kitchen assistants. (pg 12).* Skill level 2 is: *Occupations at Skill Level 2 typically involve the performance of tasks such as operating machinery and electronic equipment; driving vehicles, maintenance and repair of electrical and mechanical equipment…The knowledge and skills required for competent performance in occupations at Skill Level 2 are typically acquired through completion of the first stage of secondary education…Occupations at Skill Level 2 include butchers, bus drivers, secretaries, account clerks, sewing machinists, shop sales assistants, police officers, hairdressers, building electricians, and motor vehicle mechanics*

around P$21,000 per year. For Skill Level 2, roughly high school completion, the wage differential is roughly P$30,000 (P$6,000 in potential senders versus P$36,000 in ADRI countries).

Similar results emerge if we use occupational wages rather than skill level aggregates. For "Elementary Occupations" (ISOC category 9) the wage differential is around P$22,000. The wage differential in ISOC Category 5, "Service and Sales Workers" (which includes, for instance, Health Care Assistants, Home Base Personal Care Workers, Child Care and Security Guards) is P$25,000 (P$30,000 in ADRI countries versus P$5,000 in potential senders).

The fact that the exact same worker moving from a low productivity place to a high productivity place, even when the moving worker has low formal schooling and works in a core skill occupation in the host country, creates P$20,000 to P$30,000 more value creates the possibility for mobility to be win-win-win. Win for the moving worker whose PPP earnings increase by around a factor of five[16]. Win for the sending country as, particularly for rotational mobility, a large fraction of that will be used and spent in the sending country (either as remittances or savings or both). Win for the host country both because (a) needed services are performed for which native-born workers are increasingly just not available (at any feasible wage) and (b) the host country can arrange its tax and benefits such that these workers are a net contribution to the fisc, as a "rental" payment from the worker for opportunity to work in a high productivity country.

III.B) While ADRI countries have a birth dearth, some regions have a youth bulge

While native born, labor force aged, people will be increasingly scarce in rich countries, and the demographic transition from high fertility to low fertility is a globally a widespread phenomenon, there are regions of the world, particularly Sub-Saharan Africa and South Asia, there will be very substantial growth in the labor force aged population to 2050.

These different demographic destinies over the coming decades are important for three reasons.

One, throughout history exchange (both voluntary and expropriative) between countries and regions has been driven by differences. During the period of modern economic growth (since roughly 1870) the demographic transition in which death rates fell before and faster and further than birth rates meant that nearly all countries had growing populations overall and similarly shaped "thick based" demographic pyramids. As Figure 3 illustrates, the labor force to aged ratio was over 5 in rich countries as recently as 1950. Hence, while wage differences and differential capital and land availability between Europe and the "areas of recent settlement" drove very substantial population mobility in the "first globalization" era between 1870 and 1920 (onset of World War I), migration and mobility fell very substantially, interrupted by the two

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[16] The PPP adjustment quite substantially *understates* the potential gains from rotational labor mobility as the PPP adjustment is based on the fact that goods are more expensive in richer countries. However, if a worker earns money in a rich country and then saves or remits that money such that it is spent in his/her country of origin then the gain in PPP is much larger than the PPP adjusted earnings differential which assumes earnings are spent where they are earned.

wars and a global depression, and by a rapidly shifting politics in the main immigration recipients (e.g. USA, Argentina, Brazil). The coming potential for "age arbitrage" and labor mobility driven by radically different demographic pyramids is a historically new phenomenon.

Two, the labor flows driven by demographic differences is going to be different and this is important to recognize because it means that we should expect the emerging rules, regulations, laws, policies, institutions and organizations to handle this new type of labor mobility to differ massively from both the historical era of "open borders" (of course "open" only between select countries) or the current era of "migration." There need to be safe, orderly, and regular legal pathways for these new types of labor mobility.

Three, "the world" is not facing labor scarcity, this is a medium-term future of the richest and most powerful and most educated, scientifically and technologically advanced nations. The risk this creates is that these nations respond to scarcity of "native born" labor by attempting a technology driven "go it alone" strategy. Instead of recognizing that labor is not globally scarce and taking advantage of the potential of movement, this "go it alone" strategy mitigates the consequences of their own border-based policy distortions and by inventing machines that displace labor. Relative to a "people first" strategy this "technology only" strategy is bad for both ADRI countries and for the youth bulge regions of the world (Pritchett 2023).

Table 6 and Figure 6 shows the growth in overall population and by age groups of the "developing countries" overall (less China), Africa (both Sub-Saharan and North), and South Asia. Overall, while the ADRI countries will lose labor force aged population between 2020 and 2050, there will be 1,356 million more people of labor force age in the developed world. Nearly all of that growth, 86 percent (=1165/1356) will be in Africa (with Sub-Saharan Africa alone with 53 percent of the global gain) and South Asia (26 percent).

The concentration of the absolute gains from SSA and South Asia is because the other large regions are either not growing fast or that the other fast-growing regions are small. The demographic transition is further along in other large developing country regions, like Latin America (439 million in 2020) or Southeast Asia (453 million in 2020) and hence to 2050 the increase in the labor force aged will be modest--12 percent for LAC and 15 percent for South-Eastern Asia. North Africa is growing fast, 57 percent increase to 2020, but that is "only" 86 million additional people.

Table 6: Gains in labor force aged population from 2020 to 2050 by region							
Region/country	Labor force aged population (15-64)					Ratio LF aged/65+	
	2020	2050	Absolute Change	% change	Region as % of global (less China) LF change	2020	2050
Sub-Saharan Africa	601	1,323	722	120.1%	52.9%	18.3	13.0
South Asia	1,288	1,645	357	27.7%	26.2%	10.8	5.2
North Africa	152	238	86	57.1%	6.3%	10.7	5.7
Central and West Asia	232	311	78	33.7%	5.7%	11.4	4.5
South-Eastern Asia	453	520	67	14.8%	4.9%	9.5	3.9
LAC	439	493	54	12.3%	4.0%	7.5	3.4
Global (less China)	3,165	4,530	1,365		100%		
China	1,012	848	-164	-16.2%		5.9	2.3
Source: UN Zero Migration Scenario							

Another reason for focusing on Africa (both SSA and North Africa) and South Asia as potential suppliers of both pathway and rotational movers to ADRI countries is the possible impact of China. In the Zero Migration scenario China will lose 164 million labor force aged. By 2050 its LF/65+ ratio will fall from 5.87 to 2.31. This combined with the demographics of Japan and Korea implies that the entire Asian region outside of South Asia (Central and West Asia, China, South-Eastern Asia, plus Japana and Korea) is not a "net" labor force aged surplus region.

Figure 6: There will be growth in the labor force aged of 1.3 billion people by 2050 in the developing regions (less China), mostly from Sub-Saharan Africa (808 million) and South Asia (357 million)
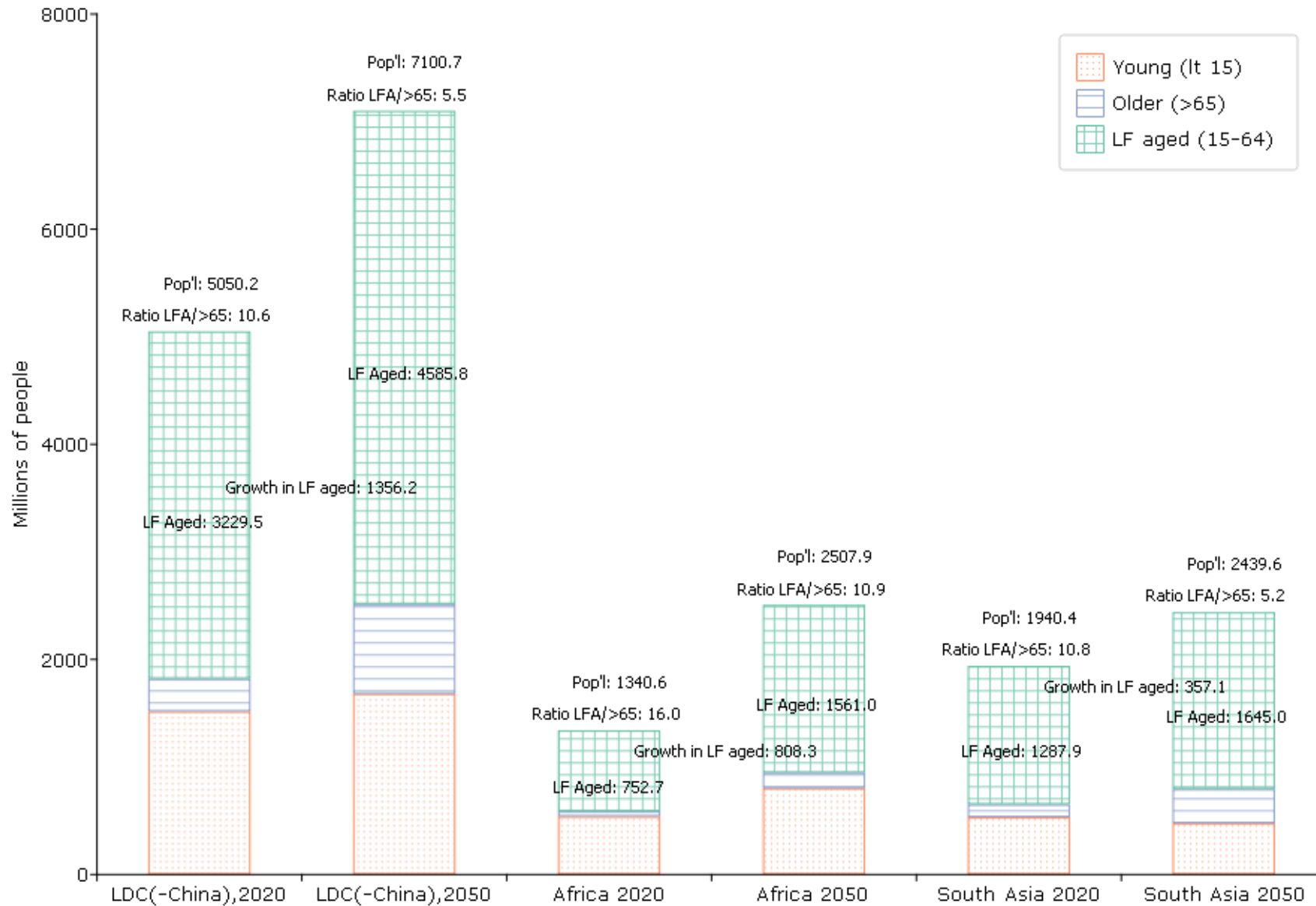
Source: Author's calculations with UN ZM scenario.

III.C) Is rotational labor mobility feasible at scale?

A typical reaction to the idea of a scaled legal pathway to work opportunities in core skill jobs in the ADRI countries is that it isn't "possible" to have such a high proportion of the working population in the country be foreign born workers residing in the country on a short to medium term basis. That this is "impossible" is obviously false as a significant number already do it. The UN DESA sources estimate that 37.6 percent of Singapore's 2020 population was from less developed regions, nearly all of which was contractual and time limited. The ratios for some of the Gulf States are much higher still.

But what is really meant by the claim this isn't "feasible" is something more subtle and sophisticated like "achieving large scale rotational labor mobility that is: (i) *orderly* (e.g. without massive non-compliance of movers with requirements to return) using (ii) *means and modalities of enforcement* that the publics of ADRI countries regard as legitimate (e.g. are consistent with human rights and fairness), (iii) protects workers while in country from *exploitation and abuse,* and (iv) with all of this done at *reasonable cost to the fisc* (e.g. that the general tax-paying public does not incur large enforcement costs while employers benefit from "cheap" labor) is impossible." A proposal that ADRI countries should "do what the Gulf does" to address ageing is a non-starter. But asserting that any rotational scheme is necessarily "what the Gulf does" is equally facetious.

Addressing the question of "feasibility" because of "political legitimacy" of modalities of movement is a hard question because what is and what is not at any given time regarded as "legitimate" is so complex and, from my perspective at least, puzzling. For instance, sometimes it is claimed that ADRI country voters will not tolerate rotational labor schemes because those are "unfair" or inevitably lead to mistreatment of workers or are inherently exploitative. Yet, at the same time the International Organization for Migration (IOM) estimates that between 2014 and 2023 over 60,000 people have died attempting to migrate and of that, there were about 27,000 deaths from drowning in the Mediterranean alone (for some perspectives on that number there have been only 6100 USA combat deaths from all conflicts since Vietnam, or the total number of deaths from attempted crossings of the the Berlin Wall are between 250 and 350). But even losses of those magnitude have not tainted the existing system as "illegitimate" in the mind of ADRI voters.

Three points.

First, I agree fully that rotational mobility at scale cannot be done within the current "two question" framework and approach overall and specifically within the current approach to enforcement, in three important regards. One, since current labor mobility policies in most host countries do not provide legal pathways for potential sending countries, they can reasonably expect zero active cooperation from sending countries in the enforcement of the host countries unilaterally adopted policies. Two, as the recent opus from de Haas (2023) emphasizes again and again, migration flows are driven by employer needs and willingness to employ. As employers in some labor scarce sectors strive to meet their needs for workers and have few legal options, the best that could be expected from employers is reluctant and "performative" compliance.

Three, due the lack of legal pathways the existing intermediaries helping people to move from poor to rich countries are necessarily operating outside the law and "under the radar." Hence impossible for governments to work cooperatively with a "labor mobility industry" in sending countries to improve conditions. An apt analogy is with Prohibition in the United States in which a new constitutional amendment made perfectly normal and historically common economic transactions—such as the production and sale of beer—illegal. As this didn't eliminate the desire of a large number of Americans desire to consume alcohol, Prohibition led to a large and thriving "criminal" industry which was impossible to tax or regulate. Was it impossible to enforce Prohibition? Yes. Was it impossible to strictly regulate the production and sale of alcohol so that it was safe, sales were regulated (e.g. in 17 US states "hard" liquor can only be purchases in state controlled stores), and heavily taxed (most states have high excise taxes on alcohol and specifically on distilled spirits)? (Also) Yes. The inability of states to adequately enforce their unilaterally adopted existing "pathway" and "distress" channels without cooperation from sending countries, employers, or an intermediating mobility industry says nothing about the potential to create well-regulated and enforced channels that could do so.

Second, just as fish are not aware of swimming in water, most ADRI country citizens take for granted just how enormously capable their countries are of carrying out enormously complex logistical tasks in a safe and orderly manner. Just as one example, gasoline is one of the most explosive substances on earth—one gallon of gasoline has the explosive energy of 14 sticks of dynamite—indeed that property is why it is used in cars. The USA consumes about 135 billion gallons of gasoline a year, which would take about 27 million trips of a typical tanker truck to mover, and there are 117,000 gas stations. A study (Ahrens 2020) estimated that from all gas station fires (including those caused by causes other than gasoline, like faulty electricity in the convenience store part of the structure) there were about 3 civilian deaths per year, with only 1 per year from vehicle fires. While each death is tragic, this is an amazing safety record in handling an enormous volume (both in numbers of people and volumes) of interactions with a very volatile and explosive substance. Modern economies are highly and tightly regulated in (nearly) every aspect and sector. I am not arguing that all of these regulations are necessary or even that they are all effective at accomplishing stated objectives, or that they are cost-effective. In fact, to the extent they are not necessary, effective, or cost-effective makes the fact they are, by and large, routinely enforced, an even greater testament to the administrative capability of the state and its agencies and organizations.

The argument that a Germany, or a Japan, or an Australia—countries that have reliable systems of producing and distributing electricity to every house and structure, that have effective systems of disposal of household waste, that have effective systems of water and sanitation for every household, that regulate food safety and cleanliness of every restaurant, on which each and every vehicle on the road is registered and the conditions of operation (e.g. speeds) are regulated, in which a domestic airline industry carries millions of passengers each year with very few accidents, and etc. etc., could not, in principle, construct and enforce a system of rotational labor mobility that could achieve the necessary objectives for both workers, employers, and society at large slightly surreal. They don't have such a system only because they haven't tried.

Third, I think it is impossible to be alive today and not recognize that social norms of what is or is not "legitimate" or "appropriate" or "acceptable" are, in the current phrase, "socially constructed" and that these social constructions are subject to enormous change, sometimes rapidly. I was born in the USA in 1959 and I could make a very long list of actions or behaviors that people found acceptable in 1959 that would be unthinkable today and vice versa, behaviors that were unacceptable in 1959 regarded as perfectly acceptable today. And, part and parcel of that change is that, while there was often a difficult period in which accepted norms were challenged, the changes that happened and now widely accepted. The argument that "people would be uncomfortable with" this or that arrangement for labor mobility is hardly to be taken as a compelling argument about the limits of the possible, but rather as a challenge to be coped with and managed as change happens.

III.D) *The total potential economic gains from rotational labor mobility*

Using the calculations of the total potential mobility and the wage gains per mover, estimating the total potential economic gains arithmetic.

A "base case" estimate of the annual gains takes the estimates of total movement of people in 2050 from Figure 5 and multiplies that by the 2017 PPP wage differentials from Table 5 for a 2050 gain from rotational mobility of 6 trillion (2017 PPP) dollars (=237.3 million rotational workers*(2017 PPP$25,000 gain per worker.

These gains are huge. The fifth largest economy in the world was Japan with GDP of 5.2 trillion. These gains are bigger than each of the four big EU economies (Germany, France, Italy and Spain) bigger than the GDP of the next 10 largest European economies (Poland, Netherlands, Switzerland, Belgium, Sweden, Portugal, Norway, Denmark, Greece and Finland) *combined*.

These large gains in 2050 are obviously far into the future and hence I calculate the net present value. The net present value of the stream of benefits from 2020 to 2050 (relative to ZM) can be calculated assuming that the annual number of migrants grows additively from 2020 to the assumed total in 2050. At a five percent discount rate, the NPV of rotational labor mobility reaching 237.2 million in 2050 at a wage gain of P$25,000 per migrant is P$34.6 trillion (2017 PPP dollars).

In terms of what could be feasibly done in and by rich countries that would be of benefit to people living in the "developing" world, really nothing else compares. In 2022 development assistance flows were $210.7 billion dollars. Even assuming these flows produce dollar for dollar benefits in the recipient countries (which even in the most optimistic case about efficacy isn't true as there are administrative costs) the NPV of that flow from 2020 to 2050 would be 3.24 trillion dollars, one tenth as much. Calculations of the gains to poor countries from global trade reform or improving financial flows are out of fashion, but even at their peak with inconsequentially small compared to gains from labor mobility (Pritchett 2018).

The recent emphasis on "rigorous evidence" has shown how difficulty it is to raise people's earnings *in situ.* A recent article in Science reported on a six country study of a sophisticated (with eight components) "graduation" style program of transferring livestock assets

to raise incomes of the chronic poor. In the five countries in which the program had a positive impact (in one country the livestock mostly died) the bottom line was that the program spent on average $4,500 per household over the first two years of implementation and this produced a total year 3 gain in (non-durables consumption) of $344 per household. Taking the wages from Table 5 shows it would take an African working in Europe versus Africa about four eight hour days of wages to increase their income by that about.

Higher economic growth can produced enormous gains, but even if growth I in Sub-Saharan Africa were to be higher by 1 percent per annum from 2020 to 2030 and these gains were "free" in that they were the result of just higher productivity growth, this would produce a total NPV of 20.26 trillion, whereas if Africa's gains from labor mobility was just their incremental share of labor force aged population (53 percent) the NPV of labor mobility gains would be about as large, $18 trillion (=.53*34.65).

Figure 7: Estimates of the net present value of the economic gains from allowing rotational labor mobility (over and above pathway migration) to meet demographic gaps in ageing, democratic, rich industrial countries
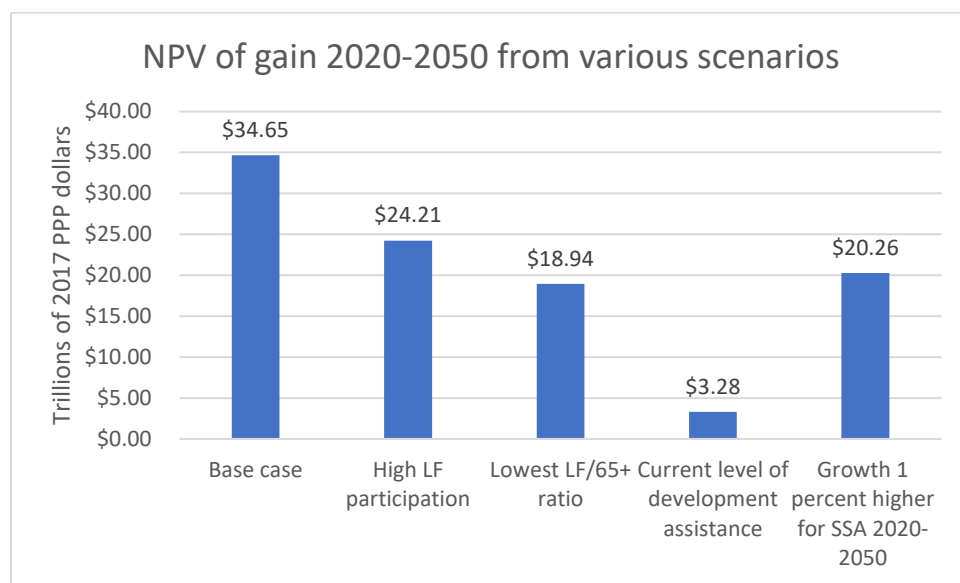
Source: Author's calculations.

Conclusion

There are trillions of dollars of gains to be had from scaled rotational labor mobility. Most of those benefits would go to people from poor countries (and people poor by rich country standards). These gains make gains from official development assistance or philanthropy look paltry. All it takes to realize those is that employers in high productivity host countries are legally allowed to employ workers and pay them the wages justified by their productivity.   In the past, when rich countries still had growing populations and a high ratio of labor force to aged the natural inclination was to allow only citizens (or those on path to citizenship) legal permission to work. However, we are already in, and will be in for the next 30 years, a radically different

demographic stage. In this demographic stage the challenge is not to find a job for every worker but to find a worker for every job. It is now in the economic interests of the rich, high productivity, countries to allow these people to work as it helps them meet needs for essential core skills jobs for which, given their rapid demographic ageing, they would have no workers. With the right legal and administrative arrangements and with public and private actors engaged in the movement this can almost certainly be done in a safe, orderly, and rights respecting way. And, with rotational mobility, the current citizens and voters of the host countries retain complete and total control over "the future of us" as the usual fears of the dangers of "mass immigration" to the preservation of a countries traditions and culture and heritage do not apply (to any great extent) to rotational mobility.

