The impact of the demographic transition on poverty reduction in Central Asia

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Central Asian countries are experiencing a demographic transition due to the shrinking fertility and mortality rates and are at the stage of getting benefits from the demographic tailwinds with an increased working-age population share. This potential may convert the transition into economic growth and poverty reduction. Although all countries' economies grow, poverty reduction stagnated. The main question is whether this stagnation is due to an increase in the working-age population and whether the region can utilize this benefit to reduce poverty through accumulating human recourses. This paper analyzes the main channels that impact demographic change with the human capital in the socio-economic situation and the poverty rate of Central Asian countries by using cross-section data from the period 2000 to 2019 using the fixed effects method. The results suggest that the share of working-age population, human capital, GDP per capita, and female labor force participation rate will reduce poverty in the region.

Keywords: Demographic dividend, Central Asia, poverty, economic growth, demographic transition

1. Introduction

Over the past five decades, most of the countries of the world have been experiencing a great demographic transition due to the shrinking fertility and mortality rates, which creates negative or positive effects on the economies. Developed countries are facing an aging problem while less developing countries are at a stage of benefiting from the demographic tailwinds with an increased working-age (15–64 years old) population share. The process of an increasing share of the active population offering a window of opportunity alludes to the demographic dividend. The duration of the demographic window is defined when the share of children (aged 0–14) falls below 30% and the population aged 65 and over is still below 15% (United Nations 2004). With the favorable age structure, economic growth can be increased, however, this bonus is only transitory and requires setting various economic preconditions (Mason 2001, 2005, Mason–Lee 2007), such as an investment in human capital and an effective policy framework. Hence, human capital is considered as a trigger of economic growth, demographic change (Lutz et al. 2019), the source of higher income (Lee–Lee 2013, Issa 2005, Arabi and Abdalla 2013), and poverty reduction (Osotimehin and Director 2017). In several studies, it is suggested that human capital investment improves education and the health care system (Lee–Lee, 2013, Duflo et al. 2015, Ashraf et al. 2008).

A change in the age structure of the population without proper human capital investment and policy implications provides socio-economic challenges (Bloom–

Williamson 1998, Pool 2004, Pool et al. 2006, Gomez and deCos 2008, Navaneetham–Dharmalingam 2012). Therefore, understanding demographic challenges should be a priority. One of the main challenges in a condition of increasing labor force following with the lack of job opportunities may cause to increase poverty and inequality in society. The inequality could be observed in a country at a stage of demographic transition while having different economic lifecycle schedules among various age groups (de la Croix–Doepke 2003, DeGraffet et al. 1996; Orbeta, 2006). Hence, for people living under the poverty line, it is difficult to get loans from formal lending centers for investing in their education and health, moreover, parents' illiteracy makes it harder for their children to study in a better environment (Banerjee–Duflo 2007, Khitakhunov 2020). This condition makes it difficult to harness the demographic dividend (Abrigo et al. 2016).

Like several developing countries, the Central Asian region (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) has been experiencing a declining fertility rate over the last several decades from 5.32 in 1960 to 2.75 in 2020 (Worldometers 2021), which follows decreasing mortality and improving longevity. In line with changes in fertility, the age structure has also changed. The share of the working-age population is increasing, while the young population aged 0-14 has decreased. On the other hand, the share of the older generation is slightly growing, more rapidly in Kazakhstan and more slowly in Tajikistan. Despite changes in the population age structure, Central Asian countries continue to be among the demographically young countries with a median age of the population at 27.6 years in 2020 (Worldometers 2021).

Despite having a similar demographic background of economic growth, these countries differ from each other in the level of socio-economic development. Especially after the break-up of the Soviet Union in 1991, the Central Asian countries chose quite different economic development paths, as a result of which their degree of success now varies. Kazakhstan has the largest area and the least population density, accounting for approximately 51% of the total regional GDP, most of which the country receives from oil. Uzbekistan has the largest population, accounting for 45% of the total population of the region. Kyrgyzstan and Turkmenistan have almost the same population size. But Turkmenistan is a desert country with large energy reserves, especially natural gas, which accounts for 16% of regional GDP. And Kyrgyzstan is a small mountainous country with few natural resources, except water, hydropower, and some gold, which account for 5% of regional GDP. Tajikistan is similar to Kyrgyzstan in terms of resources and size, but even poorer and more isolated (Aytmagambetova 2009).

As a result of variable economic development in the region, income inequality and the poverty gap have increased in Central Asia, especially after the collapse of the Soviet Union and when starting to transform from a centrally planned to a market-oriented economy (Heller and Keller 2001, Bandara et al. 2004, Jha and Dang, 2009). It is noteworthy to mention that a decade ago one-third of the population was living in absolute poverty, and a noticeable rate of extreme poverty still exists (Hayes 2014). Although due to rapid economic growth the majority of the population was lifted out of poverty in Central Asia, however, some of the region's countries are still struggling to catch up (Seitz 2019, Khitakhunov 2020). Of the Central Asian countries, only Kazakhstan has achieved a large reduction in poverty after independence, and its

extreme poverty rate is almost zero, however, the country is vulnerable to economic shocks as it depends on commodity prices and international organizations' loans that could contribute to poverty reduction.

The region's countries are not just blessed with natural resources but also have a favored population age structure in which the working-age population is increasing continuously. However, this process may worsen the structural weakness of some counties, mainly Kyrgyzstan and Tajikistan, where the unemployment rate is high following the highest level of poverty. This will give a rise to new waves of migration, and largely unskilled migrants could accompany a destabilized job market and create social tensions (Jha–Dang 2009). Ultimately, in this paper I am interested in whether the poverty in the region may increase or decrease in the case of changing in age structure. This implies that more research is needed to estimate the effect of the demographic transition on economic growth and poverty reduction focusing on Central Asia, as human poverty remains a major issue of developing countries.

The objective of this paper is to analyze the link between poverty and change in the age structure with human capital development along with other indicators in all Central Asian post-communist countries. And through analyses, it intends to investigate the challenges and identify the demographic window of opportunity and adapt these to provide the direction of policy implications for capitalizing on the demographic dividend and reduce poverty.

The research addresses the following empirical research question:

- What is the relationship between poverty, demographic transition, and other human development indicators in the case of post-communist Central Asian countries?

By addressing the research question my analysis is performed with the fixed effect (FE) method for analyzing the link between poverty and demographic, socio-economic indicators in the period of 2000 to 2019. This method allows to get precise unbiased estimates (Collischon–Eberl, 2020). To my knowledge, the FE method has not been used for analyzing the relationship of poverty, demographic transition, and human development dimensions regarding the Central-Asian countries. In the light of poverty measurement, this paper uses instruments that directly and indirectly affect the education standards, demographic variables, and living standards of the people.

The paper is organized as follows. Section 2 provides a brief literature review, followed by an outline of the economic and demographic condition of the Central Asian countries in section 3. Section 4 explains the methodology and data source. The empirical results are discussed in section 5. The final section presents the conclusion and recommendations for policy implication.

2. Literature review

Demographic transition consists of three stages based on the level of fertility and mortality rates. The initial stage begins with high fertility and mortality rates, while the second stage follows with high fertility but low mortality, and the last one with low fertility and mortality rates. These changes can affect economic growth through an

inverted U-shaped relationship known as a demographic U-hypothesis. The initial two stages may contribute positively to economic growth as labor supply and savings increase continuously in a so-called window of opportunity, however, the last stage leads to an aging society through less labor supply and decreasing savings rate (Mehmood et al. 2012). In some sources the relation between fertility and economic growth subsumes an algebraic relationship of a quadratic function, which means that initially the effect of fertility reduction encourages economic growth, but later it reduces it (Cai 2010). So far, most studies have focused on the effect of demographic change on economic growth (Bloom–Canning 2003, Bloom et al. 2000, Bloom et al. 2003, Bloom–Freeman 1988, Bloom–Williamson 1998, Brander and Dowrick 1994, Kelley–Schmidt 1995), known as a demographic dividend, which is characterized as a first and second demographic dividend (Lee–Mason 2006).

The first demographic dividend is a transitory bonus and occurs directly as the result of the increasing working-age population such that effective producers rise more than the effective consumers (Abio et al. 2017). The second demographic dividend converts this bonus into economic growth through effective demographic and economic policies. This period will occur while increasing the savings of the population, investing in human capital, and capital per worker continues to be at a higher level (Abio et al. 2017, Baerlocher et al. 2019) in the long run. Undoubtedly, maximizing human capital enlarges the productivity assets of nations (Young 2019), and enables the labor force to be flexible and innovative (World Bank 2018, Cummins 2019). Later on, if the second demographic dividend is not managed efficiently, and the number of the working-age population starts to decrease, the aging problem occurs in the country and the economic gains will be diminished (Lee–Mason 2009).

In addition to the positive effect of the demographic transition on economic growth, there is evidence that this process will impact inequality and poverty, although the studies about it are relatively smaller scale (Ahmed et al. 2014, Mason–Lee 2004, Ahmed et al. 2016). There are mechanisms by which the demographic transition will lead to poverty alleviation. The initial process suggests that there is a direct link between shaping poverty attribution and macroeconomic indicators (Burgoyne et al. 1999, Gallie and Paugam 2002), especially the demographic dividend will boost economic growth and reduce poverty (Dollar et al. 2015, Dollar–Kraay 2002, Kua–Piyachart 2016). However, as a result of the reduction of non-earning members, the consumption per capita of the household decrease and will cause a lower poverty rate (Cruz–Ahmed 2018). The next steps are related to the second demographic dividend, that demographic transition in a dimension of education reduces poverty especially, in a condition of lower fertility rate families invest more on children's education (Kua–Piyachart 2016) and when females become more educated and start having fewer children, they will be active in a job market (Bloom et al. 2009, Klepinger et al. 1999), which leads to an increase in income-earners in the household and in the living standards. Moreover, increasing the number of workers will contribute more to the economy, and the government will devote additional recourse to low-income families (Cruz–Ahmed 2018). Similarly, as an investment in human capital for the upcoming young generation increases, their lifetime earning potential will rise subsequently (Rosenzweig–Schultz 1987, Schultz, 2007), in which especially education plays a significant role (Ahmed et al. 2016). It is noteworthy to mention that in a condition of the demographic shift, economic growth

and poverty reduction are policy depended. Efforts need to be made in the development of health care and education (Falkingham 2005).

In contrast, the higher vulnerability to poverty will appear in a condition of the larger dependency ratio (Jha–Dang 2009), as there is a positive relationship between poverty and household size (Merrick 2002). Barros et al. (2015) estimated that demographic change brought an additional 0.4–0.5% in annual growth in per capita income, followed by a reduction of poverty in Brazil. In addition, poverty decreased from 61 percent to 7.2 percent between 1990 and 2012 in East Asia, associated with a sharp fall in the child dependency ratio (World Bank 2020).

From a regional perspective, evidence from Central Asia demonstrates that these countries are still challenged by poverty (Jha and Dang 2009). During Soviet times income inequality was limited with the help of a high level of social expenditure and low wage differentials (Atkinson and Micklewright 1992). However, after the collapse of the Soviet Union and transition from centrally planned to market economies poverty increased and changed its nature (Alam et al. 2005, Klugman et al. 2002, Milanovic–Ersado 2012, Habibov 2011, Habibov–Fan 2007, Klugman 1997) showing that in the Soviet era only selected categories like single mothers, disabled and old-age pensioners were vulnerable to poverty, which changed after independence in post-communist countries (Habibov et al. 2017). Moreover, throughout Central Asia, a higher poverty rate is observed in the more densely populated areas of the region's countries (Seitz 2019).

Several researchers have studied poverty, its factors, and its vulnerability in the context of Central Asia. Seitz (2019) found out that labor migrants contribute significantly to the poorest areas through remittances and investment, according to their survey, about 19 percent of families have at least one migrant abroad in Central Asia. Another channel for reducing the poverty was analyzed by Falkingham (2004), mentioning that priority should be given to the youth education system and provide the labor market with the required skills. Moreover, effective governance, especially strengthening the public administration system and involving the community in the decision-making process provide guarantees to improve the material and capability aspects of poverty (Falkingham 2005). Besides, an increase in GDP significantly reduces the structural attribution of poverty in Central Asia (Habibov et al. 2017). In essence, previous studies have focused on poverty on the individual and country level, its factors, and influence direction within Central Asia. The literature review demonstrated that no previous studies have emphasized the effect of change on age structure in poverty, estimating it through empirical analyses. Examining this effect allows us to set the right policy in a condition of increasing the working-age population.

3. Economic development, demographic transition and poverty in Central Asia

Central Asia is a very heterogeneous region in terms of socio-economic processes. It is rapidly fragmenting in terms of living standards, rates of economic growth, quality of social services, and access to infrastructure. Especially, the gap in the development of the Central Asian countries at the present stage is increasing from year to year. Moreover, the urbanization of the countries so extremely unbalanced that in Kazakhstan a significant part of the population is city residents, while Kyrgyzstan and Tajikistan rural communities dominate (see Table 1).
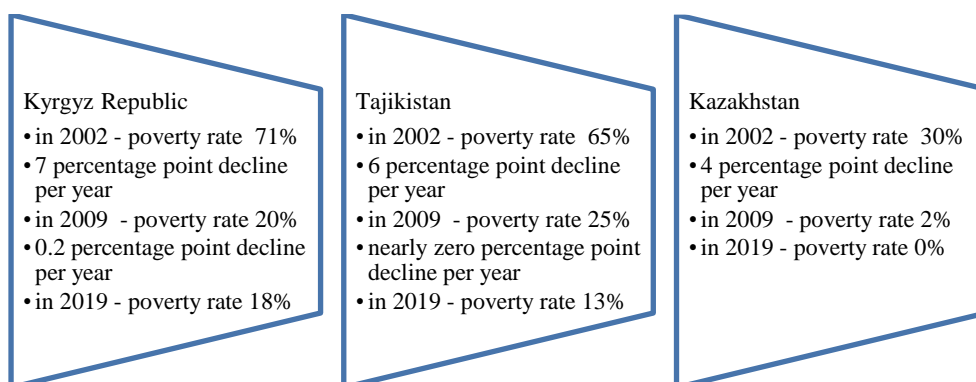
Table 1 Social-economic development indicators of Central Asian countries

Countries	1995	2000	2005	2010	2015	2018
GDP per capita (constant 2010 US$)						
Kazakhstan	3,738.469	4,491.592	7,227.983	9,070.488	10,617.47	11,165.54
Kyrgyzstan	534.9587	654.312	747.5656	880.0378	1,021.161	1,090.868
Tajikistan	447.1117	415.4645	603.2518	749.5527	935.9998	1,073.022
Turkmenistan	2,054.282	2,381.175	2,899.957	4,439.2	6,693.932	7,647.936
Uzbekistan	876.4232	979.012	1,196.422	1,634.312	2,138.567	2,373.538
Urban population (% of total population)						
Kazakhstan	55.921	56.098	56.463	56.827	57.191	57.428
Kyrgyzstan	36.349	35.298	35.29	35.306	35.777	36.351
Tajikistan	28.877	26.501	26.51	26.52	26.742	27.134
Turkmenistan	44.794	45.913	47.052	48.491	50.317	51.593
Uzbekistan	43.731	46.126	48.537	50.956	50.75	50.478

Source: World development indicators, 2020

The nature of poverty is also varied within the region. According to the data of the World Bank, the poverty rate in the region continues to decline overall, however, the pace of poverty reduction is slowing. Especially, a high level of poverty remains in remote and rural areas due to lack of employment opportunities and a close integration with urban growth centers (World Bank, 2020). In remote areas of Tajikistan and the Kyrgyz Republic, the poverty rate is above 40%. Although due to initiated macroeconomic reforms and anti-inflation policies the incidence of poverty decreased, especially in Kazakhstan (Jha and Dang 2009), however, for the rest of Central Asian countries this problem remains (see Figure 1).

Figure 1 Poverty reduction rates in Central Asian countries ($3.2 per day)

Kyrgyz Republic
- in 2002 - poverty rate 71%
- 7 percentage point decline per year
- in 2009 - poverty rate 20%
- 0.2 percentage point decline per year
- in 2019 - poverty rate 18%

Tajikistan
- in 2002 - poverty rate 65%
- 6 percentage point decline per year
- in 2009 - poverty rate 25%
- nearly zero percentage point decline per year
- in 2019 - poverty rate 13%

Kazakhstan
- in 2002 - poverty rate 30%
- 4 percentage point decline per year
- in 2009 - poverty rate 2%
- in 2019 - poverty rate 0%

Source: World Bank, 2020

The poverty reduction rate was significant until 2009, with an average 7 percentage point decline annually from 2002 to 2009, both in the Kyrgyz Republic and Tajikistan. However, after that period the rate of poverty reduction has fallen more slowly. Among Central Asian countries only Kazakhstan could eliminate poverty, which is measured by 3.20$ income per day. Due to the unavailability of lower-middle-income country poverty line data for the rest of Central Asian countries (3.20$ income per day), we try to analyze the poverty situation in these countries relying on the employed persons living in poverty indicator, also known as the working poor. This indicator allows identifying the share of the employed population living in poverty, where despite having a job, their income is not sufficient to ensure the basic living expenses. Surprisingly, the difference between the poverty rate and the working poverty rate is not significant (Gammarano 2019).

According to the poverty rate, the situation in Uzbekistan and Turkmenistan is also not favorable like in other Central Asian countries. The share of extremely poor was 20% in 2019 in Uzbekistan, meaning that despite being employed, one-fifth of all workers lived in extreme poverty. In Turkmenistan, the situation is much better (Table 2).

*Table 2* Share of employment by economic class (%, ILO modeled estimates, 2019)

Country	Extremely poor	Moderately poor	Near poor
Kazakhstan	0	0	4
Kyrgyzstan	0	13	45
Tajikistan	4	12	30
Turkmenistan	8	7	12
Uzbekistan	20	18	26

*Extremely poor: less than $1.90 a day, moderately poor: $1.90 to $3.20 a day, near poor: $3.20-$5.50 a day (using 2011 PPPs)
Source: ILO modeled estimates, ILOSTAT

Poverty in most developing countries is associated with large families and high birth rates. However, the ongoing demographic shift accompanied by changing from large to smaller families provides evidence that poverty may reduce in Central Asia due to the demographic transition that is characterized by a decrease in fertility and an increase in life expectancy. Although an increase in the region's population had been observed over the last half-century, starting from recent years the growth slowed down, and in the middle of 21 century, it is expected to decrease, especially in Uzbekistan. One of the reasons for the population reduction is explained by a decline in the birth rate in all countries of the region since 1992 by at least 25%. The fertility rate is expected to further decline in all countries of the region (see Figure 2), and it is expected that more women will enter the labor market. Currently, the female labor force participation rate is still not at an adequate level, where the highest rate is observed in Kazakstan with 62% and the lowest rate is in Tajikistan with 31% among the region's countries. This situation can be explained through the countries' different fertility rates (World Bank 2020).

Figure 2 Total fertility, Central Asian countries, 1975–2100 (live births per woman)

■ Uzbekistan ■ Kazakhstan ■ Tajikistan ■ Kyrgyzstan ■ Turkmenistan
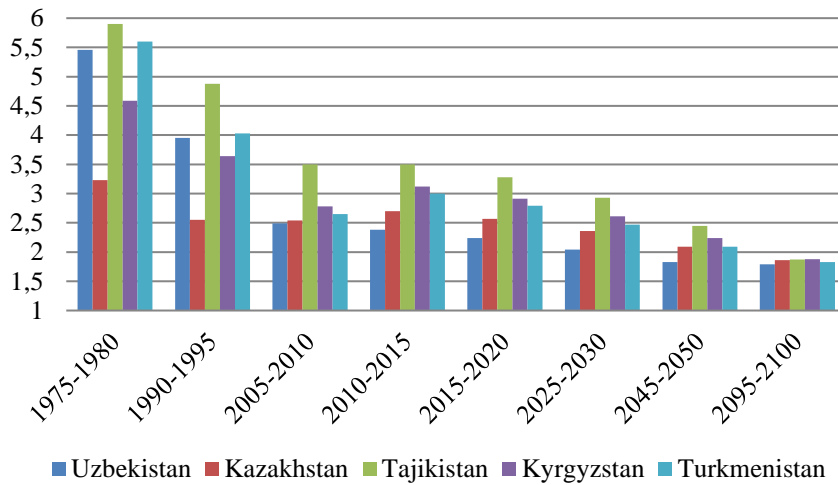
Source: WPP, 2017

However, the region has a very favorable age distribution. About 30% are under the age of 14 and 10% are over the age of 65, while almost 60% are active population (15–64 years old) over the period (see figure 3).

Figure 3 Age distribution of Central Asian countries
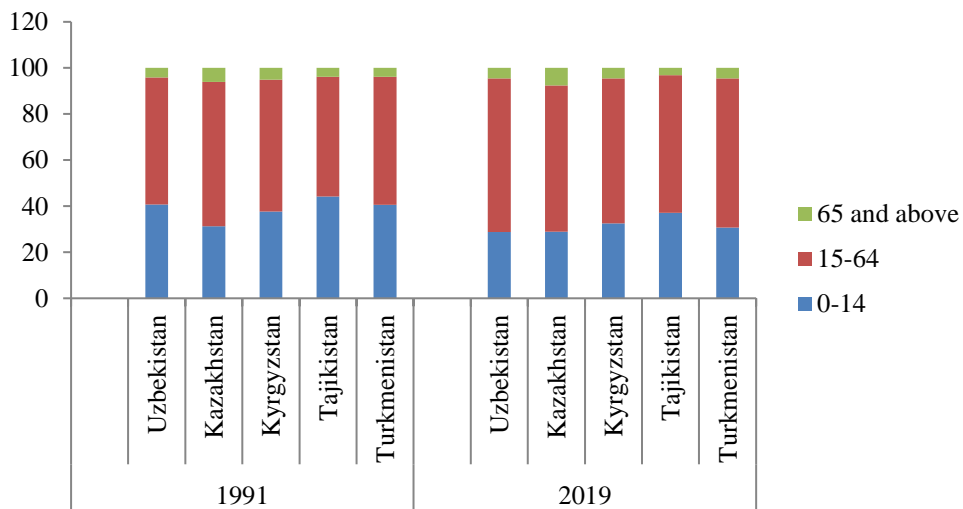
Source: World development indicators, 2020

The demographic transition in the region enables a rise in economic opportunities as well as social and policy challenges, especially a shortage of qualified personnel and low quality of human capital. However, for all countries in the region, the problem of

employment of the population, primarily youth, remains extremely urgent. The demographic shift, with an enormous growth of young people in the labor force, creates heavy pressure on the region's job market. According to the official data, the highest youth unemployment is in Tajikistan at 11.3%, and the lowest is in Turkmenistan at 3.8%. At the same time, the countries of the region are experiencing an acute shortage of qualified specialists, which means that the level and the quality of human capital investment across Central Asia are very unlikely to reap the demographic dividend. One of the main reasons for this contradictory situation is the low level of education and limited access to higher education (see Table 3). Along with this, unemployment among young graduates is observed, which can be explained by the mismatch between skills demanded in the labor market and those offered by the labor force. These countries' educational systems are not producing the necessary skills for the graduates.

Table 3 Changes in education enrolment rates (% of the relevant age group), 1989–2018

	Pre-primary			General secondary (15-18 years)			Tertiary (19-24)		
	1989	2019	% change 1989-2019	1989	2019	% change 1989-2019	1989	2019	% change 1989-2019
Kazakhstan	53.1	62.2	117	32.5	99.8	307	18.1	61.7	340.8
Kyrgyzstan	31.3	38.9	124.2	36.7	85.2	232.1	13.2	42.3	320.4
Tajikistan	16.0	8.4*	52.5	40.4	98.3*	243.3	11.5	31.3*	272.1
Turkmenistan	33.5	n/a	n/a	41.7	89.6	214.8	10.2	14.2	139.2
Uzbekistan	36.8	31.9	86.6	36.3	93.5	257.7	15.0	12.6	84

*2017
Source: UNICEF Transmonee database, Falkingham (2005).

Moreover, the share of the working-age population with higher and secondary vocational education in Central Asia is significantly lower than in European countries. Unfortunately, national systems of vocational education cannot provide the economies of the countries of the region with the necessary number of specialists with a sufficient level of training.

4. Data and methodology

As is discussed above, increasing the share of the working-age population in Central Asian countries may reduce or increase poverty in the region. In order to see the effect of this change on the whole region, I adopt previous researchers' methodologies. Following the empirical exogeneous framework to estimate the effect of demographic transition with human capital and socio-economic indicators on poverty reduction in Central Asian countries, I adopted Cruz and Ahmed's (2018) methodology.

It is suggested that poverty analysis should be complemented with not only one indicator but with other socio-economic measures as this provides a wider picture of poverty and identifies the main causes behind it (Gammarano 2019). For this reason, I

conduct an equation to explain poverty through demographic, economic, and human capital variables. As I will estimate a region's countries overall, it is more effective to use the panel data estimation. This method has several advantages such as getting better estimates through a large sample, controlling for unobservable variables, accounting for heterogeneity, and tackling the omitted variables bias problem (Ahmad–Khan 2019). For panel data analysis it is common to use random effects and fixed effects models. However, Bloom et al. (2013) suggested that the existing endogeneity problems for human capital and demographic variables can be solved through the Two-Stage Least Squares method, but there are no instrumental variables for our case. Moreover, we cannot use the Ordinary Least Squares method as it will not tackle the omitted variable bias problem.

Based on the work of Cruz and Ahmed (2018), I estimated the following econometric model for the fixed effects method, where GDP per capita ($GDPPC_{it}$), working-age population ratio (WAP_{it}), female labor force participation rate (FL_{it}), mean years of schooling (X_{it}), total fertility rate (TFR_{it}) and the share of urban population (U_{it}) are key in determining poverty (P).

$$P_{it} = \beta_0 + \beta_1 GDPPC_{it} + \beta_2 WAP_{it} + \delta_3 FL_{it} + \beta_4 X_{it} + \delta_5 TFR_{it} + \delta_6 U_{it} \qquad (1)$$

In my analysis, I used poverty as a dependent variable. Two approaches of measuring poverty are used commonly in empirical analysis: direct and indirect. Income is considered as an indirect approach, which is most commonly traditionally used to measure poverty (Wongboonsin–Phiromswad 2016, Jha–Dang 2009). Traditionally, poverty is measured by the number of people living under the international poverty threshold. Indeed, internationally comparable estimates of poverty are provided by the World Bank, where the dollar-a-day line was $1.25 in 2005 and changed to $1.90 a day in 2011 (World bank 2020). Moreover, the international practice uses the income class poverty line, defined at $3.2 for lower-middle-income countries and $5.5 for upper-middle-income countries. On the other hand, the direct approach lies in the standard of living, such as having clean water or access to electricity. In this paper, I rely on an indirect approach, more specifically the working poverty rate, measured as the percentage of employed living below US$1.90 PPP.

Due to the lack of an absolute international poverty line (1.90$ per person daily) data for all Central Asian countries in the period between 2000 and 2019, I used the share of the employed who are poor as a proxy of poverty in my estimation. Employment aims to be a bridge to lift people out of poverty. This can be true only in a condition of adequate earning, sufficient job quality, and job security. One of the advantages of using the working poverty rate in our regression model is that this indicator provides valuable insights into the percentage of employed people living in poverty despite having a job, hinting that the employment-related incomes are not enough to secure better living conditions for themselves and their families and lift them out of poverty (Gammarano 2019). Moreover, it provides an opportunity to formulate effective policies.

For eradicating extreme poverty, it is essential to focus on its root causes. In this sense, I included the share of the population aged 15–64 and the total fertility rate in my model as they represent demographic transition indicators and allow us to identify whether there is a link between demographic dividend and poverty.

GDP per capita (in constant 2010 prices) data is also added as there is a direct effect of economic growth on poverty. To avoid getting biased results, data about the characteristics of the population living in poverty is necessary. A better education is considered as a trigger for lifting out of poverty (Barro–Sala-i-Martin 2004), in this sense, a mean years of education effect is observed as well. As discussed above, the poverty hotspot in Central Asia is more likely to be in rural areas that lack close integration with urban growth centers, for this reason, I added the proportion of people living in urban areas. The study utilized secondary data from the World Development Indicators (WDI), ILO database, and human development database spanning from 2000 to 2019 for five Central Asian countries, allowing an estimate panel data analysis. However, the limited availability of data on some variables did not allow for covering longer periods.

5. Results of the fixed effect method

In this paper, I applied the fixed effect method to get an efficient result. For choosing between random and fixed effects, I applied the Hausman Test and found that fixed effect estimation is more appropriate for my model. The empirical estimation of the model, which was expressed in equation one, is given in Table 4. To correct for heteroskedasticity error, I use robust estimators.

Table 4 Results of fixed effect estimation

Dependent variable: poverty (the percentage of employed living below US$1.90 PPP)

Variable	Coefficients
C	177.324
	[112.17]
$GDPPC_{it}$ − GDP per capita	-4.079
	[.447]***
WAP_{it} - Share of working age population	-0.367
	[0.237]*
TFR_{it} − Fertility rate (total (births per woman))	7.788
	[14.576]
X_{it} - Mean year of schooling	-6.962
	[1.159]***
FL_{it} - Female labor force participation	-0.555
	[0.182]**
$g_{U_{it}}$ – the share of urban population	-0.670
	[1.986]
R-squared	0.2737

Robust standard errors are in parenthesis
Note: *, **, *** represents Significant level at 10%, 5% and 1%, respectively.

According to the results of my model, GDP per capita, the share of working-age population, female labor force participation and mean years of schooling show significant results and have a positive impact on the reduction of poverty. The percentage point of growth above-mentioned indicators provide an opportunity to

reduce poverty in Central Asia. The fertility rate has shown a positive influence on poverty, as the increasing of the total fertility rate is estimated to be associated to increase poverty, however, the coefficient is not significant (Table 4).

From the short review above, key findings emerge: the education effect, which is taken as a proxy for human capital, is higher than the age effect. This implies that education is a key mechanism for reducing poverty. Moreover, providing job opportunities for the female labor force and making them active in the labor market brings a positive outcome for the alleviation of poverty. In the case of Central Asia, the demographic transition can turn further advantages only by accumulating human capital effectively. In a nutshell, all control variables have an encouraging impact on poverty reduction. Hence the suggestion to make policy implications in this direction.

6. Conclusion

This paper has investigated the effect of demographic transition and human capital on poverty reduction in Central Asia. The empirical analysis has been estimated for 5 countries of the region applying a panel dataset for the period between 2000 and 2019. In order to examine the evidence for the inverse relationship between poverty and demographic transition with human capital, the fixed effect method was used.

The empirical results of my estimation indicate a significant and negative relationship between the share of the working-age population, GDP per capita, labor force participation rate, and the mean years of schooling. These variables might decrease poverty in the region.

However, the variables that represent human capital investment have shown a significant and positive impact. Especially the female labor force participation ratio is significant and reduces the poverty. Mean years of schooling and GDP per capita have a robust positive effect on economic growth as well, which is consistent with the theoretical suggestions. Similarly, the share of the urban population has shown a positive contribution, however, the coefficient is insignificant.

My empirical results confirm that the increasing working-age population correlates negatively with poverty, that ongoing demographic transition can provide an opportunity to reduce poverty in Central Asia. However, almost in the whole region, the main challenges are the lack of enough job supplies that enable to reduce unemployment, and the low education level is not appropriate for labor market demands.

An important policy implication based on my empirical results suggests that the demographic transition enables the countries to provide an opportunity to reduce poverty by effectively accumulating the capabilities of the working-age population. It can be done by specifically targeting the working-age population, especially the young cohort, to provide them with an adequate education level, creating job opportunities, and supporting their self-employment. Efforts need to be made not only to increase the quantity of education but the quality of education as well, especially to enhance general and vocational education quality. As I have discussed above, the majority of the population have a limitation to access tertiary education, which makes the share of the skilled labor force decrease. Indeed, due to a limited job supply and without appropriate education level, the unskilled labor force emigrates to other developing countries, which may cause a worsening of the social-economic conditions of the country.

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