Aging Society and Human Resources Rating: An Empirical Investigation

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Abstract

This paper examines how aging society affects human resources rating. Based on a sample consisting of 195 countries from 1990-2019, an inverted U-shaped relationship is found between aging society and human resources rating. As long as the aging people do not prove to be a burden on national exchequer, they may improve human resources rating owing to their experience, learning and knowledge. However, a rise in the ratio of aged people to labor force after a certain threshold burdens governments and forces them to shift away resources to the social securities of the aging people which could have been allocated for younger people. As a consequence, human resources rating worsen. The findings substantially hold for weak democracies and low income countries.

Keywords: *aging society; human resources rating; an inverted U-shaped relationship; weak democracy; low income countries*

Introduction

Changing demographic structure due to higher life expectancy and lower fertility rates post WW-II has raised various concerns for policy makers. The proportion of aged population (65 or over) in total population is substantially on rise. As reported in Table 1, the aged population will grow by 120% from 2019 to 2050 worldwide. Northern Africa and Western Asia are estimated to be the most affected regions where population aging 65 or above will rise by 226% during the same course of time. Likewise, the aged population in Sub-Saharan Africa, Central and Southern Asia, Eastern and South-Eastern Asia, Latin America and the Caribbean, Australia and New Zealand, Oceania excluding Australia and New Zealand and Europe and Northern American regions will constitute unprecedented proportion of total population.

Table 1
Region-wise Summary of number of persons aged 65 or over

	Number of persons aged 65 or over in 2019 (millions)	**Number of persons aged 65 or over in 2050 (millions)**	**Percentage change between 2019 and 2050**
World	702.9	1548.9	120
Sub-Saharan Africa	31.9	101.4	218
Northern Africa and Western Asia	29.4	95.8	226
Central and Southern Asia	119	328.1	176
Eastern and South-Eastern Asia	260.6	572.5	120
Latin America and the Caribbean	56.4	144.6	156
Australia and New Zealand	4.8	8.8	84
Oceania excluding Australia and New Zealand	0.5	1.5	190
Europe and North America	200.4	296.2	48

Source: United Nations Department of Economics and Social Affaris, Population Division (2019). World Population Prospects 2019.

Given this monumental rise in the share of aged population, work and organizations will certainly be affected.

There are positive and negative effects of aging people on human resources rating. Owing to attributes such as experience, reliability, trust and consistency the aging people are found to have positive influence on building human resources and thus organizations (Genberg, 1992; Malmberg, Lindh and Halvarsson, 2008; Garibaldi, Oliveira Martins and van Ours, 2010;

Haegeland and Klette, 1999). On the contrary, some studies (Fritzsche, DeRouin and Salas, 2009; Rabl, 2010; Wong, Gardiner, Lang and Coulon, 2008; Greller, 2006; Maurer, Barbeite, Weiss and Lippstreu, 2008; Rosen and Jerdee, 1976; Avolio and Barrett, 1987; Morris and Venkatesh, 2000; Smith, 1997; and Warr, 1993; DeArmond, Tye, Chen, Krauss, Rogers and Sintek, 2006; Pinquart and Sorensen, 2001; Victor, Scambler, Bond and Bowling; 2002; Chen and King, 2002; Radvansky, Copeland and von Hippel, 2010; Hummert, 1990; Chiu, Chan, Snape and Redman, 2001; Kite, Deaux and Miele, 1991; Gordon, Whelan-Berry and Hamilton, 2007; Ng & Feldman, 2007) find aged people to be negatively affecting human resources rating and thus organizations due to lack of motivation, energy and dedication.

