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The impact of geography an natural resource abundance on growth in Central Asia

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Working Paper No. 629

The Impact of Geography and Natural Resource Abundance on Growth in Central Asia

by

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ABSTRACT

This paper examines the growth experience of the Central Asian economies after the breakup of the Soviet Union. In particular, it evaluates the impact of being landlocked and resource rich. The main conclusions are: (1) Over the period 1994–2006, the landlocked resource-scarce developing countries of Central Asia grew at a slower pace than other landlocked resource-scarce developing countries; on the other hand, resource-rich developing countries in Central Asia grew at the same pace as other resource-rich developing economies. (2) Having "good" neighbors pays off in the form of growth spillovers; this calls for greater regional cooperation and enhanced regional integration through regional transport infrastructure, improved trade facilitation, and enhanced and coordinated economic policies. And (3) countries with a higher share of manufacturing exports in GDP grow faster, and the more sophisticated a country's export basket, the higher its future growth; Central Asian countries should, therefore, take a more aggressive stance in supporting export diversification and upgrading.

Keywords: Central Asia; EXPY; Landlocked; Manufacturing Exports; Primary Exports; Resource-rich

JEL Classifications: O13, O14, O52, O57, Q33, Q34

1. GROWTH CHALLENGES IN CENTRAL ASIA

The Central Asian countries are resource-rich and/or landlocked. There is ample economic literature that discusses how these characteristics affect the long-term economic performance of a country. First, consider resource abundance. The generalized poor long term growth performance of many resource-rich economies has often been attributed to the so-called "resource curse." There are various mechanisms through which resource abundance has an impact on the long-term economic prospects of a country. First, the overall poor performance of the resource-rich countries has been discussed in the context of the Dutch disease. This refers to the potentially negative effect that a boom in natural resources may have on the tradable sector and, therefore, on the country's overall growth. A boom in export earnings from natural resource exports can cause a country's currency to appreciate (leading to an appreciation of the real effective exchange rate) and, therefore, to loss of competitiveness. In addition, part of the boom revenues is usually spent on non-tradables such as health, education, housing, and other services. An increase in the demand for non-tradables not only leads to an increase in the price of the goods/services of the non-tradable sector, which causes the real exchange rate to appreciate, but also leads to a diversion of labor and other resources away from the tradable goods sector, into the non-tradable sectors. If the tradable-goods sector is characterized by externalities in production, then the shrinking of the sector leads to its further decline. It is these tradable export activities (e.g., manufacturing) that might have had the potential to reduce the dependence on natural resources, generate gainful employment, diversify the economy and induce structural change.

Second, abundance in natural resources poses a problem for resource revenue management, which has long-term implications. This issue raises questions about what to do with the revenues earned (spend now or invest i.e., time profile of consumption); where to invest them (foreign assets or domestic assets); and how to balance public and private sector actions (i.e., government consumption and investment vis-à-vis private sector consumption and investment). It is important for a resource-rich country to find the right balance between these forces. This is especially important in the case of a developing country, where consumption per capita is low (so there are immediate welfare gains to be derived from increasing consumption), and capital is scarce, and therefore returns from investment at home are likely to be higher but investment might be riskier. Collier et al. (2009) provide a detailed discussion of the issues involved in resource revenue management in developing economies.

Third, natural resource abundance also impacts growth through the negative influence on governance and institutional quality. Sala-i-Martin and Subramanian (2003) show that although natural resource abundance may or may not affect growth negatively, it can have a

serious negative impact on the quality of institutions. To the extent that institutional quality has a positive effect on long-term growth, any adverse impact that resource revenue has on institutions will also affect the long-term growth performance of an economy. Evidence indicates that natural resources exert a negative and a nonlinear impact on growth through their adverse effect on institutional quality. Amin and Djankov (2009) show that countries that are rich in natural resources are less likely to implement growth-enhancing reforms, or to improve their investment climate.

Fourth, reliance on natural resources exposes a resource-abundant country to the vagaries of international markets. Lack of financial development and poor institutional quality is likely to result in the mismanagement of revenues that result from booms in commodity prices, leaving little for the future. In addition, price booms and crashes increase uncertainty about future prices, hampering investment in the sector. An influx of resource revenues resulting from a price boom can result in over-investment in non-tradable sectors, such as construction. This fact is often reinforced by the additional influx of foreign capital that attracts a booming economy. A crash in commodity prices, followed by the drying up of foreign capital is likely to cause a collapse in construction activity. As a result, a resource-rich country may end up squandering away an opportunity to invest in the diversification of the economy into high value added activities that would have generated employment and facilitated the structural transformation of the economy.