That said, it would be naïve or disingenuous (or both) to pretend this transformation to a "three question" approach to labor mobility will be easy. There are lots of people and groups who have every reason to be skeptical. People can legitimately worry that temporary workers will be exploited or abused. People can legitimately worry that, although workers enter a country on a legally time-limited authorization, over-stay will not be enforced. People can legitimately worry that their jobs or potential wage gains will be reduced by allowing foreign worker to compete for their jobs. Employers can legitimately worry that the regulatory system will not be responsive to their needs for workers. The politics of creating support for an agenda of scaled rotational labor mobility are fraught.

That said, many economic and political advances people living in the ADRI countries take for granted—electricity, automobiles, air travel not to social progress in women's rights, civil rights, universal suffrage in democracy—were regarded as impossible, unworkable, and unnecessary at one time. But when needs created potential for massive gains in advanced democracies, the combination of private firms and public regulation in advance democracies have created the legal, regulatory, and physical infrastructure that allow enormously complex industries to function effectively and safely at scale. In 1930 in the USA domestic carriers flew 85 million passenger miles but the fatalities were 280 per billion passenger miles, By 1940 the industry flew over a billion passenger miles and fatalities per passenger mile had fallen more than ten-fold to only 23. In 1970 US domestic carriers flew over 100 billion passenger miles with zero fatalities.

There might be other ways of coping with ageing, through changes in taxes and benefits to make the fiscal costs of ageing less, through technology and innovations that cope with the mobility policy induced labor scarcity, but none of those pathways benefit the youth of the world who seek the opportunity for productive employment. Why not choose the path that grings big benefits to people?

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Appendix A: Details of robustness of estimates of the DLFG

A.1) Labor force participation rate

The demographic labor force gap estimates in Table 1 assume that the labor force participation rates in 2050 are the same as in 2020 in each age/sex cell. The change in the labor force in 2050 versus 2020 is driven entirely by the changing age structure of the population[17].

Some suggest that at least some part of the growing labor scarcity could be addressed by increased labor force participation by prime age women and increased labor force participation at higher ages. Figure A.1 expands on the average labor force participation rates shown in Figure 1 by showing both the median labor force participation by age and sex across the 31 ADRI countries, and adds a line for the average LFPR of thee= highest three countries for each age/sex cell and the average of the lowest three countries for each age/sex cell.   For instance, the highest three countries in their LFPR of males aged 65-69 are Korea (82.7), Japan (76.51), and New Zealand (57.6) and the average of is 72.3. The lowest three countries in male 65-69 LFPR are Luxembourg (8.1), Slovenia (8.0) and Spain (7.7) with the average of 7.9.

Figure A.1 shows that the biggest differences for male LFPR are among the young (less than 25) and older than 50 as retirement starts much earlier in some countries than others.   For females there are much larger cross-national differences in LFPR, even in prime labor ages. Hence in reporting the potential gains in the labor force in Table A.1 I report the fraction of the gain from increased LFPR by four categories: Young (under 25) both sexes, Prime age (25-64) female, Prime age (25-64) male, and 65 and over both sexes.

Table A.1 shows the results of the demographic labor force gap under the assumptions that the LFPR in 2050 in each country either descends to be as low as the average of the lowest 3 countries (cell by cell) or, alternatively, rises to be as high as the average of the highest 3. These are extreme robustness checks rather than actual alternative possibilities, as it is hard to predict the secular trend in LFPR over the next 30 years.

Column IV of Table A.1 shows that if the LFPR by age/sex in each country were to fall to the lower levels (average LFPR of the lowest three countries in each cell—the green/dotted line in Figure 4) then, naturally, the demographic labor force gap would be much larger than in Table 1 as the ZM labor force would fall to just 209 million. The gap would be just over 100 million workers higher, rising from 356 million to 461 million.

Column VI of Table A.1 shows the alternative if LFPR in each country rose to the higher observed levels (the blue/dashed line in Figure A.1) for every country. This would substantially raise the ZM projected labor force to 562 million, slightly larger than its 2020 value as the demographic shift would be outweighed by increased LFPR. This reduces the demographic labor force from 355 to only 233 million.

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[17] There might be some changes in the sex structure but these are minor compared to age shifts.

Figure A.1: The range in labor force participation rates by age and sex across 31 rich industrial countries
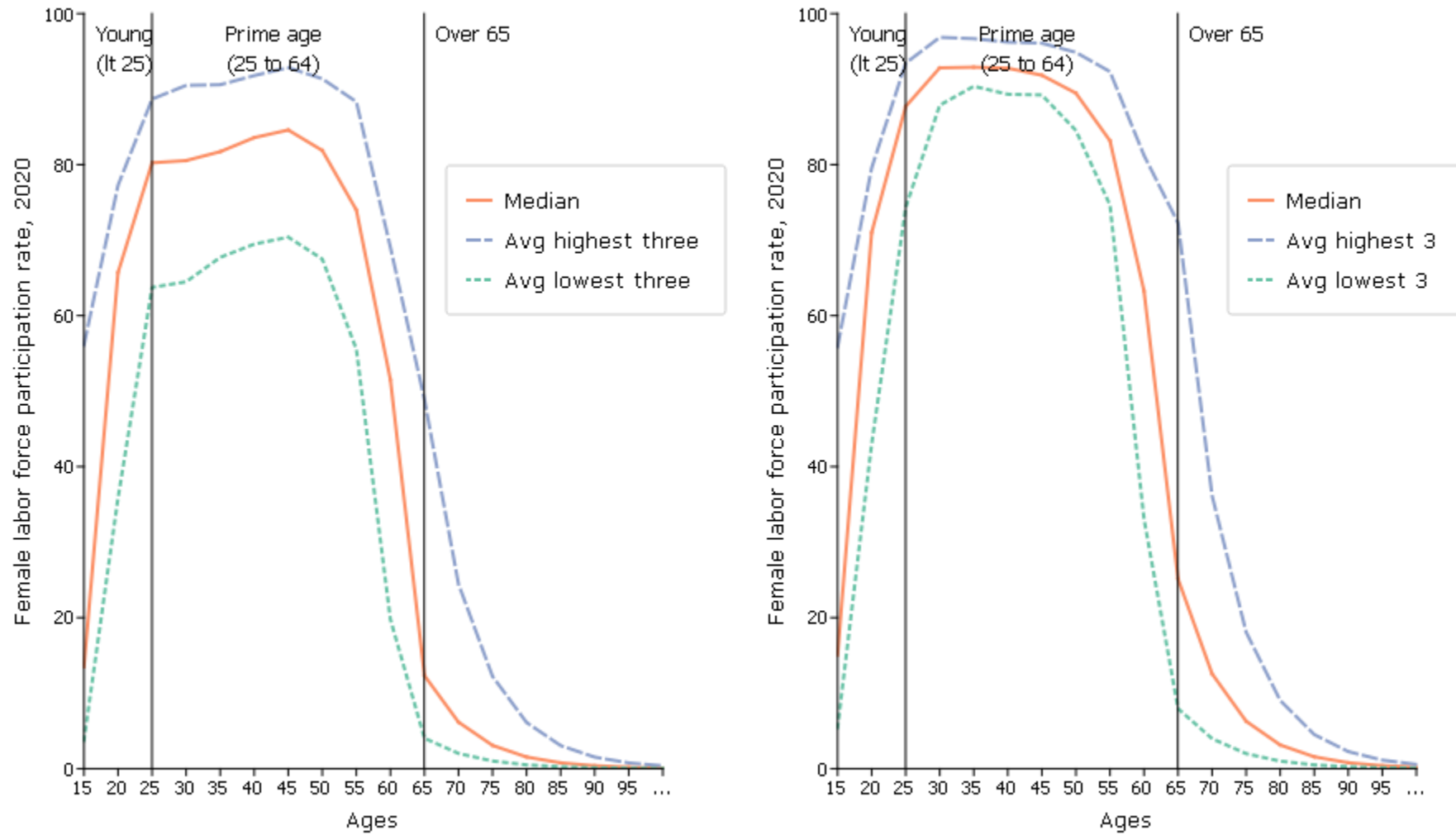
Source: Author's calculations as described in text.

Country/region	Labor force 2050 (2020 LFPR)	DLF gap (col VII of Table 1)	Labor force 2050 (low LFPR)	DLF gap, LFPR low	Labor force 2050 (high LFPR)	DLF gap, high LFPR	Gain in LF from higher LFPR	Percent of gain in higher LF from:				Percentage point increase in Female age 65-69 LFPR, 2020 to high scenario	
								Young	Prime female	Prime Male	Old	Female	Male
Col:	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Spain	16.1	23.3	13.83	25.6	22.8	16.65	6.7	18.4%	19.4%	12.9%	49.4%	43.8%	64.6%
Germany	33.1	23.3	24.95	31.5	40.5	15.91	7.4	15.1%	19.6%	13.1%	52.3%	36.6%	51.3%
United Kingdom	31.2	19.5	23.52	27.2	37.3	13.35	6.1	12.3%	27.9%	15.9%	43.9%	30.2%	43.7%
Italy	17.0	17.7	15.98	18.7	26.3	8.44	9.2	18.4%	31.1%	14.3%	36.2%	41.9%	56.1%
Poland	13.7	13.3	11.79	15.2	19.4	7.61	5.7	19.0%	27.3%	12.9%	40.8%	41.8%	57.2%
France	25.9	13.1	21.82	17.2	34.7	4.28	8.8	24.9%	19.3%	15.1%	40.6%	42.4%	62.7%
Netherlands	8.2	5.1	5.95	7.3	9.5	3.77	1.3	-1.6%	28.5%	14.1%	59.0%	37.1%	46.8%
Switzerland	4.0	4.5	2.78	5.8	4.6	3.99	0.6	3.9%	19.5%	5.8%	70.8%	31.7%	41.1%
Austria	3.5	3.7	2.79	4.4	4.6	2.66	1.1	8.9%	24.1%	18.1%	48.9%	42.4%	59.0%
8 moderate size	28.9	22.1	1.31	27.5	37.9	0.73	9.0	24.5%	21.7%	12.0%	41.7%	37.0%	49.9%
8 small size	11.0	6.7	1.65	9.3	13.4	0.69	2.4	20.8%	15.3%	17.6%	46.3%	34.9%	50.8%
Europe	192.7	152.3	126.4	**189.8**	251.0	**78.1**	58.3						
USA	158.8	110.7	123.32	146.2	194.6	74.96	35.8	15.5%	38.6%	23.1%	22.8%	18.2%	28.8%
Canada	17.4	16.1	12.94	20.6	20.8	12.69	3.4	6.2%	29.7%	21.3%	42.8%	28.8%	37.2%
North America	176.3	126.8	68.13	**166.8**	215.4	**87.65**	39.1						
S. Korea	21.0	41.2	14.73	47.5	24.4	37.82	3.4	37.0%	66.2%	19.6%	-22.8%	-12.2%	-10.5%
Japan	48.6	22.3	31.63	39.2	52.2	18.60	3.7	43.4%	63.0%	-4.2%	-2.3%	2.8%	-4.2%
Australia	13.2	11.0	9.77	14.4	15.6	8.58	2.4	2.0%	36.7%	21.6%	39.7%	26.8%	37.0%
New Zealand	2.9	2.3	1.99	3.2	3.1	2.00	0.2	11.2%	45.2%	16.2%	27.4%	9.5%	14.7%
Asia and Pacific	85.6	76.8	14.53	**104.2**	95.3	**67.01**	9.8						
Totals	454.5	**355.9**	209.0	**460.8**	561.7	**232.7**	107.2	16.5%	31.4%	14.7%	37.5%	29.0%	40.4%

Source: Author's calculations, described in text.

The results in Table A.1 are the arithmetic of various assumptions not "predictions" or even "policy options" and it is worth making three points.

First, in Europe especially, the plurality of the gains (over 40 percent in most countries) come from increased LFPR of those 65 and over and the magnitudes depend on extremely large gains in the LFPR rate of the older population. The "high LFPR" scenario would require that the LFPR of those aged 65-69 in Germany (as one example) increase by 51 percentage points, from the current level of 21 percent (four out of five people in this age group *not* in the labor force) to the "highest three country average" of 72 percent (almost three out of four are *in* the labor force). These massive changes in the employment of older people seem implausible. While obviously some people could choose to voluntarily extend their careers if they have a rewarding and interesting job and are in good health, this is unlikely to be true of 40 to 50 percent of the (male) population.

There could be policy steps to force/encourage later retirement and OECD (2023) *Pensions at a Glance* documents that many countries are taking action to extend working lives by raising pension eligibility ages so that for workers starting work today (and hence retiring after 2050) the retirement age will be, on average, 66.3 years for men and 65.3 for women But even those efforts would not reach have 72 percent LFPR for the age range 65-69. The significant political protests against French President Emanuel Macron's efforts to raise the pension eligibility age from 62 to 64, forcing him to invoke special constitutional provisions to enact the reform without a parliamentary vote—and even in May 2023 his approval rating was in the low 30s--were a vivid illustration of the risks in "decreasing benefits" by raising minimum pension eligibility ages as a way of addressing demographic pressures.

Second, a significant fraction, typically between 15 and 25 percent, of the gain in LFPR would come from increases for youth less than 25 and a significant fraction of that from gains in the LFPR of the 15-19 age range—as some ADRI countries have relatively high youth employment. This seems neither plausible as a forecast nor desirable and the general expansion of schooling, higher education, and training for the 15 plus population is seen by most countries as an integral part of their strategy for creating a highly skilled labor force.

Third, the gains from increased prime aged female labor force participation are quite mixed by region. In Europe only about 20 to 30 percent of the total increase in LFPR comes from increased participation by prime age females—because participation rates are already quite high. In the USA the fraction is much higher. And in Korea and Japan, where female LFPR rates are low, it is the most important component of LFPR increases (as LFPR for men, both prime age and older) are already quite high.

There is general consensus among economists (and others) that policies that eliminate discrimination against women and hence increase their opportunities, wages, and labor market choices are win-win. That said, the idea that large increases in female LFPR is a mechanism for coping with labor scarcity due to shrinking labor force aged populations ignores the reality that a large, if not primary, reason that women are often out of the labor force is gendered roles for

care-giving of both children and the elderly. Hence a realistic plan for increasing female LFPR has to address the creation of viable options for child and elder care—which itself requires more workers.

Even under extreme assumptions about the growth of LFPR in each age and sex cell by 2050 (changes that are in my view both unlikely and not obviously welfare improving), the estimates of the demographic labor force gap are still 234 million.

A.2) Level of 2050 LF/65+ ratio

The results in Table 1 estimate the DLFG to keep each country at its current (2020) LF/65+ ratio. While this ratio has been trending downward across all countries. it currently has a pretty substantial range (from Italy at 1.8 to New Zealand at 3.6). In this sub-section I explore two alternative scenarios for the 2050 ratio for each country:

(a) All countries converge to the current average ratio of 2.66.

(b) that all countries converge to the 10th percentile of the current distribution of LF/65+ across the 31 ADRC, which is 2.11, the current level in France.

In the "all converge to the current average" the global totals are nearly the same (not surprisingly), 356 million versus 366 million. The main difference is across countries as the gap for countries with currently high ratios are smaller as their ratio falls substantially. For example, the gap in the USA falls from 111 million to 73 million as its 2020 ratio is 3.4 and hence maintaining that high level creates a bigger gap that falling to 2.66. In contrast, those countries currently below the average have much larger gaps. In Italy the gap roughly doubles, increasing from 17.7 to 34.4 million as its 2020 ratio is only 1.8 so moving to the average would require a much higher labor force in 2050.

The open and likely undecidable question is "how low can this ratio be and still sustain the economy, the elderly population, and manageable fiscal balances?" As we saw above the "business as usual" outcomes without migration lead to ratios never before seen in human history and so there can be no persuasive argument that these can be sustained. The lowest current ratios (Italy, Spain, Japan) do not seem "sustainable" as currently policymakers in those countries are acting with urgency to address their labor scarcity. As mentioned above, France recognizes that even their relatively slowly declining ratio of 2.11 is not sustainable at current configurations of taxes and benefits and hence their leadership had to, was willing to, absorb enormous political pressure to make changes in retirement ages (and these were strongly resisted as they were seen as not the final change but a harbinger of more to come). Hence as a guess of a lower-bound 2.11 is likely not far off (it might be somewhat higher, cannot be much lower).

Assuming every rich industrial converges to this lower bound of 2.11 produces an estimate of the demographic labor force gap of 196 million, much lower than the 356 million needed to sustain each country's current level.

Country	LF/65+ ratio in 2020	LF/65+ 2050 (ZM, 2020 LFPR)	"Target" ratios of LF/65+ in 2050		
			Country's own 2020 level (col VII of Table 1)	All country 2020 average (=2.66)	10th percentile of 2020 ratios (=2.11)
Col:	I	II	III	IV	V
Spain	2.5	1.0	23.33	26.82	17.95
Germany	2.4	1.4	23.32	30.33	17.23
United Kingdom	2.8	1.7	19.50	17.98	7.82
Italy	1.8	0.9	17.68	34.45	23.82
Poland	2.6	1.3	13.31	13.78	8.10
France	2.1	1.4	13.12	23.28	13.12
Netherlands	2.8	1.7	5.07	4.62	1.98
Switzerland	3.1	1.4	4.55	3.39	1.86
Austria	2.7	1.3	3.73	3.65	2.17
8 moderate sized	2.6	1.4	22.06	26.28	14.88
8 smaller sized	2.7	1.6	6.69	7.18	3.42
Europe	2.4	1.4	**152.35**	**191.74**	**112.36**
USA	3.1	1.8	110.72	72.87	25.02
Canada	3.0	1.6	16.06	12.43	6.26
North America	3.0	1.7	**126.77**	**85.29**	**31.28**
S. Korea	3.5	1.2	41.23	26.99	17.08
Japan	1.8	1.3	22.27	54.76	33.42
Australia	3.3	1.8	11.02	6.54	2.47
New Zealand	3.6	2.0	2.25	0.88	0.10
Asia and Pacific	3.0	1.6	76.77	89.17	53.08
Total (average)	2.67	1.48	**355.9**	**366.2**	**196.7**

Table A.2: Scenarios for the size of the demographic labor force gap at various "target" levels of the LF/65+ ratio in 2050

Source: Author's calculations.

Appendix B: Everything else is impossible too

In the face of the massive challenges of ageing that demographic changes will bring to the "social contract" of supporting the elderly, there are broadly really only three viable policy options, each of which is viewed as completely politically impossible[18],[19].

One, governments could raise taxes. This is widely perceived as politically impossible, in part because total tax take to GDP (consolidated for all tiers of government) is already very high in these countries. In the ADRI countries, all of which are competitive electoral democracies (by definition of the category), overall tax to GDP ratios have not increased substantially since the 1990s. This suggests any increase in overall tax rates is not an easy sell, and much tax increases of the the magnitudes the demographic shifts of declining labor force would entail.

Two, one could cut the benefits of the elderly, either through changing eligibility (e.g. raising retirement ages), cutting payments (e.g. eliminating indexation or other means of cutting "real" benefits over time) or raising non-labor taxes with incidence on the elderly (e.g. raising VAT rates, or other taxes that pass through). Raising labor force participation of the native born (and existing migrants) has some possibilities (e.g. by extending retirement ages), but, as I argue in Appendix A, the upside potential of increasing labor force participation is pretty modest as LFPR are already pretty high.

The third, politically impossible option is to allow more "migration" or more specifically, allowing more foreign born to legally work in your country to address overall labor scarcity and pay (net) taxes to help the fiscal balance. The calculations above show that in the absence of additional migration by 2050 countries will far into historically uncharted territory and, while labor movement might not be all of the solution or the only solution it is hard to envision countries maintaining their existing economic prosperity and their social contract with the aged in anything like their current form without a substantially larger labor force that natural increase alone will produce.

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[18] One alternative not listed is that a country could have accumulated massive savings relative to population and hence finance the ageing transition from these savings. Norway, for instance, with a sovereign wealth fund worth about US$1.6 trillion, about $300,000 per person, probably needn't worry too much about financing benefits for an ageing population. But most countries with future demographic challenges currently have substantial debt (Italy and Spain have debt to GDP over 100 percent, Japan over 200 percent) and going back in time and having accumulated savings isn't an option.

[19] Another option not listed because it isn't really a policy option but more a fantasy is that somehow "technology" is going to dramatically raise labor productivity and this manna from heaven will feed everyone. But this (a) ignores the historical evidence that during the last 30 years of very rapid progress in one narrow sector of the economy (IT) the economy wide TFP growth has been much *slower* than in previous years, not faster, and so how more IT productivity will produce something very different is never made clear and (b) getting manna from heaven is not a "policy choice" it happens or it doesn't.

Appendix C: Economics of migration is not the issue

The text makes the argument that the widespread opposition to "more" migration not primarily about the strictly "economic" consequences of migration with people voting their economic self-interest. This appendix fleshes out that argument, particularly with respect to opposition to rotational labor mobility for core skill jobs.

First, there has been massive economic literature about the impact on wages of native-born workers from migration. Analytically this hinges in part around the question of whether an incremental migrant is predominantly as "substitute" in the process of economic production (and hence in the demand for firms) for a native-born worker or a "complement" to a native-born worker. The National Academy of Sciences (NAS) 2017 review of the existing evidence concluded that for the "typical" or median US worker the aggregate wage effect of migration was certainly very small and almost certainly positive.

That study allowed for the *possibility* that for some selected groups of workers, such as those native-born workers with less than a high school degree, there was *some* negative effect as these workers might be substitutes for a typical, say, migrant from Latin America (or elsewhere).

However, the step from a finding that there might be a (small) negative wage effect on some very low skill native born workers to either an assertion this is (i) a reason to oppose migration or (ii) that this is a positive explanation of political opposition tend to not hold water. As to the latter, a self-interested motivation that people oppose migration due to losses to *their own* wages cannot account for the opposition except for those groups like those with less than high school degree, who are a very small portion of people. One would need therefore a political model with a very certain kind of altruism where people are voting to limit migrants to protect wages of a small part of the population, but this assertion is never supported with an explicit theory nor any empirical evidence.

Second, there has been recent arguments that "too many" movers, that would result from "open borders" would undermine the economic institutions that support high productivity in ADRI countries (e.g. Borjas ( ) and Collier (2013)). However, these arguments were stated as a possibility but unsupported by either theory or evidence as to the magnitudes of what "too many" might mean or the "threshold" beyond which migrants would "overwhelm" institutions. Clemens and Pritchett (2019) build an epidemiological model of the type these authors allude to, which allows for non-linear feedback loops on economic institutions. We then parameterize this model using empirical evidence and find no indication that migration at anything like current rates of flow or stocks would lead to lower productivity via a deterioration of economic institutions. Similar results emerge from Nowrasteh and Powell (2021) and Nowrasteh, Howard, and Forrester (2022).

Third, a major economic question is about the fiscal consequences of migrants, which is a very complex question depending on the composition of taxes and the entitlement to benefits. The net impact largely depends on the question of the utilization of services for non-worker migrants, particularly the costs of schooling for dependents.