This paper focuses on an important question. Given the literature cited above regarding positive and negative relationships, this paper empirically investigates a non-linear relationship between aging society and human resources rating. The findings suggest an inverted U-shaped relationship between aging people and human resources rating. Initially a rise in the aging population leads to improve human resources rating. However, the relationship becomes negative once the ratio of ageing people to labor force reaches at least 6.04% and over. The rationale for an inverted U-shaped relationship follows: as long as the proportion of aged people in comparison to labor force is not considerable, the provisioning of basic health, education and trainings is manageable for the younger population which may enhance the capacity of human resources. In addition, the aged people are more experienced, learned, skilled and reliable hence their presence provides younger people with an opportunity to learn from them. Owing to these factors, aging society leads to higher standards of human resources. Nevertheless, after the proportion of aging people reaches a certain threshold, it starts affecting human resources negatively because now the government has to allocate funds for their social securities which could have otherwise been used for young people. Similarly, aging society also means loss of experienced workers through retirement. These both factors lead to poor human resources formation and hence rating.

Another contribution of this paper is that the sample is further decomposed into strong VS weak democracies and high VS low income countries. The findings verify an inverted U shaped relation across both sub-samples although for strongly democratic and high income countries the estimated coefficients are not statistically significant.

In section 2 the literature is reviewed whereas data collection and empirical analysis are discussed in section 3 and section 4 respectively. The last section concludes.

Literature Review

There is a vast literature which discusses and establishes positive and negative impact of aging on human resource development. Aging employees may potentially contribute to enhance productivity and organizational performance through experience, learning and loyalty. On the contrary, aging may cause lack of motivation, participation and productivity which may affect organizations adversely and hence lead to poor performance.

There are some stereotypes attributed to older workers which may negatively affect organizations. Aged workers are stereotyped as lesser motivated as compared to young workers (Fritzsche, DeRouin and Salas, 2009) and lesser ambitious. As a consequence, they are viewed to exert lesser effort on their job (Rabl, 2010). Least concerned about achievement (Wong, Gardiner, Lang and Coulon, 2008), the aging workers lack interest for training and activities designed to elevate career development of professionals (Greller, 2006; Maurer, Barbeite, Weiss and Lippstreu, 2008). Due to their lack of willingness, the authorities recommend younger workers for additional trainings (Rosen and Jerdee, 1976).

Inflexibility in attitude is another factor that comes with aging. Avolio and Barrett (1987), Morris and Venkatesh (2000), Smith (1997) and Warr (1993) find that older workers are lesser likely to change to situational requirements. These studies also argue against older workers in terms of their adaptability to technological changes. The older workers also find it difficult to learn computer skills which come rather easier to younger workers and the former are also perceived to be less assiduous to learn modern day technology (DeArmond, Tye, Chen, Krauss, Rogers and Sintek, 2006). Given their lack of elasticity to be adaptable, they are discriminated if and when the opportunities to career development arise.

Interpersonal relationship is assumed as one of skills where older workers are found struggling to keep at par with younger workers. Pinquart and Sorensen (2001) and Victor, Scambler, Bond and Bowling (2002) are studies that find older workers to be lesser trusting. Owing to this lack of trust, they stay lonely. Furthermore, the older workers are perceived to be lacking effective

communication skills while interacting with young workers (Chen and King, 2002; Radvansky, Copeland and von Hippel, 2010). Along these lines, the older workers are perceived to be self-centered, prejudiced, snobbish, demanding, and annoying (Hummert, 1990).

Health is also one of major concerns as people age older. Chiu, Chan, Snape and Redman (2001) and Kite, Deaux and Miele (1991) find aged workers more affected with health related issues as compared to younger people.

Keeping work-family balance is becoming more challenging in this modern era. There is an opportunity cost of dedicating more time to family. Gordon, Whelan-Berry and Hamilton (2007) find that time and energies of older workers are dedicated more towards family and societal activities in comparison to work. Ng & Feldman (2007) find older people to be more involved in leisure pursuits, travel and extended family matters.

Given older worker's lack of motivation, participation, attitude flexibility, interpersonal skills, health problems and more dedication towards leisure and entertainment activities, the aging human resource adversely affects work and organizations.

Along different lines, there are arguments proposed in favor of aging population and their impact on organizational performance. In this regard, the most popular argument presented is the experience of the Horndal steel plant in central Sweden (Erik Lundberg is the first economist who discussed the experience of Horndal steel plant). In 1930, almost one-third of total work force in Horndal steel plant were aging over 50 years which rose to more than half in 1950. Despite an aging work force, plant experienced 2.5% mean annual growth rate in productivity of total workers without any major investment (Genberg, 1992).

Applying plant-level fixed effects on a panel of employer-employee matched data covering 1985-1996, Malmberg, Lindh and Halvarsson (2008) find substantial support for the argument that aging workers lead to higher productivity.

There are others channels through which aging may enhance worker's productivity. A study conducted by Garibaldi, Oliveira Martins and van Ours (2010) establishes older workers to be more reliable and better skilled in contrast to young workers. They further argue in favor of aged workers that they are more consistent, cautious, and conscientious. In addition to this, older

workers are less likely to quit and switch to other job which reduces the firm's cost of hiring a worker again.

Using plant level Norwegian data from 1986 to 1993, Haegeland and Klette (1999) finds older workers to be more experienced than younger ones. Owing to their learning throughout a prolonged career and higher salary, they are found to be more productive.

Data

This section presents discussion on data set collected to analyze the effect of changes in demographic structure of population on human resources rating. The annual panel data set consists of 195 countries from 1990 to 2019.

We collect data for human resources rating, measured by CPIA (Country Policy and Institutional Assessment) building human resources rating, from World Development Indicators (WDI) database. According to World Bank group, "building human resources assesses the national policies and public and private sector service delivery that affect the access to and quality of health and education services, including prevention and treatment of HIV/AIDS, tuberculosis, and malaria". Countries are rated on a scale of 1 (indicating low CPIA building human resources rating) to 6 (indicating high CPIA building human resources rating). According to summary statistics reported in Table 2, the mean value for CPIA human resources rating is 3.54 whereas .59 is its standard deviation. From these values, it can be inferred that the countries included in the sample enjoy moderate human resources rating on average and there is not considerable dispersion of human resources development across the sample.

Table 2
Summary Statistics

	Obs	Mean	St: Dev	Minimum	Maximum
HR	969	3.545408	.5961326	1	4.5
Aged Pop	5268	11.44199	7.268339	.7957366	46.17086
GDPpc	5062	9.067063	1.225572	6.083686	11.81273
Trade	4858	85.923	51.99566	.0209992	442.62
Sec Sch Enr	4254	100.374	17.13345	20.88291	165.6454
Investment	4914	6.545595	40.80492	-58.32288	1282.633
Inflation	4537	28.68631	407.1052	-18.10863	23773.13
democracy	4456	3.324731	6.50099	-10	10
Direct Taxes	2822	23.64257	13.14431	-1.34838	68.98722

Notes: Table 2 presents Summary Statistics of HR (CPIA Human Resources Rating), Aged Pop (Aged Population), GDPpc (GDP per capita), Trade (share of GDP), Sec Sch Enr (Secondary School Enrolment Rate), Investment (Foreign Direct Investment), Inflation, Democracy and Direct Taxes (Taxes on Income, Profit and Capital Gains).

Another variable of interest is the ratio of aged population (65 years or over) against total labor force. The argument that the societies are aging older can be verified through mean value of the ratio of aged population (65 years or over) against total labor force which is 11.44 across the sample. However, its standard deviation, 7.26, may imply that the aged population is composing higher share of population in some countries in contrast to others.

For purposes of empirical analysis, it is important to add control variables. GDP growth per capita following Ranis, Stewart and Ramirez (2000), Trade (ratio of exports and imports to GDP) following Kayode (2012), secondary school enrolment rate following Rao (1966), foreign direct investment following Waring and Lewer (2004), inflation rate following Pecorino (1995), level of democracy following Amante (1993) and direct taxes following Trostel (1993) are included as control variables.