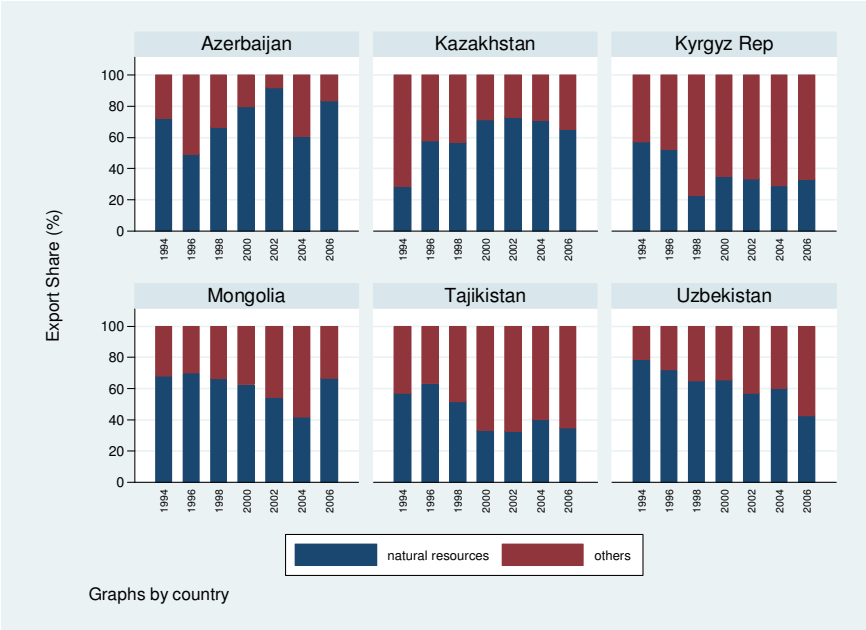
Fifth, resource-rich countries make for "bad" neighbors as a result of the limited spillovers into the surrounding countries. This is particularly relevant in the case of the Central Asian countries, all of which are also landlocked. The Central Asian countries are dependent on each other as transit corridors but also to generate growth spillovers.

Consider now the lack of coastline. The globalization of supply chains has highlighted the importance of foreign trade. Being landlocked has a direct impact on the time it takes for goods to transit a country, as well as on the cost of transportation. In an era of globalized supply chains and pressure for wafer-thin margins and timely deliveries, lack of a coastline and lack of easy access to international markets may make a country unattractive as a sourcing destination. There is a vast body of empirical literature in international trade that shows that landlocked countries trade less than those that have a coastline (Felipe and Kumar 2010). Being landlocked also increases dependence on the neighbors' infrastructure. For the Central Asian countries, this highlights the importance of developing regional infrastructure networks to gain access to markets beyond the region.

It is, however, easy to come up with examples of landlocked countries that have performed very well, such as Switzerland. It is clear that Switzerland benefits from the growth (and the markets) of the neighboring countries—Germany, France, and Italy. In other words, neighbors matter, and “good” neighbors can generate growth spillovers.

This paper focuses on the growth performance of the Central Asian countries. They are landlocked, rich in natural resources, and depend critically on revenues from exports of natural resources.[1] In Azerbaijan, Kazakhstan, Mongolia, and Uzbekistan, the bulk of the total export revenues come from natural resources (see Figure 1).[2] Central Asian countries grew rapidly post-2000 benefitting from a boom in commodity prices, benign global conditions, and easy availability of credit. Following the collapse in commodity prices and the financial meltdown in the latter half of 2008 these countries suffered enormously. In 2009, Kazakhstan suffered a contraction and Azerbaijan, Kyrgyz Republic, Mongolia, and Tajikistan slowed down sharply (Table 1).

Figure 1: Share of natural resource exports in total exports



Source: UN COMTRADE

[1] The countries included in the analysis are: Azerbaijan, Kazakhstan, Kyrgyz Republic, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan.

[2] Natural resource exports covers SITC Rev 2 categories 0, 2, 3, and 4 which are food and live animals chiefly for food, crude materials (inedible) except fuels, mineral fuels and related materials, and animal and vegetable oils, fats and waxes, respectively.

Table 1: GDP Growth Rates in the Central Asian countries, 1992-2010

	1990-94	1994-2000	2000-04	2004-07	2007-08	*2009*	*2010*
Azerbaijan	-17.00	3.66	10.47	28.58	10.80	*3.00*	*4.50*
Kazakhstan	-9.57	0.62	10.54	9.76	3.20	*-1.00*	*2.50*
Kyrgyz Republic	-14.43	3.69	4.80	3.66	7.67	*1.00*	*2.00*
Mongolia	-4.99	3.31	6.29	8.67	8.86	*2.80*	*4.30*
Tajikistan	-18.84	-2.15	10.02	7.17	7.90	*0.50*	*2.00*
Turkmenistan	-9.19	2.42	3.08	11.86	9.80	*8.00*	*10.00*
Uzbekistan	-4.89	3.05	5.01	7.93	9.00	*7.00*	*6.50*

Source:WDI and Asian Development Outlook (2009, December update). GDP growth rates are based on GDP measured in constant prices. Growth rates for 2009 and 2010 are forecasts of GDP growth from Asian Development Outlook (2009, December update). Data for Turkmenistan is from the Total Economy Database.

Section 2 discusses results from an analysis of covariance to bring forth the historical experience of other landlocked and natural resource-rich countries, and estimate the spillovers from neighborhood growth.

A perennial challenge that the Central Asian economies face is the problem of reducing their dependence on natural resources and generating sustainable economic growth through structural transformation. The process of structural transformation involves a change in what a country produces and a shift away from low-productivity, low-wage activities to high-productivity and high-wage activities. A very clear example of structural transformation is found in Asian economies such as the PRC, Vietnam, Malaysia, or the NIEs. The output and employment structures are changing very fast in the direction of high value-added sectors. Section 3 examines whether countries with a higher share of manufacturing exports in total exports grow faster and whether export sophistication affects future growth. Section 4 concludes the paper and discusses policy implications.

2. OPPORTUNITIES AND CHOICES: RESOURCE ABUNDANCE AND GEOGRAPHY

All developing countries can be classified such that they belong to one of the following four groups: (i) landlocked resource-poor, (ii) coastal resource-poor, (iii) coastal resource-rich, or (iv) landlocked resource-rich.[3] To estimate the growth differential across the four categories, we run the following regression of per capita GDP growth (Growth GDP_{pc}):

[3] We follow Collier and O'Connell (2007), who classify a country as resource rich if it satisfies the following three conditions: (1) current rents from energy, minerals, and forest exceed 5% of Gross

$$\text{Growth } GDPpc_{it} = \beta_0 + \beta_1 Coastal_i + \beta_2 Coastal_i * R_i + \beta_3 Landlocked_i * R_i + \text{Time FE} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots (1)$$

where R is a dummy variable that takes 1 if the country is resource-rich, and 0 otherwise; *Coastal*=1 if the country is coastal and 0 otherwise; and *Landlocked*=1 if the country is landlocked and 0 otherwise. Year fixed effects are included to control for any shocks that affect all the developing countries simultaneously in any year. The estimated coefficients show the growth performance of each of the four groups over the period 1960-2000.[4] Only countries with data for at least 39 (out of 40) years are included in the sample. Consequently, the Central Asian countries are not a part of the sample. This serves the purpose of highlighting the long-term growth performance of resource-rich and landlocked countries.

Table 2 shows the estimation results. Landlocked resource-poor countries were the slowest growing group over the period 1960-2000 (shown by the constant).[5] Coastal resource-poor economies grew faster than the landlocked resource-poor economies by 1.34 percentage points. Landlocked economies face higher cost of trading with the rest of the world and are dependent on regional infrastructure networks to trade with the outside world.[6] However, as we discuss later, being landlocked might not be a curse and whether this is so or not depends on the neighbors.

National Income (GNI); (2) a forward moving average of these rents exceeds 10% of GNI; and (3) the share of primary commodities in exports exceeds 20% for at least a 5-year period following the initial year.

[4] The default group in the regression is the landlocked resource-poor countries, whose average growth is given by the constant term, β_0. The average growth of landlocked resource-rich countries is $\beta_0 + \beta_3$. The average growth of coastal resource-poor is $\beta_0 + \beta_1$. And the average growth of coastal resource-rich is $\beta_0 + \beta_1 + \beta_2$.

[5] Real GDP per capita (measured in PPP terms, 1996 prices) from PWT 6.1 is used to calculate the growth rates (dependent variable) in Tables 2 and 3. Any gaps in growth rates are completed using growth rates based on per capita GDP measured in PPP terms (2000 prices) from the World Bank's World Development Indicators. Any further gaps are filled up using The Conference Board's Total Economy Database (June 2009 release, available at http://www.conference-board.org/economics/database.cfm.

[6] Being coastal provides a natural advantage over a landlocked country in terms of lower transportation costs and easier access to other countries. Presence of a coast line is neither a sufficient nor a necessary condition. The success of coastal resource-scarce economies is contingent on the presence of complementary conditions such as infrastructure, availability of labor force, enforcement of property rights and governance, globally competitive costs, and supportive government policies.

Table 2: Growth in the four groups

Dependent Variable: Growth in Real GDP per capita	
Coastal	1.34***
	(0.27)
Coastal*R	-0.23
	(0.35)
Landlocked*R	1.30**
	(0.60)
Constant	0.67***
	(0.24)
Observations	3,999
R-squared	0.04

Notes: OLS estimates are reported. Sample consists of 100 developing countries with data for at least 39 years (for the period 1960-2000). Robust standard errors in parentheses. ***, **, * denotes statistical significance at 1%, 5%, and 10% respectively. Year fixed effects are included in the regression. *Coastal* (and *Landlocked*) refer to geographically-based time-invariant status. It takes the value 1 if the country is coastal (and landlocked) and 0 otherwise. *R* is a dummy variable that takes the value 1 if the country is resource-rich as defined in footnote 3 and 0 otherwise. Regression estimated is specified in equation 1.

Estimates in Table 2 show that coastal economies seem to lose their advantage if they are resource-rich (the coefficient on Coastal*R is insignificantly different from zero i.e., coastal resource-rich grow at the same pace as coastal-resource poor economies). On the other hand, landlocked resource-abundant countries grow faster (by 1.3 percentage points) than the landlocked resource poor economies. Thus, even though the coastal resource-rich countries have the advantage of access to a coastline, this advantage seems to be offset by the adverse impact that resource-abundance may have on growth through the various channels discussed above. In the case of the landlocked resource-rich countries, however, rents from natural resources are sufficiently high to overcome higher transportation costs as a result of being landlocked. Thus, resource rich-countries, both landlocked and coastal, face a similar set of opportunities and policy challenges. Following Collier and O'Connell (2007), we therefore group the countries into one of the following three groups: coastal resource-scarce (CORS), landlocked resource scarce (LLRS) and resource-rich (RR), whether coastal or landlocked. Using the same sample as in Table 2, we estimate the following equation to see if there is a difference in the growth performance of the three groups[7]:

$$\text{Growth } GDPpc_{it} = \beta_0 + \beta_1 CORS_i + \beta_2 RR_i + \text{Time FE} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

[7] Estimated coefficients show the growth performance of the three groups. The default group in the regression is the landlocked resource-poor countries, whose average growth is given by the constant term, β_0. The average growth of coastal resource-poor is $\beta_0 + \beta_1$. And the average growth of resource-rich is $\beta_0 + \beta_2$.

Annual growth in GDP per capita is the dependent variable, *RR* is a dummy variable that takes on 1 if the country is a resource-rich economy, and 0 otherwise; *CORS*=1 if the country is coastal and resource-scarce, and 0 otherwise. Time fixed effects for each year are also included. Results are shown in Table 3. Coastal resource-scarce economies grow faster than the resource-rich countries (column 1) and both groups in turn grow faster than the landlocked resource-scarce economies (column 1). Historical experience, thus, shows that landlocked-resource scarce and resource-rich countries have performed worse than the coastal resource-scarce economies.

Table 3: Growth across three groups: resource-rich, landlocked resource-scarce, and coastal resource scarce

Dependent Variable: Growth in Real GDP per capita		
	(1)	**(2)**
CORS	1.34***	0.55
	(0.27)	(0.37)
RR	1.13***	0.32
	(0.38)	(0.48)
CORS*SSA		-1.71***
		(0.25)
LLRS*SSA		-1.66***
		(0.45)
RR*SSA		-1.20**
		(0.60)
Constant	0.67***	2.01***
	(0.24)	(0.34)
Observations	3999	3999
R-squared	0.04	0.05

Notes: OLS estimates are reported. Sample consists of 100 developing countries with data for at least 39 years (for the period 1960-2000). