HDI in Transition Countries: A Panel Data Analysis
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Abstract:

This paper investigates the factors that have the ability to affect development in transition countries. The study incorporates the human development index to examine the influence of outside variables to human development within transition countries. The study looks at a variety of contributing factors such as the Gini coefficient, federal direct investment levels, world governance contributors, health expenditure per capita, personal remittance levels among a few other contributors. Focusing on transition countries, which evolved after the breakup of the Soviet Union, this study aims to understand human development in twelve of the fourteen former Soviet Republics. Using data from the World Bank and the UNDP, the results generally suggest that governance indicators are significant and positively correlated while development indicators hold a variety of results.

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1.0 INTRODUCTION

By the early 1990's, communism in the Soviet Union had crumbled and Russia's dominance of its fourteen Soviet states reached an end in December 1991. Initial policies aimed to transform these dysfunctional socialist economies to market economies where prices could be liberalized, monetary policy could be implemented, and privatization of state run firms could be occur. As such, the transformation of these former Soviet states lead them to be called *transitioning countries*. More than two decades after the collapse of the Soviet Union, these countries are still in transition and are still having difficulty in reaching economic, political, and social stability. These transformations have impacted the lives and development of many citizens, and this study plans to show evidence that progress can be made by understanding the factors that lead to improvements in the human development index (HDI).

Developed in 1990 and published by the United Nations Development Programme (UNDP), the HDI is widely used to measure a country's capabilities and is an assessment of development. The HDI index takes into account three key measurements: a long and health life, having a decent standard of living and being knowledgeable. Ultimately, each component uses different measures to assess values and a summary of HDI can be found by examining **Figure 1**. A long and healthy life is assessed by life expectancy which is calculated with a minimum value of twenty years and a maximum value of eighty -five years. Secondly, the standard of living component is measured by using gross national income per capita levels. Minimum income is valued for $100 while maximum income is $75,000 which is adjusted by purchasing power parity. Furthermore, the education component is determined by measuring the mean of schooling years for adults aged twenty-five and for children who are just entering school. Years of schooling data is retrieved from the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics using estimates based on enrollment for all ages at all levels of education. Similar to the UNDP, the UNESCO is run as a segment of the United Nations.

The current model to determine HDI is as follows:

Life expectancy index: (LE -20) / (85-20)
Education index: (MYSI + EYSI) / 2
        Mean years of schooling index (MYSI): MYS/15
        Expected years of school index (EYSI): EYS/18

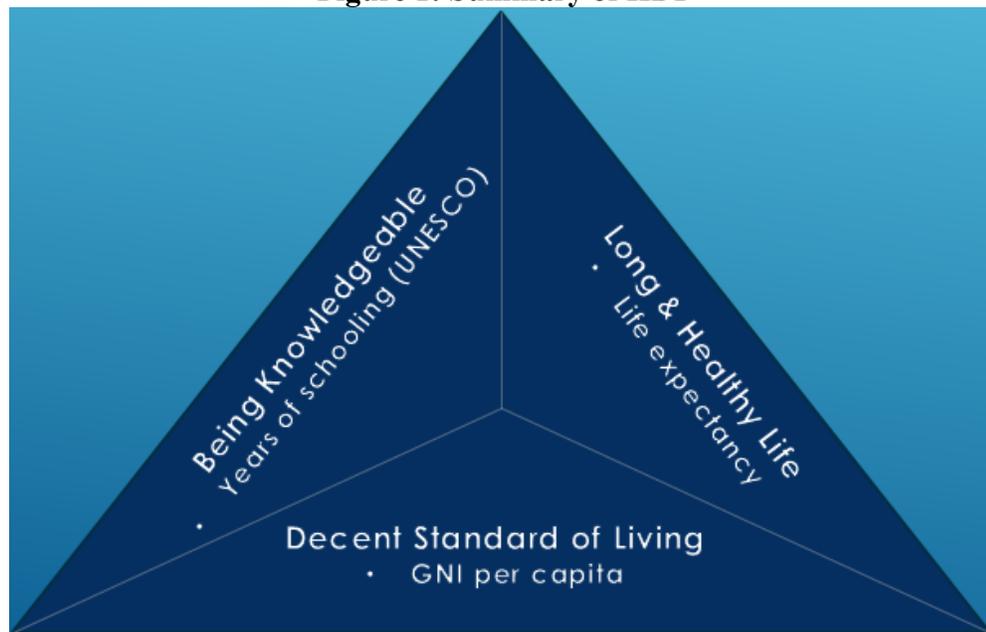**Income index:** [ln (GNI pc) – ln (100)] / [ln (75,000) – ln (100)]

LE: life expectancy at birth
MYS: mean years of schooling
EYS: expected years of schooling
GNI pc: gross national income at purchasing power parity per capita

**Figure 1: Summary of HDI**

Source: UNDP Human Development Reports

The HDI model is important in discussing the transition economies because it will allow for a better understanding of each country's development or lack of, after the collapse of the Soviet Union. Many, if not all, of these transition economies are struggling to maximize human development within their borders. It is important to note that HDI calculation does not include poverty, inequalities or control of corruption. Using a series of independent variables not evaluated within the HDI, this study aims to understand how outside variables affect human development within transition countries.

The rest of this paper is as follows. Section 2 will outline particular trends in relation to HDI while Section 3 will discuss prior research in this area. Section 4 will discuss the data surrounding the study while Section 5 will outlay the empirical results, followed by a conclusion in Section 6.

2.0 TREND

Figure 2 showcases HDI categories as published in the 2013 Human Development Report. The results do show that throughout the years, countries have made successful attempts toward increasing human development. As such, it is important to note that in 1990 only 33 countries had human development indices above or equal to 0.731 while in 2012 the number of countries with this HDI value has almost doubled to 59. The upward sloping trend of HDI increases is ultimately seen through the number of countries with significantly lower HDI values. In many of the cases, the same countries with lower HDI values in the past are now experiencing higher HDI values.

Figure 2: Number of countries per HDI categories, 1990, 2000, 2012
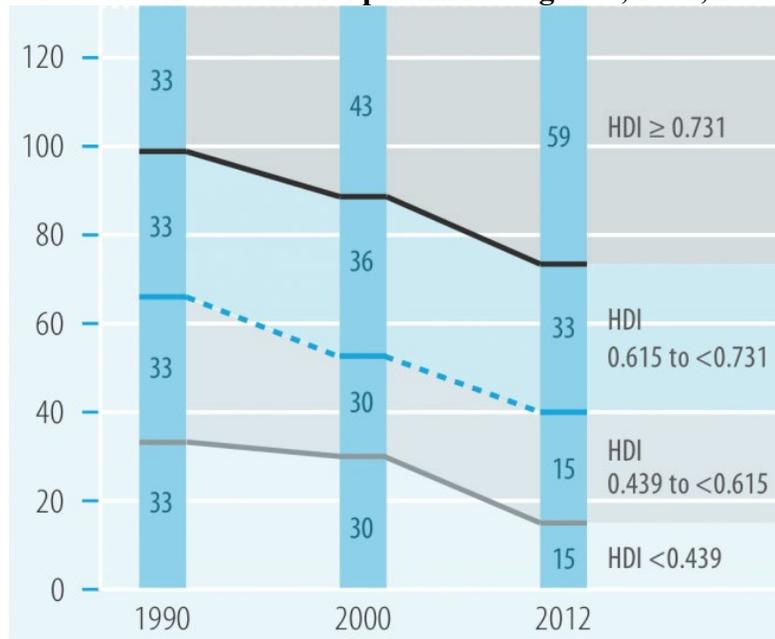

Source: Human Development Report 2013

Figure 3 shows how HDI varies across the world. It is evident to note that many developed countries hold some of the largest HDI values. The United States, Australia, New Zealand, France, Spain and Italy have human development indices between 0.8 and 1. It is also apparent that most of the countries in the African continent hold the lowest HDI values below 0.55. This trend can also be seen in Pakistan, Afghanistan and Papa New Guinea. Retrospective to the three components encompassing HDI, it is evident that countries in the African continent would have some of the lowest HDI values as most of these countries do lack schooling opportunities, have

shortened life expectancies due to lack of proper medical care, which ultimately results in lower GNI per capita values.

Figure 3: Human Development Index in the year of 2012
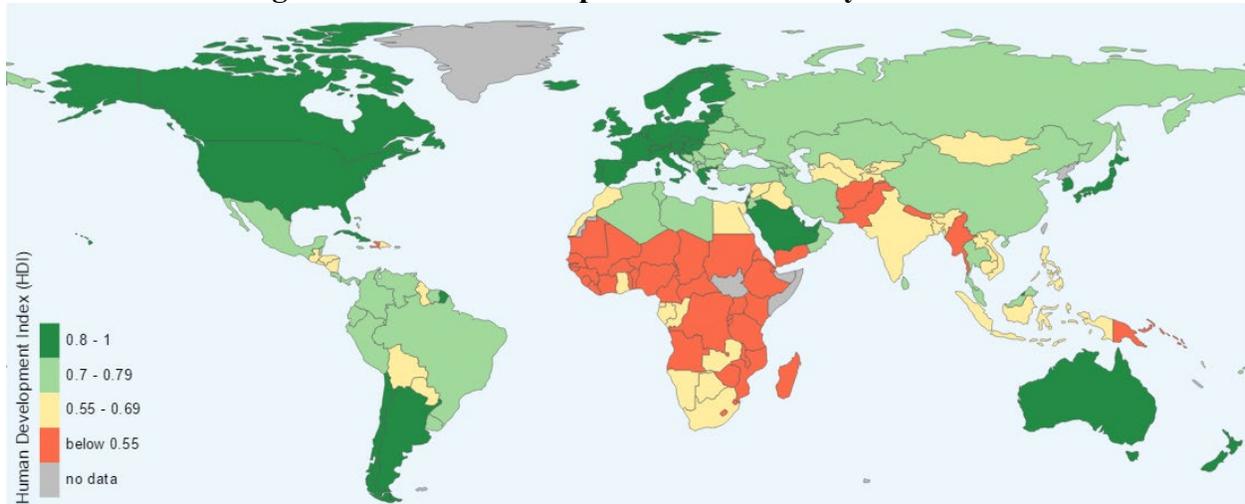
Source: United Nations Development Programme

Figure 4 details the trends of HDI within eight categories: Arab states, East Asia and the Pacific, Latin America and the Caribbean, South Asia, Sub-Saharan Africa, less developed countries and the overall world. With the exception of Europe and Central Asia, each category seems to be following a linear upward trend. As such, from 1980 to 2013, HDI has steadily increased. Europe and Central Asia did not seem to experience a linear increase for HDI from 1990 to 2000 but thereafter these regions follow the trends seen throughout the world.

Figure 4: HDI by World Region 1980-2013
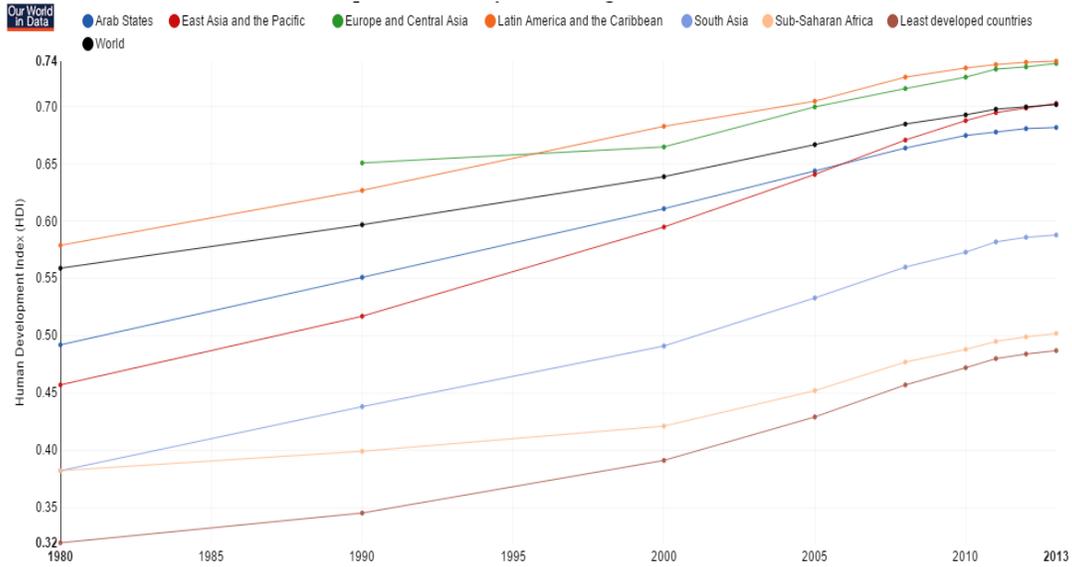
Source: United Nations Development Programme

Figure 5 zeroes in on HDI by paying particular attention to South Asia and Nepal. A study conducted by Pradhan (2012) elaborates that from 1980 to 1990 Nepal has not achieved its regional average human development index. However, after 1990 and onward Nepal has been able to maintain just above the average score for what is considered low human development. It is also important to note that South Asia does exhibit a significantly lower trend pattern than the rest of the world. This is also the case for many African countries.

Figure 5: Trend of HDI with a focus on South Asia and Nepal
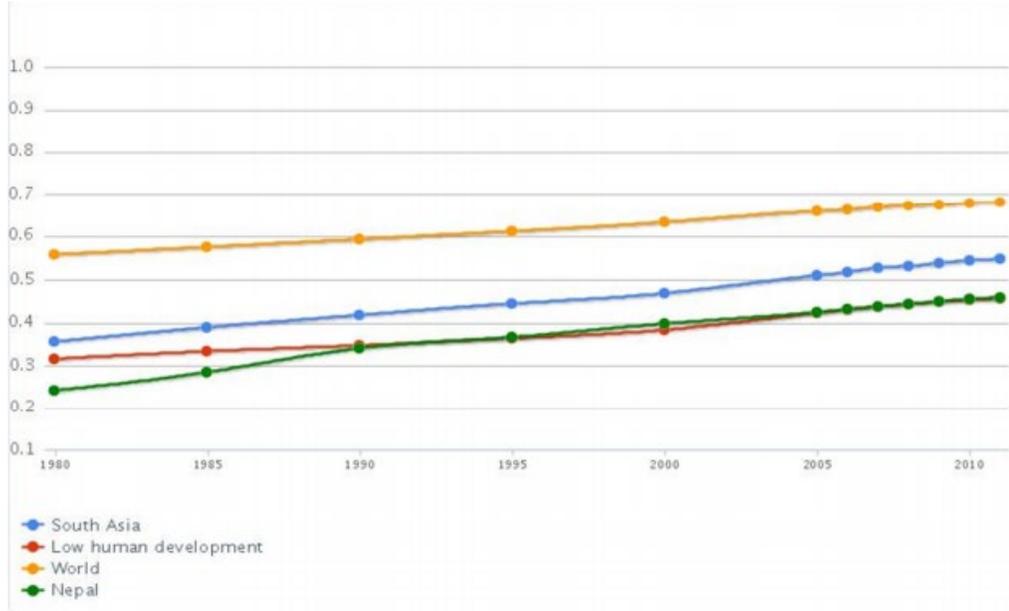
Source: Pradhan (2012)

3.0 LITERATURE REVIEW

Human development, as measured by HDI, is a key factor in measuring a country's economic development. HDI uses economic growth per capita as a factor, meaning that better economic development also means better human development. Since HDI encompasses more than just economic growth, is has become a widely used measure to understand how well off people are. As such, many studies have incorporated a variety of variables as determinants to human development. Reiter and Steensma (2010) have elaborated on human development with regards to foreign direct investment. In their studies the authors have attempted to understand the influence of FDI policy and corruption in relation to human development. They ultimately conclude that FDI inflows hold a positive relationship to human development as FDI policy restrictions discriminate against foreign investors from entering a market or discriminate relative to domestic investors. Additionally, in their findings the authors conclude that lower levels of corruption yield to a more positively correlated relationship between FDI and human development. The authors emphasize that success in development ultimately means more equitable and sustainable gains in standard of living, which can be achieved through health and education factors. Although this is the case, the authors do note that development sometimes occurs at the expense of other variables such as a society's health and education components.

Thus, policy implications should target developmental gains without disregarding the factors that these gains could be offset with.

In a more zeroed in approach, Pradhan (2012) studied the relationships between HDI and the corruption perception index (CPI) for Nepal from a stakeholders' perspective. Within the study the author has first grouped together different sized economies (i.e. low/middle/high income economies). Studying across a five year spectrum, the author has found that the link between HDI and CPI is negative. His findings correlate with his preceding assumption that corruption decreases as human development occurs. While graphically analysing his results, the author has concluded that the trends for these three categorized economies hold true to a 'W' shape. The only difference lies in that the width of the 'W' varies across economies. The trends exhibit such a curve pattern due to the underlying indecisiveness in investment and the effect of corruption at a developmental level. Based upon these findings, the author then studied the case of Nepal from 2004 to 2011. The case of Nepal concludes that HDI and CPI are negatively correlated (i.e. higher CPI scores were associated with lower HDI scores). Similarly Akcay (2006) has also attempted to understand the correlations between corruption and human development. Studying HDI across 63 countries, the author has ultimately attempted to view human development as a function of the urbanization rate, democracy, corruption and economic freedom. As in the case of Nepal, the empirical results for this study conclude that there exists a negative relationship between corruption indices and human development. Thus, as countries are more corrupt they ultimately experience lower levels of human development growth.

In a broader perspective, Nathan and Mishra (2010) have studied the progress in human development across 127 countries for the period 1990 to 2004. By using HDI_2, which represents a Euclidean distance (shortfall from the ideal), the authors have grouped together their findings and suggested the right path for these groupings. Within their study the authors have separated the 127 countries into a group of 111 countries that exhibit an improvement in HDI throughout the years and a group of 16 countries that are considered 'losers' who fall opposite to this trend. Five of the countries from the 'lower' category are located in the Sub-Saharan region where trends have shown significantly lower HDI scores than the rest of the world. Four of the countries on the list of 'losers' are also the former Soviet Republics of Kazakhstan, Ukraine, Tajikistan and Moldova. The authors have also examined the countries with the maximum HDI fluctuation patterns. As such, seven of the thirteen countries on this list are the former Soviet

Republics of Armenia, Belarus, Lithuania, Kazakhstan, Ukraine, Latvia and Estonia. The empirical results for this study ultimately show that 16 countries show movements away from the ideal HDI. Many of these countries are located in the Sub-Saharan region or a part of the Commonwealth of Independent States (CIS countries). The prevalence of poor health infrastructure and the income dimension of 1990 to 1995 are analysed as key components to these results.

Ray (2014) takes a different approach to the HDI by adding an ecological footprint to its measures. The author calls this new index the environmentally stressed human development index (ESHDI). The ESHDI ultimately measures the amount of stress that each country is placing on the environment in attempts to develop economically and socially. Within the study, the author has found that if a country has higher environmental stress, the more it has to substitute for this in terms of longevity, income and/or knowledge to reach development goals.

Hicks (1997) has studied an inequality-adjusted human development index. Since HDI does not include inequality contributors, Hicks has constructed a model to incorporate an understanding of the HDI while taking into consideration the Gini coefficient for twenty developing countries. Although the author discusses that the Gini coefficient may not necessarily be the perfect measure for inequality, he emphasizes the importance of adjusting HDI to include inequality factors because development overarches a variety of other factors and not just its three components as seen in **Figure 1**.

4.0 DATA AND EMPIRICAL METHODOLOGY
4.1 Data

This study uses data obtained from the World Development Indicators, World Governance Indicators and UNDP. The World Development Indicators are reflective of data from the World Bank. Due to data availability, this study chooses to focus on only twelve of the former fourteen Soviet states during the years of 2000, 2005, 2008 to 2011. **Table 1** showcases a complete list of the countries examined in the study. Summary statistics for the data are provided in **Table 2**.

Table 1: Countries Used in Study

Country	Country Code
Armenia	ARM
Azerbaijan	AZE
Belarus	BLR
Estonia	EST
Georgia	GEO
Kazakhstan	KAZ
Kyrgyz Republic	KGZ
Latvia	LVA
Lithuania	LTU
Moldova	MDA
Tajikistan	TJK
Ukraine	UKR

Table 2: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
HDI	72	.7168333	.0773996	.529	.836
GE	72	-.2816863	.6964656	-1.21171	1.158486
PSAV	72	-.1640183	.6255899	-1.789006	.7873226
RQ	72	-.0520258	.8183394	-1.752705	1.426657
RL	72	-.4125402	.7550378	-1.428784	1.163048
GINI	72	32.52507	4.593616	16.64	42.13
GDPG	72	3.882646	6.863614	-16.58917	25.11444
HEXPPC	72	307.7211	304.0644	7.228178	1075.405
FDI	72	5.980887	5.022946	-.2778235	33.7958
REM	72	9.545192	11.89014	.0712794	49.2899
GCF	72	25.10399	7.214332	9.413684	41.53484

4.2 Empirical Model

Following Hicks (1997) this study aims to conclude which variables impact human development within these twelve transition nations. I have added four world governance indicators and six world development indicators. Due to the correlations between the four governance indicators, I have decided to establish five different models.

The models could be written as follows:

I $HDI_{it} = \beta + \beta_1 HEXPPPC + \beta_2 GINI + \beta_3 FDI + \beta_4 REM + \beta_5 GDPG + \beta_6 GCF + \epsilon_{i,t}$

II $HDI_{it} = \beta + \beta_1 HEXPPPC + \beta_2 GINI + \beta_3 FDI + \beta_4 REM + \beta_5 GDPG + \beta_6 GCF + \beta_7 GE + \epsilon_{i,t}$

III $HDI_{it} = \beta + \beta_1 HEXPPPC + \beta_2 GINI + \beta_3 FDI + \beta_4 REM + \beta_5 GDPG + \beta_6 GCF + \beta_7 RL + \epsilon_{i,t}$

IV $HDI_{it} = \beta + \beta_1 HEXPPPC + \beta_2 GINI + \beta_3 FDI + \beta_4 REM + \beta_5 GDPG + \beta_6 GCF + \beta_7 PSAV + \epsilon_{i,t}$

V $HDI_{it} = \beta + \beta_1 HEXPPPC + \beta_2 GINI + \beta_3 FDI + \beta_4 REM + \beta_5 GDPG + \beta_6 GCF + \beta_7 RQ + \epsilon_{i,t}$

HDI_{it} is the human development index for country i and year t. Independent variables consist of ten variables obtained from the UNDP and the World Bank. **Appendix A** and **Appendix B** provide data source, acronyms, descriptions, expected signs and justifications for using the variables. First, Gini represents the extent to which income is distributed among individuals within an economy. Second, HEXPPC represents the total health expenditure as a ratio of total population. Third, FDI are the net inflows of foreign direct investment to acquire a lasting management interest. Fourth, REM are personal remittances which are personal transfers of cash received by a household in a host country from individuals outside of the country in which they live in. Fifth are GDPG which represents gross domestic product growth on an annual rate using constant local currency. Sixth are GCF which represents gross capital formation. Gross capital formations are outlays on additions to the fixed assets of the economy. Model I represents the use of the first six variables while models II, III, IV and V each use a different world governance indicator to elaborate on the basic model I. Under the Hausman test, the models are consistently using fixed effects.

5.0 EMPIRICAL RESULTS

The empirical estimation results are presented in **Appendix C**.

Upon reviewing the results, it is apparent to notice that health expenditure per capita and personal remittances are the only two development indicators which are highly significant at the 1% level across the five models that were used in the study. Additionally, these variables are consistently positively correlated to HDI. As such, when health expenditure and remittances increase, HDI also increases. For many of these former Soviet Republics, personal remittances are some of the highest in the region or in the world. As noted by Mansoor and Quillin (2006), in 1991 during the collapse of the Soviet Union, approximately 15% of the population from Armenia, Georgia, Kazakhstan and Tajikistan emigrated permanently. These permanent migrations allowed people to work in different countries to ultimately support family still living in host countries. Due to the fact that many of these transition countries are still experiencing

economic hardships, often triggered by corruption, citizens still find themselves permanently immigrating to different countries (mostly to the European Union) to support family back home. As discussed, life expectancy is one of the three primary components to HDI. It is then obvious to note that health expenditure per capita would be positively correlated to HDI and consistently significant because the underlying components of health expenditure directly affect life expectancy (i.e. the more countries understand about health, the more life expectancy increases).

FDI and the Gini coefficient also exhibit similar trends in comparison to one another. Both FDI and the Gini coefficient remain negatively correlated across the five models. While the Gini coefficient remains significant at the 5% level, FDI remains not significant across the five models. It is important to note that in many of these transition countries, the income is held within particular groups and individual people. As such, a middle class is difficult to find and the inequality levels are large. When FDI does occur, it ultimately targets the wealthy populations who have the ability to create capital from capital. This result conflicts with Reiter and Steensma (2010) who concluded that FDI inflows positively impact human development. Thus, the inequality levels continue to grow as the rich get richer while the poor remain poor. This further means supports that as inequality increases, HDI decreases. This aligns with Hicks (1997) who studied an inequality adjusted HDI and found that as inequality increases, HDI decreases.

My results have shown that gross capital formation and gross domestic product growth exhibit opposite correlations. GDP growth ultimately remains negatively correlated to HDI while gross capital formation remains positively correlated throughout the five models. Consistent with the trends seen in FDI inflows, a transition country's GDP growth can target particular groups or individuals in a society. Additionally, as gross capital formation increases so does HDI. Now taking into consideration the governance indicators, it is important to note that each remains significant across the five models. All four indicators (government effectiveness, regulatory quality, rule of law, and political stability and the absence of violence and terror) are significant while regulatory quality is the most significant at 1% followed by political stability and rule of law then concluding with government effectiveness. All of the governance indicators are also positively correlated which confirms that as each increases so does HDI.

5.1 Policy Recommendations

This study has proven to show the importance of, or lack of, the variables outside the HDI. My results have shown the importance of the world governance indicators. As such, since all are positively correlated and significant across the five models, it is important that these transition countries encompass political and economic policies that surround these variables. Governments within these transition countries should implement policies which promote the private sector and ultimately be credible to civil services, such as health expenditure. Governments should also be be able to abide by societal rules and operate in a stable environment. Government stability is important here, as many of these transition countries exhibit instability, thus allowing the HDI to be at lower levels than in comparison to other more developed countries. Although these are the best recommendations for these transition countries, some may argue that these governments would experience much difficulty in following these policies due to the past practices of the former Soviet Republics. Twenty-four years have passed since the collapse of the Soviet Union and some of the former Republics are continually using old economic and political practices.

Although remittances remain highly significant and positively correlated to the study, I would recommend that transition countries try to decrease the amount of emigration that occurs. Many of the individuals leaving these countries are doing so in attempts to grasp a better economic stance which will help family remaining back home. As such, if the governments and economies of these transition countries become more stable, individuals will be more apt to stay in their homelands for work. This will allow for internal growth as the economy increases with more employment and capital flows in the economy. These transition economies should also continue to spend on health expenditure as my study has suggested a positive correlation and high levels of significance. As populations become healthier they are ultimately better off in learning and expanding the country's economic abilities.

6.0 CONCLUSION

In summary, the HDI remains an important measure in capturing a country's capabilities and its assessment of development. The collapse of the Soviet Union has left its former Republics in a transition period in which they are still continually progressing. As such, this

study has aimed to understand a variety of outside variables which effect the HDI. Taking into consideration two sets of data, world governance and world development indicators, the results of my study have varied for the different variables. Nevertheless, this paper has shown that development is effected by factors outside being knowledgeable, having a decent standard of living and having a long and healthy life. Just as other studies have adjusted HDI to include other factors, I have done so also and understood that HDI in transitioning countries are positively impacted by health expenditure, personal remittances, gross capital formation and all four of the governance indicators used in my study. As such, policy recommendations should be formatted to encompass these variables.