Empirical Analysis

This section empirically investigates the non-linear association between aging population and human resources rating. Assessing non-linearity between aged population and human resources rating is important given the literature cited above that aging of workers affects human resources rating both positively and negatively. Econometric specifications include Ordinary Least Squares (OLS) and OLS applying time fixed effects for an international panel data set.

Table 3 assesses nonlinearity between aged people and human resources rating. The coefficient estimates (linear and quadratic) of column 1 suggest an inverted U-shaped relationship between aged people and human resources development. Initially an increase in the proportion of aging population leads to improvement in the development of human resources (Genberg, 1992; Malmberg, Lindh and Halvarsson, 2008; Garibaldi, Oliveira Martins and van Ours, 2010; Haegeland and Klette, 1999). However, after achieving a certain threshold, any further rise in the share of aged population is found to affect negatively the development of human resources

(Fritzsche, DeRouin and Salas, 2009; Rabl, 2010; Wong, Gardiner, Lang and Coulon, 2008; Greller, 2006; Maurer, Barbeite, Weiss and Lippstreu, 2008; Rosen and Jerdee, 1976; Avolio and Barrett, 1987; Morris and Venkatesh, 2000; Smith, 1997; and Warr, 1993; DeArmond, Tye, Chen, Krauss, Rogers and Sintek, 2006; Pinquart and Sorensen, 2001; Victor, Scambler, Bond and Bowling; 2002; Chen and King, 2002; Radvansky, Copeland and von Hippel, 2010; Hummert, 1990; Chiu, Chan, Snape and Redman, 2001; Kite, Deaux and Miele, 1991; Gordon, Whelan-Berry and Hamilton, 2007; Ng & Feldman, 2007). The possible rationale for an inverted U-shaped association between aging population and human resources follows: the government can easily and effectively manage and enhance human resources through providing them quality education, quality medication and trainings as the resources required for improving standards of human resources would be manageable if the society is not aging. In addition to this, the diversity of aging and younger workers contributes positively to organizations. Aged workers are more experienced and they transfer their learning and knowledge to younger workers. This trickle down of knowledge from aged workers to younger workers enhances aggregate productivity of organizations as long as the share of aged workers does not attain a certain threshold. However, a larger share of ageing workers exerts a considerable pressure on finances allocated for improving human resources through better health, education and research and development provisioning. In Sweden, for example, the health expenditures due to aging population are estimated to rise by 13% from 1970 to 1985 (Gerdtham, 1993). According to OECD's projections, almost 50% of the rise in total public expenditures is forecast to be attributable to aging population from 2000 to 2050. As a consequence, human resources rating declines because of limited resources spent for upgrading human resources. Apart from budgetary issues, a rise in the proportion of aging workers also implies a substantial loss of experience and set of skills the organization accumulated over the period of time. This may negatively affect organization and its human resources.

Throughout Table 3, an inverted U-shaped relationship between human resources and aging population firmly holds even when control variables, GDP growth per capita, trade, secondary school enrolment rate, investment, inflation rate, level of democracy and direct taxes, are added from column 2 to column 8 respectively. With respect to controls, we discuss column 8 only as it contains all control variables. A rise in GDP growth per capita, human capital and extent of

democracy leads to improve human resources rating whereas higher economic trade results in worsening of human resources rating.

Table 3
Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	HR	HR	HR	HR	HR	HR	HR	HR
Aged Pop	0.1534***	0.1093***	0.0930***	0.0896***	0.0893***	0.1249***	0.1162***	0.1754***
	(0.0254)	(0.0272)	(0.0269)	(0.0270)	(0.0270)	(0.0339)	(0.0392)	(0.0543)
AgedPopSq	-0.004***	-0.003***	-0.003**	-0.002**	-0.002**	-0.004***	-0.004**	-0.008***
	(0.0011)	(0.0012)	(0.0011)	(0.0012)	(0.0012)	(0.0017)	(0.0019)	(0.0026)
GDPpc		0.1446***	0.2183***	0.1730***	0.1794***	0.1934***	0.1616***	0.2599***
		(0.0322)	(0.0337)	(0.0336)	(0.0341)	(0.0366)	(0.0390)	(0.0580)
Trade			-0.002***	-0.002***	-0.002***	-0.003***	-0.003***	-0.006***
			(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0010)
Sec Sch Enr				0.0075***	0.0077***	0.0077***	0.0073***	0.0042***
				(0.0010)	(0.0011)	(0.0011)	(0.0011)	(0.0015)
Investment					0.0009	0.0007	0.0005	0.0029
					(0.0007)	(0.0007)	(0.0007)	(0.0038)
Inflation						-0.0049	-0.0021	0.0023
						(0.0032)	(0.0035)	(0.0050)
democracy							0.0094**	0.0234***
							(0.0041)	(0.0066)
Direct Taxes								-0.010***
								(0.0032)
Observations	938	921	871	708	706	644	571	290
R^2	0.099	0.119	0.138	0.203	0.202	0.201	0.178	0.319
F	51.3165	41.2621	34.6118	35.7837	29.5057	22.8265	15.2174	14.5568
Countries	195	195	195	195	195	195	195	195

Notes: Table 3 contains results using OLS regression of how changes in aged population affect CPIA Human Resources Rating (dependent variable denoted as HR). GDPpc (GDP per capita), Trade (share of GDP), Sec Sch Enr (Secondary School Enrolment Rate), Investment (Foreign Direct Investment), Inflation, Democracy and Direct Taxes (Taxes on Income, Profit and Capital Gains) are included as control variables. Robust standard errors are shown in parenthesis. *, **, *** denote statistical significance respectively at 10%, 5% and 1% level.

Table 4 reproduces Table 3 controlling for the time fixed effects. It's important to control for time invariant factors to derive reliable results. The coefficient estimates confirm an inverted U-shaped non-linearity between aging population and human resources rating.

The sample is decomposed into strong VS weak levels of democracy as well as high VS low income countries. First 4 columns of Table 5 estimate how changes in aging population affect human resources rating including all control variables. Again an inverted U-shaped association is established between aging population and human resources rating across strong VS weak levels of democracy as well as high VS low income countries.

Table 4
Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	HR	HR	HR	HR	HR	HR	HR	HR
Aged Pop	0.157***	0.1226***	0.1063***	0.1049***	0.1043***	0.1423***	0.1403***	0.212***
	(0.0250)	(0.0268)	(0.0264)	(0.0265)	(0.0266)	(0.0333)	(0.0388)	(0.0551)
AgedPopSq	-0.004***	-0.003***	-0.0031***	-0.0026**	-0.0026**	-0.0050***	-0.0049**	-0.009***
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0016)	(0.0019)	(0.0027)
GDPpc		0.1149***	0.1857***	0.1431***	0.1488***	0.1647***	0.1379***	0.244***
		(0.0321)	(0.0333)	(0.0333)	(0.0339)	(0.0362)	(0.0388)	(0.0588)
Trade			-0.0021***	-0.0022***	-0.0023***	-0.0027***	-0.0027***	-0.006***
			(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0010)
Sec Sch Enr				0.0069***	0.0071***	0.0071***	0.0066***	0.0035**
				(0.0010)	(0.0010)	(0.0011)	(0.0011)	(0.0016)
Investment					0.0006	0.0005	0.0003	0.0052
					(0.0007)	(0.0007)	(0.0007)	(0.0039)
Inflation						-0.0009	0.0032	0.0075
						(0.0034)	(0.0038)	(0.0055)
democracy							0.0066	0.020***
							(0.0041)	(0.0066)
Direct Taxes								-0.010***
								(0.0033)
Observation	938	921	871	708	706	644	571	290
R^2	0.142	0.157	0.187	0.250	0.248	0.254	0.224	0.357
F	10.1955	10.5337	11.5231	12.7679	11.9240	10.5857	7.5330	6.7299
Countries	195	195	195	195	195	195	195	195
Time Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table 4 replicates Table 3 applying Time Fixed Effects.

However, the coefficient estimates of weakly democratic and low income countries are statistically significant. We further replicate these 4 columns controlling for time fixed effects. From column 5 to column 7 (results for high income countries are not shown as the number of observations were too low to derive coefficient estimates). The findings again confirm an inverted U-shaped association.

As we have discussed non-linearity between aging population and human resources, it's important to investigate and calculate the threshold point. For this we apply threshold model. This model is used to determine a value that distinguishes the behavior predicted by the model.

Table 5
Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	HR	HR	HR	HR	HR	HR	HR
	Strong Democracy	Weak Democracy	High Income	Low Income	Strong Democracy	Weak Democracy	Low Income
Aged Pop	0.0100	0.3363***	0.0928	0.1640***	0.0152	0.4074***	0.1938***
	(0.0762)	(0.0822)	(0.3493)	(0.0581)	(0.0893)	(0.0791)	(0.0587)
AgedPopSq	-0.0008	-0.0141***	-0.0013	-0.0076***	-0.0010	-0.0163***	-0.0089***
	(0.0040)	(0.0037)	(0.0165)	(0.0027)	(0.0048)	(0.0035)	(0.0028)
GDPpc	-0.0380	0.1631*	-0.7227	0.3129***	-0.0383	0.0972	0.3139***
	(0.0891)	(0.0959)	(0.9141)	(0.0724)	(0.1027)	(0.0949)	(0.0730)
Trade	-0.0036***	-0.0041***	-0.0020	-0.0062***	-0.0038***	-0.0029*	-0.0062***
	(0.0013)	(0.0016)	(0.0034)	(0.0011)	(0.0014)	(0.0015)	(0.0011)
Sec Sch Enr	-0.0076***	0.0063***	-0.0172	0.0047***	-0.0073**	0.0040**	0.0040**
	(0.0027)	(0.0019)	(0.0102)	(0.0016)	(0.0028)	(0.0019)	(0.0016)
Investment	0.0101**	-0.0062	0.0032	0.0024	0.0100*	-0.0048	0.0045
	(0.0046)	(0.0053)	(0.0017)	(0.0043)	(0.0051)	(0.0052)	(0.0045)
Inflation	-0.0018	-0.0019	0.0017	0.0037	-0.0028	0.0101	0.0092
	(0.0070)	(0.0065)	(0.0081)	(0.0051)	(0.0092)	(0.0068)	(0.0057)
democracy	0.1599***	0.0106	0.0091	0.0231***	0.1579***	-0.0023	0.0211***
	(0.0379)	(0.0106)	(0.0327)	(0.0073)	(0.0408)	(0.0104)	(0.0074)
Direct Taxes	-0.0038	-0.0066	-0.0291*	-0.0107***	-0.0042	-0.0104*	-0.0115***
	(0.0034)	(0.0056)	(0.0118)	(0.0036)	(0.0039)	(0.0054)	(0.0037)
Observations	116	174	15	275	116	174	275
R^2	0.393	0.416	0.992	0.306	0.408	0.526	0.346
F	7.6334	12.9622	70.1712	12.9853	2.9086	7.6025	6.0609
Time Fixed					Yes	Yes	Yes

Notes: Column 1-4 of Table 5 replicate column 8 of Table 3 decomposing the sample into strong and weak democracies and high- and low-income countries. Column 5-7 of Table 5 replicate column 8 of Table 4 disaggregating sample across strong and weak democratic countries and high (the estimated values for high countries are not shown as observations were too low to produce coefficient estimates) and low income countries.

Table 6 contains specifications results applying the threshold model for 25 percentile value which is 6.04. A positive association between aging population and human resources rating is found to change into negative when aging people constitute 6.04% of labor force (column 1 without time fixed effects). For time fixed effects (column 2) and decomposed samples for strong VS weak democracies and high VS low income countries (column 3-5 without time fixed effects & column 6-8 with time fixed effects), the results are confirmed that a growing human resources rating with aging worsens when the ratio of aged population to labor force is at least 6.04 or over.

Table 6
Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	HR	HR	HR	HR	HR	HR	HR	HR
			Strong Democracy	Weak Democracy	Low Income	Strong Democracy	Weak Democracy	Low Income
Aged Pop	0.3480***	0.3614***	0.4721***	0.4439**	0.3515***	0.7333***	0.4214**	0.3688***
	(0.1194)	(0.1238)	(0.1333)	(0.1683)	(0.1284)	(0.1755)	(0.1909)	(0.1334)
AgedPopSq	-0.015***	-0.015***	-0.026***	-0.0176**	-0.015***	-0.040***	-0.016**	-0.016***
	(0.0051)	(0.0053)	(0.0065)	(0.0066)	(0.0055)	(0.0087)	(0.0075)	(0.0057)
GDPpc	0.0437	0.0446	-0.1396*	-0.1431	0.1558	-0.1108	-0.0769	0.1636
	(0.0902)	(0.0943)	(0.0722)	(0.1340)	(0.1125)	(0.0703)	(0.1608)	(0.1179)
Trade	-0.004***	-0.004***	-0.002**	0.005**	-0.003***	-0.0013	0.0044*	-0.004***
	(0.0012)	(0.0013)	(0.0012)	(0.0021)	(0.0013)	(0.0012)	(0.0025)	(0.0014)
Sec Sch Enr	-0.0017	-0.0022	-0.026***	0.0043	0.0006	-0.033***	0.0053	0.0001
	(0.0031)	(0.0032)	(0.0037)	(0.0035)	(0.0032)	(0.0040)	(0.0041)	(0.0034)
Investment	-0.0030	-0.0021	0.0179**	-0.022***	-0.0021	0.0056	-0.020***	-0.0013
	(0.0048)	(0.0051)	(0.0086)	(0.0041)	(0.0050)	(0.0094)	(0.0047)	(0.0054)
Inflation	-0.0155*	-0.0147	-0.0018	0.0022	-0.0103	0.0021	0.0062	-0.0094
	(0.0080)	(0.0095)	(0.0068)	(0.0076)	(0.0087)	(0.0087)	(0.0099)	(0.0103)
democracy	-0.0085	-0.0084	0.2220***	-0.0231*	-0.0187	0.2528***	-0.0229*	-0.0181
	(0.0100)	(0.0103)	(0.0341)	(0.0116)	(0.0116)	(0.0347)	(0.0126)	(0.0120)
Direct Taxes	-0.0045	-0.0045	-0.008***	0.0335***	-0.0040	-0.009***	0.0328***	-0.0040
	(0.0047)	(0.0049)	(0.0032)	(0.0084)	(0.0049)	(0.0033)	(0.0109)	(0.0052)
Observation	145	145	77	68	135	77	68	135
R^2	0.239	0.281	0.814	0.621	0.217	0.869	0.665	0.256
F	4.7167	2.1659	32.5528	10.5714	3.8389	16.3379	4.3568	1.7519
Time Fixed		Yes				Yes	Yes	Yes
Threshold	>=6.04	>=6.04	>=6.04	>=6.04	>=6.04	>=6.04	>=6.04	>=6.04

Notes: Column 1 replicates column 8 of Table 3 applying the threshold model. Threshold point is achieved when aged population constitutes at least 6.04 or greater proportion of labor force. Column 2 extends column 1 applying time fixed effects. Column 3-5 replicate column 1 decomposing the sample into strong and weak democracies along with drawing comparisons between high and low income countries (the estimated values for high countries are not shown as observations were too low to produce coefficient estimates). Column 6-8 extend column 3-5 applying time fixed effects (the estimated values for high countries are not shown as observations were too low to produce coefficient estimates).

