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# THE JOURNAL OF CENTRAL ASIAN STUDIES

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# Convergence and Divergence of Growth in Commonwealth of Independent States Countries

*Prof. R V Ramana Murthy\**  
*Mohammad Orfan Abdullah<sup>+</sup>*

## Abstract

*The post-Soviet era did not seem to provide equitable growth opportunities for all its constituent countries. The group of Central Asian countries has experienced divergence in growth from the Western cohorts of ex-Soviet countries, which have grown faster in the last 33 years during 1990-2022. The Central Asian countries had a growth shock, experiencing a negative growth rate during 1990-95, and recovered to a positive growth later. The western block countries also suffered a similar initial growth shock during (1990-95) but recovered on a faster growth trajectory. The Central Asian countries began with lesser per capita income, with a lower degree of industrialization and primary exports. The study estimated the  $\beta$  and  $\sigma$ -convergence between the two cohorts and found evidence for conditional convergence between and within the two cohorts. The study also estimates rates of conditional convergence. The study highlights the higher potential for the Central Asian countries to grow faster with the help of human and physical infrastructure investments. The study also fills the gap in the convergence studies in the international literature.*

**Keywords:** *Economic growth, Convergence, Central Asian region, Western block of Ex-Soviet region; Sigma Convergence; Conditional Convergence.*

## Introduction

After its dismantling in 1990, the ex-Soviet Union countries formed the Commonwealth of Independent States (C.I.S.) for economic and defence cooperation in 1991. The C.I.S. group as a whole had a mixed growth outcome for many of its constituent countries initially before recovering towards positive growth since 1996. The Central Asian countries (C.A.S.) region, of C.I.S. countries, comprising of Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, and Kyrgyzstan, with an average per capita income of \$ 2688, compared to the Western bloc of C.I.S. countries (WCIS), comprising Russia, Belarus, Ukraine, Armenia, Georgia, Moldova and Azerbaijan, with an average per capita income of \$5511 in 1990. Both regions suffered negative growth for the next half-a-decade during 1991-96; the C.A.S. countries shrunk at -6.84 percent on average, and WCIS countries' growth declined on average by -9.34 percent [see Graph 1].In

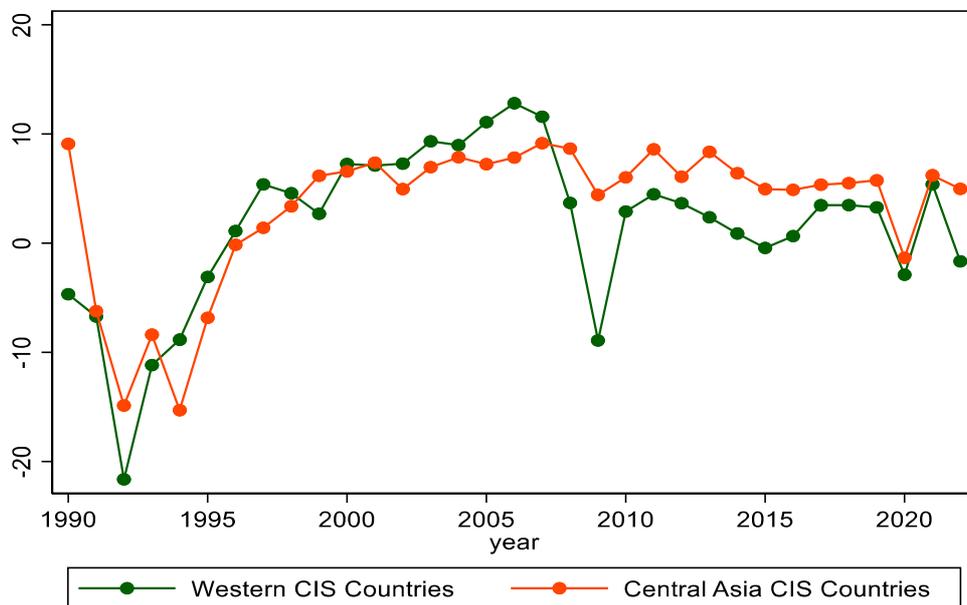
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\* School of Economics, University of Hyderabad.

<sup>+</sup> Ph.D Scholar, School of Economics, University of Hyderabad

comparison, C.I.S. countries as a whole recovered towards positive growth in the next 22 years from 1996-2022, except for the years of the global financial crisis in 2009 and the COVID-19 crisis in 2020. Given the differences in levels of per capita income of WCIS, which is twice that of C.A.S. countries, this paper explores the Convergence and divergence in the growth rates in the canonical Solonian framework [Solow (1956)]<sup>3</sup>. This paper estimates unconditional and conditional convergence between and within the C.A.S. and WCIS countries for the period 1991-2022 by drawing data from World Bank statistics, using the standard methodology of convergence developed by Barro and Sala-i-Martin (1992) and Romer (1986, 1991).

**Graph 1: Comparison of growth rate in C.A.S. and WCIS countries**



**Source:** Author

### *The Received Theory*

Solow proposed that assuming population and technology growth rates remain the same across all countries, all countries will ultimately converge to the same level of per capita income (Solow, 1956). This is referred to as absolute or unconditional convergence in technical terms. Studies, however, testified to a divergence between the poor and the rich countries, which made Romer revise the

---

<sup>3</sup>Based on the literature review, convergence on growth economics suggests that developing countries tend to have quicker economic growth than industrialized countries, eventually narrowing income inequalities between countries in different areas. Neoclassical economics is well-known for this notion, which assumes a diminishing return on capital with increased investment. This assumption predicts that the marginal returns on investment in emerging countries with a lower capital-labour ratio will surpass those in developed countries with a higher capital-labour ratio.

convergence hypothesis into a conditional convergence. Further, the literature also introduced sigma convergence into the discourse about the dispersion of growth rates between groups of countries, which is a measure of weaker convergence. Romer (1991) showed in his endogenous growth model that the divergence between the poor and the rich is due to differences in human capital; hence, more significant investment in human capital will close the technology and productivity differences to attain the Solowian Convergence.

### *Literature Gap*

Barro and Sala-i-Martin (1991) identified strong proof of absolute convergence among U.S. states between 1960 and 1985, indicating that economically weaker states saw higher growth rates than wealthier states. However, there was no evidence of convergence when comparing rich countries (OECD) to a group of 98 poor countries in the same period. Nayyar (2013), in his book, *The Catch Up*, revisited the debate on the convergence possibility between the rich and poor countries for a longer period into the globalization era of post-1990s and found that a group of sixteen developing countries that showed remarkable economic convergence with industrialization nations during 1995-2008. Convergence is mediated by an industrial transformation led by the manufacturing sector and an encouraging world gross domestic product (G.D.P) growth. Varblane and Vahter (2005) studied the process of economic convergence in transition economies from 1995 to 2004. Their research shows that there is both absolute and sigma convergence throughout this period. A study by Ismail (2008) on ASEAN countries also confirmed Convergence during 1960-2004, both in absolute and conditional terms. Unal (2014) studied convergence between the 31 Organisation of Islamic Co-operation (O.I.C.) countries; there was conditional sigma convergence from 1980 to 2009, while a smaller group of oil-producing O.I.C. countries had an absolute convergence with the rich countries. Their research revealed strong proof of conditional convergence among 31 O.I.C. countries. Thus, the literature has covered convergence questions geographically, at the aggregate, and for some select regions. This paper tries to address the scope and need to expand the empirical studies to other regions, namely, the C.I.S. countries.

### **Central Asia's Infrastructure and Resources**

The Central Asian countries were historically less industrialized nations compared to their other cousins in the C.I.S. However, the infrastructure in Central Asian countries has gradually improved since around 2007-08, but the progress has been uneven across the region. Kazakhstan and Uzbekistan are the leaders in infrastructure development, with their infrastructure situation much better overall

than the other Central Asian countries. Turkmenistan falls in the middle ground; Tajikistan and Kyrgyzstan are still catching up with the others regarding infrastructure quality. The Global Competitiveness Index, published by the World Economic Forum, ranked the C.A.S. countries lower than many other countries, which have a greater difficult terrain, besides being land locked. However, there are serious initiatives in these to develop infrastructure. The Belt and Road Initiative is believed to hold a promise to boost the region's connectivity and economic growth (Abbas, 2021).

### *Human Development in Central Asian Countries*

The C.A.S. countries had robust health and education systems in the Soviet era. The initial crisis during 1991-95 affected the investments in human capital, however, there is a considerable improvement thereafter. While some countries, like Kazakhstan and Uzbekistan, maintained or increased education spending, others, like Kyrgyzstan, saw declines. As poverty increased, families struggled to afford education costs like books, uniforms, and fees. Changes in the economies and job markets also affected education provision. Industries declined, resulting in job losses and underutilization of labour. This created challenges for aligning education with new workforce needs. Between 1989 and 1999, it found improvements in infant mortality and abortion rates across the region. However, other indicators like youth mortality, life expectancy, sexually transmitted diseases, and tuberculosis worsened in most countries. Preschool and tertiary (university-level) enrolment rates dropped significantly, especially in Kazakhstan, Kyrgyzstan, Turkmenistan, and Uzbekistan.

The reasons included reduced education spending, rising poverty making it harder for families to afford costs, and cultural shifts emphasizing family-based childcare over preschool. Turkmenistan is facing several challenges, including a decrease in primary education from 10 to 9 years, entry restrictions to universities, isolation from outside influences deemed "alien cultures," and an increase in drug use and infectious diseases. A core issue was that skills learned under the Soviet system became obsolete in market economies. Curriculum reforms, teacher training, and improved learning environments were priorities to enhance education quality and align it with market needs, recognizing the need for new skills. However, in some countries, like Kyrgyzstan, formal education lost prestige as poverty, marginalization, and early marriage traditions re-emerged after independence. Failure to invest in human capital would adversely impact current and future generations' health, education, and productivity. Restoring dwindling human capital stocks would also result in higher future costs (Bolormaa Shagdar, 2006).

**Table 1: Comparative analysis of economic growth and social trends between C.A.S. and the WCIS countries.**

	1990-95	1996-2000	2001-05	2006-10	2011-15	2016-20	2021-22	Total Avge
<b>C.A.S. regions</b>								
G.D.P. (current US\$)	3.60	2.50	5.00	5.00	4.70	.50	2.60	.10
Gross capital formation (current US\$).	24.00	3.90	24.00	3.70	1.80	.40	4.00	0.80
Exports of goods and services (current US\$).	17.50	.00	28.00	0.70	18.30	.20	2.00	.10
H.D. I	-1.80	.00	.00	.70	.82	.24	.24	.90
General government final consumption (current US\$).	23.00	3.40	1.60	3.70	2.00	.70	3.00	.61
Population, total.	0.92	.74	.10	.90	.70	.80	.80	.30
Labor force, total.	1.50	.30	.70	.80	.00	.95	.80	.40
<b>WCIS countries</b>								
G.D.P. (current US\$)	-4.80	5.30	6.00	.00	15.00	.00	8.00	.00
Gross capital formation (current US\$).	-13.15	4.20	7.60	.50	17.03	.24	1.90	.40
Exports of goods and services (current US\$).	2.50	.00	5.0	.00	14.0	.00	5.29	.00
H.D. I	0.90	.10	.20	.61	.45	.09	0.09	.00
General government final consumption (current US\$).	0.20	12.00	4.0	.21	15.00	.0	.03	.96
Population, total.	-0.10	0.46	0.40	0.06	.15	0.17	0.60	0.20
Labor force, total	-1.00	.80	.20	.09	0.10	0.49	1.50	0.22

**Source:** World Bank data and authors' own calculations

**Note:** The data are calculated using the compound growth rate.

The comparative compound growth rate (CAGR) analysis between C.A.S. and WCIS shows significant differences in economic growth and social trends across various indicators. With G.D.P. growth, C.A.S. experienced consistent G.D.P. growth, with an average CAGR of 9.10%. However, the C.A.S. region has experienced fluctuation across periods but mostly positive gains, particularly from 2001 to 2010. On the other hand, WCIS regions experienced greater instability in G.D.P. growth, having a low average CAGR of 6. % compared to the C.A.S.

regions. With an initial negative growth, particularly from the 1990s to the 2000s. The C.A.S. regions maintain a positive average gross capital formation CAGR of 10.80%, which indicates some investment activities. However, it fluctuated significantly, reaching -3.90% in the 2000s before recovering to 14% CAGR in 2022. Meanwhile, the WCIS struggled with gross capital formation, indicating a less stable investment environment than the C.A.S. region. WCIS experienced an average CAGR of 6.40% and a more significant decline of -17.03% in mid-2010. Regarding the CAGR of exports, C.A.S. shows steady growth with an average CAGR of 9.10%, reflecting improvement in the trade dynamic. Conversely, the WCIS countries experienced a moderate export trend, having an average CAGR of 6%, with a temporary increase in 2005. The human development index trend reveals a substantial difference between C.A.S. and WCIS. C.A.S. countries experienced a higher average CAGR of 2.90 %, indicating improvement in social development with a peak of 8% of CAGR in 2005. In contrast, the WCIS regions demonstrated less favorable conditions, with an average CAGR of 1.1%. This low rate reflects less stable improvement in social indicators than the C.A.S. region.

Furthermore, government expenditures show these disparities: C.A.S. has declined since 1990, with an average CAGR of 7.61 %. This decline was evident, with a sharp drop of -3.40% in the 2000s and -2.00% in 2015. Apart from these two periods, the CAGR of government expenditures in C.A.S. regions remain positive throughout the entire period, reflecting the potential stability of physical management.

Similarly, WCIS maintains almost the same average CAGR of 6.96%, with some negative CAGR in the 2000s and 2015. This indicates stable government physical policies that support social and economic growth. Population growth in C.A.S. experienced significant stability, with an average CAGR of 1.30%, while the WCIS regions showed a minor decline in population growth, with an average CAGR of -0.20. When considering the labor force, both regions faced challenges. C.A.S. had a moderate CAGR for the labor force, with an average of 1.40%, whereas the WCIS regions experienced a slight negative trend, with an average CAGR of -0.22%. Overall, the C.A.S. regions show steady economic growth and moderate social progress, while WCIS experienced less stable growth and social progress.

### **Absolute Convergence**

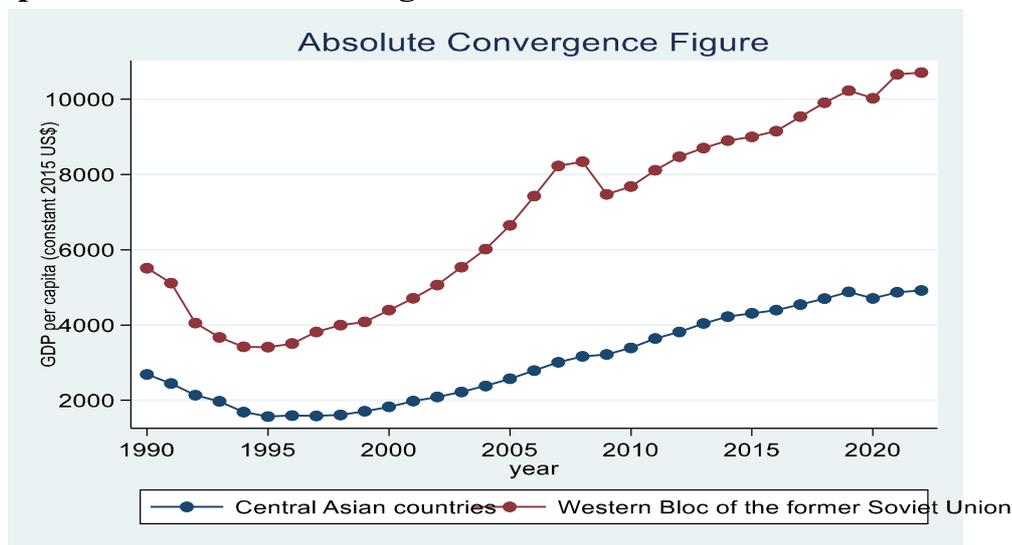
Absolute convergence, a key concept in the study of economic growth, suggests that poorer countries tend to grow faster than wealthier ones, ultimately

leading to a convergence in per capita income levels across nations. We use a panel data regression model to examine the presence of absolute Convergence:

$$GR = \alpha_0 + \alpha_1 \log y_{i0} + \epsilon_{it}$$

In this equation, G.R. represents the country’s growth rate,  $\log y_{i0}$  represents the initial G.D.P. per capita income level, and  $\epsilon_{it}$  is the error term. For absolute convergence to hold, the coefficient  $\alpha_1$  must be significantly negative. A negative coefficient implies that countries with lower initial income levels experience higher growth rates, thus closing the gap with wealthier nations over time. To assess the validity of the absolute convergence hypothesis in the context of WCIS and C.A.S. countries, we used data from 1990 to 2022. We applied the fixed effect estimation technique. The regression results, presented in Table 1.1, reveal that the coefficient of the initial level of G.D.P. per capita is positive and statistically significant; this finding indicates no absolute convergence between WCIS and C.A.S. during the study period. The lack of absolute convergence between WCIS and C.A.S. countries suggests that the steady-state level of income, or the long-run equilibrium level towards which economies converge, is not uniform across these nations. These results align with the findings of Barro (1991), who also observed an absence of absolute convergence in a broader cross-country analysis.

**Graph 1.1: Absolute convergence trend between C.A.S. and WCIS**



**Source: Authors**

The absolute convergence figure shows no clear evidence of income convergence between C.A.S. and the WCIS. The graphs 1.1 represents the GDP per capita for both regions over time, while both lines indicate an upward trend. This shows economic growth in both areas, but the gap between them does not appear to

narrow significantly. The WCIS consistently maintained a substantially high GDP per capita, starting at \$5511 in 1990 and reaching \$ 10661 in 2022. In contrast, C.A.S. countries begin at about \$ 2688 in 1990 and rise to approximately \$4920 in 2022. The persistence and significant difference between these two regions suggest that the income levels of these regions are not converging.

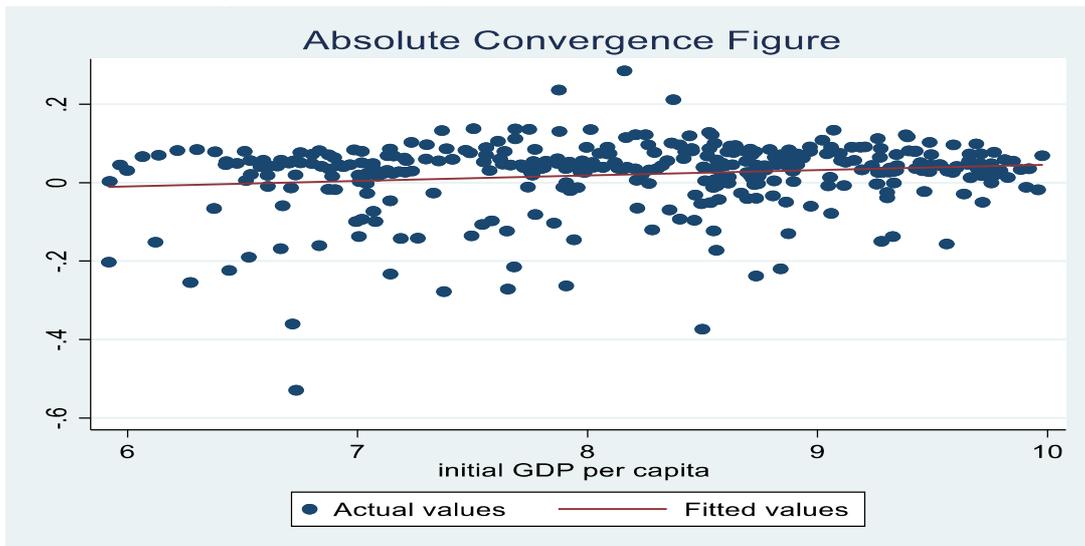
**Table 1.1: Estimation of income convergence between C.A.S.and WCIS**

Depvar: Growth rate of PCGDP				
	Coef.	Std. Err.	t-value	p> t
$\alpha_1$	0.04	0.01	4.19	0.000
$\alpha_0$	-0.31	0.08	-3.87	0.000

Source: Authors

Graph 2 displays the scatter plot of G.D.P. per capita of C.A.S. and WCIS. The figure indicates a significant positive relationship between the rate of G.D.P. per growth and the initial G.D.P. level.

**Graph 2: Convergence between C.A.S. and WCIS**



Source: Authors

**$\sigma$  (sigma) Convergence**

Sigma convergence, a closely related concept to absolute convergence, focuses on the evolution of income dispersion across countries over time. While absolute convergence examines the relationship between initial income levels and subsequent growth rates, sigma convergence investigates whether the cross-sectional variance of income decreases as time progresses. The literature has widely adopted Grier and Grier (2007) and Streissler (1979) linear regression approach to

study sigma convergence. To evaluate the presence of sigma convergence, we employ a linear trend equation that takes the following form:

$$\sigma_{st} = \gamma_0 + \gamma_1 t + u_t$$

In this equation,  $\sigma_{st}$  is standard deviation of the logarithm of income across countries at time t measures the income dispersion. The intercept term,  $\gamma_0$ , captures the initial level of income dispersion. At the same time, the coefficient  $\gamma_1$  presents the trend in dispersion over time: the error term,  $u_t$ , accounts for any unexplained variation in the dispersion measure.

The critical parameter of interest in this regression is  $\gamma_1$ , which indicates the direction and magnitude of the trend in income dispersion. A negative and statistically significant value of  $\gamma_1$  provides evidence favouring sigma convergence, implying that income dispersion across countries decreases over time.

We utilized the data on the standard deviation of the natural logarithm of income across C.A.S. and WCIS countries to estimate the linear trend equation. This helped us see if the sigma convergence hypothesis was confirmed. **Table 1.2** presents the results of this analysis, reporting the estimated coefficients and their corresponding t-statistics based on Newey-West heteroskedasticity and autocorrelation consistent (H.A.C.) standard errors.

The findings in Table 1.2 reveal that the coefficient,  $\gamma_1$ , Which captures the time trend in income dispersion is positive and statistically significant. This result provides strong evidence in support of sigma divergence between C.A.S. and WCIS countries. The positive  $\gamma_1$  indicates that the dispersion of income, as measured by the standard deviation of the logarithm of income, has increased over the period under study. However, it is essential to note that sigma convergence is a necessary but insufficient condition for absolute Convergence. While sigma convergence indicates that income dispersion is decreasing over time, it does not necessarily imply that poorer countries are growing faster than richer ones.

**Table 1.2: The result of Sigma convergence between the C.A.S. and WCIS**

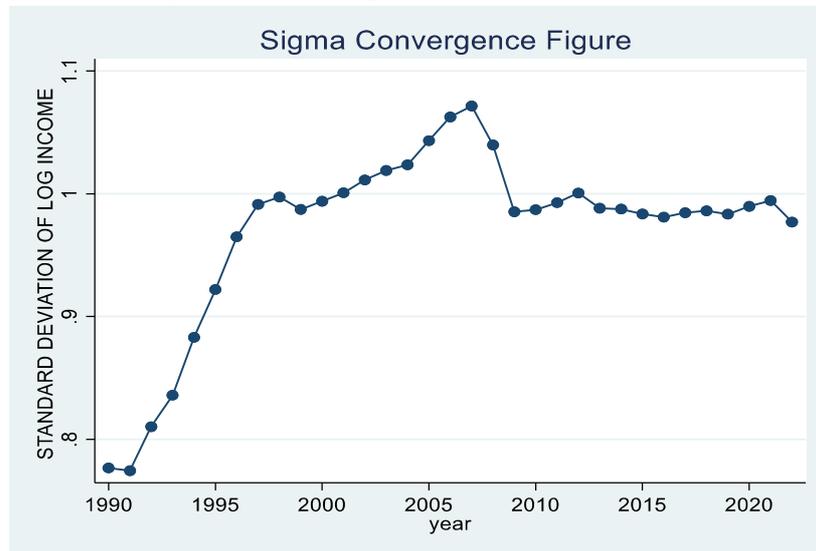
Variable	Coef.	Newey west Std. Err.	t-value	p> t
$\gamma_1$	0.004	0.001	2.41	0.02
$\gamma_0$	-7.57	3.55	-2.13	0.04

*Source: Authors*

*Note:* Dependent variable: Standard Deviation of G.D.P. per Capita (as a measure of income dispersion)

However, Graph 2.a shows the graphical presentation of sigma convergence. The predicted regression slope is upward, meaning there is no sigma convergence between C.A.S. and WCIS. This supports the earlier result of absolute Convergence.

**Graph 2.1: Sigma Convergence-between C.A.S. and WCIS**



*Source: Authors*

**Estimation of absolute Convergence within the group**

Table 1.3. shows the absence of absolute Convergence within the C.A.S. and WCIS countries over time; the positive coefficient and statistical significance support this.

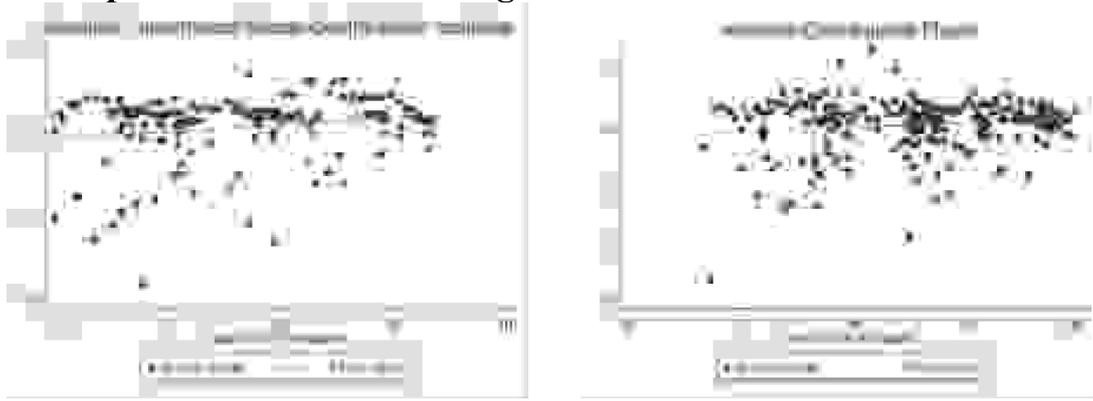
**Table1.3: Absolute Convergence within countries**

WCIS				
Variable	Coef.	Std. Err.	t-value	p> t
$\alpha_1$	0.04	0.01	2.93	0.001
$\alpha_0$	-0.34	0.11	-3.0	0.002
CAS				
Variable	Coef.	Std. Err.	t-value	p> t
$\alpha_1$	0.04	0.1	2.93	0.004
$\alpha_0$	-0.34	0.12	-2.8	0.006

*Source: Authors*

Graph 1.3 displays the scatter plot showing the G.D.P. per capita in both regions. The figure indicates a significant positive relationship between the rate of G.D.P. per growth and the initial G.D.P. level for C.A.S. and WCIS countries.

**Graph 1.3: Absolute Convergence: C.A.S. and WCIS countries**



*Source: Authors*

Table 1.4 reveals that the coefficient of  $\gamma_1$  is positive and statistically significant, indicating the absence of sigma convergence within the C.A.S. countries. However, the coefficient for WCISA is negative but statistically not significant; therefore, the sigma convergence did not hold within the WCIS countries as well; this indicates that the income dispersion has increased across these countries over time.

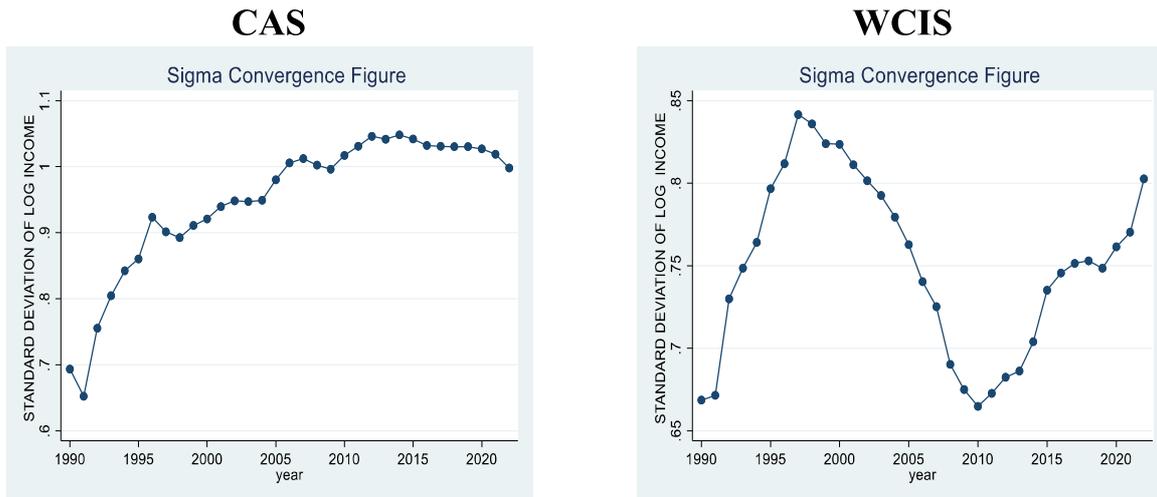
**Table 1.4: Result of Sigma within the C.A.S. and WCIS countries.**

<b>C.A.S.</b>				
<b>Variable</b>	<b>Coef.</b>	<b>Newey west Std. Err.</b>	<b>t-value</b>	<b><math>p&gt; t </math></b>
$\gamma_1$	0.001	0.001	5.30	0.000
$\gamma_0$	-17.4	3.48	-5.0	0.000
<b>WCIS</b>				
<b>Variable</b>	<b>Coef.</b>	<b>Newey west Std. Err.</b>	<b>t-value</b>	<b><math>p&gt; t </math></b>
$\gamma_1$	-0.00	0.001	-0.7	0.47
$\gamma_0$	2.66	2.67	1.00	0.32

*Source: Authors*

Graph 1.4. presents sigma convergence graphically. The predicted regression line slopes upward for the C.A.S. countries, indicating no sigma convergence. However, for the WCIS countries indicate significant fluctuations in income inequality, with a sharp rise in 1997, followed by a decline in 2010 and another increase toward 2022. The regression result shows a negative coefficient but is statistically insignificant, suggesting there have been convergence and divergence periods. Still, this region has no statistical evidence for consistent sigma convergence over time. Income dispersion across C.A.S. countries has occurred over time.

**Graph 1.4: Sigma Convergence: CAS and WCIS**



*Source: Authors*

**Conditional  $\beta$  Convergence.**

This paragraph examines the conditional convergence hypothesis using cross-country data of both regions from 1990-2022. Conditional convergence is analyzed using the augmented Solow and Solow extended models, where the G.M.M. dynamic model is used for the estimation. A vital feature of this paragraph is the explanation of trends and patterns in various economic and social indicators across both the regions. We will then offer detailed descriptions of the trends observed in the data, highlighting significant patterns, similarities, and differences between central Asia and the Western bloc of the former Soviet Union.

**Estimation of conditional Convergence**

Recognizing the limitations of absolute convergence, Barro and Sala-i-Martin (1992) introduced conditional convergence, accounting for the differences in steady-state incomes across countries. The neoclassical growth model inspired this revised approach to convergence, which sought to account for cross-country variations in steady states. Salali-Martin (1996) explained that conditional convergence demonstrates an inverse relationship between a country’s growth rate and its initial income level after controlling for the differences in its steady-state conditions.

Dynamic growth model equation for the concept of conditional convergence proposed by Bassanini, Scarpetta, and Hemmings (2001). In their study, the researcher recognized that the convergence process in economic growth and income level across countries is influenced by different factors that shape the steady state or long-run equilibrium for each economy. However, to estimate the extended Solow equation, we added more variables to capture the effect of different factors on economic growth and the conditional convergence process. The GDP per

capita growth rate, gross capital formation (investment), trade, HDI, general government expenditure, labor force, and population growth are used.

$$\log y_t - \log y_0 = v_i - \beta_1 \log y_0 + \beta_2 \log S_k + \beta_3 \log X + \beta_4 \log H + \beta_5 \log G_c + \beta_6 \log L_f + \beta_7 \log P_G + \theta_t$$

In this equation, we have presented an additional variable:  $k$  represents investment in gross capital formation,  $X$  is trade,  $H$  is the human development index,  $G_c$  is General government final consumption expenditure,  $L_f$  is labour force, and  $P_G$  is population. All the variables are transformed into natural logarithm form.

**The conditional Convergence between C.I.S.**

The following are the estimates of the conditional convergence between the C.I.S. countries. As we found no evidence for unconditional convergence in the previous exercise, here we find significant evidence for conditional convergence, as shown in Table 1.5. The beta coefficient is negative and significant at a 1% significance level, conveying strong conditional convergence. The convergence is supported by investment, trade at a 1% significance level, and H.D.I and labor at a 10% significance level. Government expenditure and population bore a negative sign, which is entirely possible. Government expenditure has a significantly negative relation to per capita growth. The population coefficient has an expected negative relation with the per capita GDP growth and is significant at 10% statistical significance. The overall model is statistically significant, shown by the p-value being less than the critical value.

**Table 1.5: Conditional Convergence between C.I.S.**

<b>Independent variable</b>	<b>Dependent variable: PCGDP growth rate</b>
LnPCGDP	-0.06*** (-2.73)
LnInvestment	0.06*** (6.02)
LnTrade	0.05*** (4.04)
LnHDI	0.19* (1.49)
LnLabour	0.19* (1.62)
LnGovt Expenditure	-0.09*** (-5.19)
LnPopulation	-0.16* (-1.65)
<i>F</i> -statistic	23.43
<i>Prob</i> > <i>F</i>	0.001

**Source:** Authors

*Note:* Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

### Conditional convergence within CAS and WCIS countries

The findings in Table 1.6 indicate the presence of conditional convergence among the countries in Central Asia and the Western bloc of the former USSR. The coefficients associated with the initial G.D.P. per capita logarithm show a negative value for both regions, indicating statistical significance. This suggests that countries in these regions tend to converge to their state's steady income rather than expected. Therefore, the conditional convergence hypothesis holds for the Central Asian countries and western Bloc of the former USSR after controlling factors such as investment, Trade, HDI, total labour force, government expenditure, and population growth. When examining the influence of factors that affect economic growth, Table 1.7 clearly shows that all the factors have a positive and statistically significant effect on the economic development of Central Asia, except population growth and government expenditure. Similar to the Western bloc of the former USSR, most factors show positive and statistically significant impacts on economic growth; however, labor force and government expenditure proved to be exceptions to this pattern for the WCIS region.

**Table 1.6: The conditional Convergence between CAS and WCIS.**

Variable	CAS	WCIS
LnGDPC	-0.11***(-2.95)	-0.04*(-1.47)
LnInvestment	0.009*(0.73)	0.07***(5.76)
LnTrade	0.09*(0.86)	0.03***(1.97)
LnHDI	1.50***(6.34)	0.06*(0.47)
LnLabour	0.71***(5.65)	-0.32**(-2.31)
LnGovt Expenditure	-0.08***(-4.47)	-0.07***(-3.28)
LnPopulation	-0.63***(-5.41)	0.16*(1.33)
<i>F</i>	23.43	18.55
<i>Prob&gt;F</i>	0.002	0.001

**Source: Authors**

**Note:** Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

The *F*-test in fixed effect estimation in the regression model assesses the overall importance of the independent variable in explaining the variation in the dependent variable. The *f*-statistics of (23.43) and (18.55) with a *p*-value of 0.000 shows that the model is highly significant. Furthermore, fixed effect estimation accounts for country-specific factors likely to affect economic growth across different countries.

We convert all variables into a natural logarithm form to capture heteroscedasticity and nonlinear trends.

## **Conclusion**

The study highlights the complex dynamic of economic growth and convergence between Central Asian countries and the Western bloc of the Soviet Union, as well as within Central Asian countries. The finding indicates an evident absence of absolute and sigma convergence between these regions and Central Asian countries. This shows that the income level across these regions has not become similar over time.

However, this divergence is deeply rooted in the historical, economic, and structural legacies left by the Soviet Union, which developed these countries unevenly- assigning some to focus on specific agricultural products like cotton. In contrast, others were mainly exploited for their mineral and natural resources. When the Soviet Union collapsed in 1991, each of the Central Asian countries had to transform their economy from a central economy to a market economy. This was a big challenge, and each country had it differently. Some adapted it quickly, while others fell behind due to different growth rates within these countries.

## **References**

- Andreano, M. S., Laureti, L., & Postiglione, P. (2013). Economic growth in MENA countries: Is there a convergence of per-capita G.D.P.s? *Journal of Policy Modelling*, 35(4), 669-683.
- Arellano, M., & Bond, S. (1991), Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277.
- Barro, R. J., Sala-i-Martin, X., Blanchard, O. J., & Hall, R. E. (1991). Convergence across states and regions. *Brookings Papers on Economic Activity*, 107-182.
- Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, 100(2), 223-251.
- Bassanini, A., Hemmings, P., & Scarpetta, S. (2001). Economic growth: The role of policies and institutions: Panel data evidence from OECD countries. Paris: Organisation for Economic Co-operation and Development.
- Dobson, S. & Ramlogan, C. (2002). Economic growth and Convergence in Latin America. *Journal of Development Studies*, 38(6), 83-104.
- Djennas, M. & Ferouani, B. (2014). Growth and income convergence in Africa. *Journal of Economics and Development Studies*, 2(4).
- Gujarati, D. N. (1995). *Basic econometrics*. New York: McGraw-Hill.
- Guseh, J. S. (1997). Government size and economic growth in developing countries: A political-economy framework. *Journal of Macroeconomics*, 19(1), 175-192.
- Gömleksiz, M., Şahbaz, A. & Mercan, B. (2017). Regional economic convergence in Turkey: Does the government matter? *Economies*, 5(3), 27.
- G. E. Wheeler (1955). *Soviet Policy in Central Asia*.
- Grier, K. & Grier, R. (2007). Only income diverges: A neoclassical anomaly. *Journal of Development Economics*, 84(1), 25-45.

- Harrod, R.F. (1939), An essay on dynamic theory. *Economic Journal*.  
<http://hdr.undp.org/en/content/human-development-index-hdi>.
- Havlat, M., Havrlant, D., Kuenzel, R., & Monks, A. (2018). *Economic Convergence in the Czech Republic and Slovakia* (No. 034). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.
- Ismail, N. W. (2008). Growth and Convergence in ASEAN: A dynamic panel approach. *International Journal of Economics and Management*, 2(1), 127-140.
- Jones, I.C. & Vollrath, D. (2013), *Introduction to economic growth*. W. W. Norton & Company, Inc., 500 Fifth Avenue, New York, NY 10110-0017.
- OECD. (2024a). Crude oil production. <https://data.oecd.org/energy/crude-oil-production.htm>
- OECD. (2024b). Data. <https://data.oecd.org>.
- Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), 65-94.
- Shagdar, B. (2006). Human capital in Central Asia: Trends and challenges in education. *Central Asian Survey*, 25(4), 515-532.
- Streissler, E. (1979), Growth models as diffusion processes: Empirical illustrations. *Kyklos*, 32 (3), 571-586.
- Smith, A. (1776), An inquiry into the nature and causes of the wealth of nations. R.H. Campbell, A.S. Skinner and W.B. Todd (eds), Oxford University Press, Oxford, 1976.
- Snowdon, B. & Vane R.H. (2005). *Modern macroeconomics: Its origins, development and current state*. Edward Elgar Publishing Limited Glensanda House Montpellier Parade Cheltenham Glos GL50 1UA UK.
- Sharma, R.R. (1979). A Marxist Model of Social Change: Soviet Central Asia: 1917- 1940. Macmillan.
- Varblane, U., & Vahter, P. (2005). An analysis of the economic convergence process in the transition countries. *University of Tartu Economics and Business Working Paper*, (37-2005).
- Vinokurov, E., Ahunbaev, A., Babajanyan, V., Berdigulova, A., Fedorov, K., Kharitonchik, A., ... & Zaboev, A. (2022). *The Economy of Central Asia: A Fresh Perspective*.
- Romer, P. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94, 1002-37.
- Romer, P. M. (1990), Endogenous technological change. *Journal of Political Economy*, 98(5), 71-102. doi:10.3386/w3210.
- Ricardo, D. (1951). *On the principles of political economy and taxation*, 1st edition 1817, 3rd edition 1821. In vol. I of *The Works and Correspondence of David Ricardo*, edited by Piero Sraffa with the collaboration of Maurice H. Dobb, Cambridge: Cambridge University Press.
- Thirlwall. P. A (2011). *Economics of development: Theory and evidence*. Palgrave Macmillan, New York, NY 10010.
- Unal, U. (2014). Economic growth and convergence across the O.I.C. countries. Munich Personal RePEc Archive. Paper No. 81439.
- World Bank. (2024b). Metadata Glossary. Gross capital formation (% of G.D.P.). <https://databank.worldbank.org/metadataglossary/world-development-indicators/series/NE.GDI.TOTL.ZS>.
- World Bank. (2024c). Metadata Glossary. Trade (% of G.D.P.). <https://databank.worldbank.org/metadataglossary/world-development-indicators/series/NE.TRD.GNFS.ZS>.

- World Bank. (2024d). World Development Indicators 2024. <https://databank.worldbank.org/source/world-development-indicators>.
- World Bank. (2024b). Metadata Glossary. Government Consumption as (% of G.D.P.). <https://databank.worldbank.org/metadataglossary/world-development-indicators/series/NE.GDI.TOTL.ZS>
- World Bank. (2024c). Metadata Glossary. Population annual growth rate. <https://databank.worldbank.org/metadataglossary/world-development-indicators/series/NE.TRD.GNFS.ZS>.
- Yoshino, N., Huang, B., Azhgliyeva, D., & Abbas, Q. (2021). Developing infrastructure in Central Asia: Impacts and financing mechanisms. Asian Development Bank Institute.

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