Appendix A: Variable Description and Data Source

Acronym	Description	Data Source
HDI	Human Development Index	United Nations Development Programme
GE	Government Effectiveness: captures the credibility of the government's commitment to public and civil services and the degree of interdependence from political pressures	World Bank (World Governance Indicators)
RQ	Regulatory Quality: captures the government's ability to formulate and implement policies that promote the private sector	World Bank (World Governance Indicators)
RL	Rule of Law: captures perceptions of the extent to which agents have confidence in and abide by the rules of society	World Bank (World Governance Indicators)
PSAV	Political Stability ad Absence of Violence/Terrorism: captures the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means	World Bank (World Governance Indicators)
GINI	Gini coefficient: income distribution	World Bank (World Development Indicators)
HEXPPC	Health Expenditure per capita: sum of public and private health expenditures as a ratio of total population	World Bank (World Development Indicators)
FDI	Foreign Direct Investment: net inflows of investment	World Bank (World Development Indicators)
REM	Personal Remittances: personal transfers and compensation of employees	World Bank (World Development Indicators)
GCF	Gross Capital Formation: captures outlays on additions to the fixed assets of the economy	World Bank (World Development Indicators)
GDPG	Gross Domestic Product Growth: captures annual % growth rate of GDP per capita based on constant local currency	World Bank (World Development Indicators)

Appendix B: Variables and Expected Signs

Acronym	Variable Description	Expected Sign
HDI	Human Development Index	+
GE	Government Effectiveness	+
RQ	Regulatory Quality	+
RL	Rule of Law	+
PSAV	Political Stability ad Absence of Violence/Terrorism	+
GINI	Gini coefficient	-
HEXPPC	Health Expenditure per capita:	+
FDI	Foreign Direct Investment	+/-
REM	Personal Remittances	+/-
GCF	Gross Capital Formation	+
GDPG	Gross Domestic Product Growth	+

Appendix C: Regression Results for the HDI in Transition Countries

	(1) HDI	(2) HDI	(3) HDI	(4) HDI	(5) HDI
GINI	-0.00170*	-0.00160*	-0.00149*	-0.00109*	-0.00146*
	(-2.10)	(-2.05)	(-1.95)	(-1.36)	(-1.97)
GDPG	-0.000756*	-0.000831**	-0.000812**	-0.000689*	-0.000682*
	(-2.36)	(-2.69)	(-2.70)	(-2.27)	(-2.34)
HEXPPC	0.0000866***	0.0000718***	0.0000583***	0.0000860***	0.0000721***
	(7.34)	(5.56)	(3.95)	(7.71)	(6.30)
FDI	-0.000425	-0.000750	-0.000568	-0.000187	-0.000546
	(-0.81)	(-1.44)	(-1.15)	(-0.37)	(-1.15)
REM	0.00132***	0.00119***	0.00134***	0.00117***	0.00124***
	(3.94)	(3.66)	(4.26)	(3.63)	(4.09)
GCF	0.000968*	0.00129**	0.00108*	0.000702	0.000940*
	(2.22)	(2.93)	(2.64)	(1.66)	(2.38)
GE		0.0250*			
		(2.38)			
RL			0.0370**		
			(2.90)		
PSAV				0.0201**	
				(2.71)	
RQ					0.0318***
					(3.54)
_CONS	0.714***	0.718***	0.729***	0.704***	0.714***
	(22.89)	(23.95)	(24.54)	(23.67)	(25.22)
R-squared	0.7303	0.7564	0.7673	0.7632	0.7820
F-statistics	24.37	23.51	24.96	24.41	27.16
N	72	72	72	72	72

Note: ***, **, and * denotes significance at the 1%, 5%, and 10% respectively. Standard errors in parentheses.

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