Social Implications of Aging Society

Changes in demographic structure may potentially change social dynamics at large. The empathy factor within families due to a rising share of the elderly may be adversely affected and affect intra and intergenerational social contract as a consequence. Historically the societies formed the

social contract of inter-generational reciprocity both directly and indirectly. Based on directly formed informal social contract within families, the current working class is expected to finance the expenditures incurred by dependent youth. In return, when the youthful dependents attain legal adulthood and hence economic independence, they are morally burdened with the liability of providing for the current elderly. In societies, this inter-generational contract is also enforced through taxing the current labor and redistributing to the elderly.

Analyzing through different lens, the aging population may potentially affect roles within family structure. Owing to longevity the duration of kinship roles, such as spouse, siblings and parent of non-dependent children, has increased. On the contrary, a fall in fertility rates is found to diminish other familial roles such as the parent of dependent youth (Harper, 2006; Bengston. 2001). Furthermore, the aging is found to cause delays in life transitions (Harper, 2006). In aging societies the parenthood and grant parenthood are delayed. Along these lines, the status of legal adulthood and the interval of economic, financial, moral and social dependence on parents lengthen.

Economic Implications of Aging Society

There are several concerns emerging as societies are aging older. An analysis of Table 7 provides us with some meaningful and relatable insights. Once an individual attains 50 years of age or beyond, his/her consumption per capita increases whereas labor income falls. Net government transfers are found to rise as an individual ages older. Higher consumption, lower income earnings and higher net government transfers imply a rising burden on public expenditures required for social security provisioning for the elderly.

A rising proportion of aged population among the total population may adversely affect economic growth. Maestas, Mullen and Powell (2016) find the GDP growth per capita to decline by 5.5% with a 10% rise in the proportion of people aged 60 years or over.

Direct Taxation is another dimension which may be influenced through aging population. Razin, Sadka and Swagel (2002) find labor income tax rate to decline once the aged people form at least the majority of population. A higher proportion of elderly means less contribution to revenue through taxation and higher demand for the provision of social securities. On the contrary, it is

politically undesirable to tax the already contracting pool of working labor as higher taxes may create disincentive to work.

Table 7
Average Consumption, Labor Income and Net Government Transfers by Age, 2003

Age Group	Consumption ($)	Labor Income ($)	Net Government Transfers ($)
0-4	13821	0	4998
5-9	22785	0	11971
10-14	26810	0	12201
15-19	29140	2142	9713
20-24	27200	14984	2842
25-29	27001	30754	-3294
30-34	30205	40388	-7063
35-39	31063	46302	-9887
40-44	31750	49875	-10827
45-49	33895	51898	-12012
50-54	36559	51136	-12340
55-59	39694	45256	-10628
60-64	41455	30251	-3331
65-69	41447	14837	8203
70-74	42558	7466	11409
75-79	42276	3807	13775
80-84	42496	2046	16588
85-89	46407	1215	23391

Source: Data provided by Gretchen Donehower based on Ronald Lee, Donehower, and Tim Miller (2011)

Conclusion

How changes in demographic structure affect human resources rating is empirically investigated in this paper collecting annual panel data which consists of 195 countries from 1990 to 2019. The findings reveal an inverted U-shaped relationship between aging and human resources rating. Based on findings, it is recommended that the governments should focus on privatization of social security. This may not only provide governments with fiscal liberty and lesser pressure on public exchequer but also higher rate of returns to individuals. Moore (1997) favors privatization of social securities of the elderly as it may provide them with the higher financial return as compared to the system categorized as Pay As You Go.

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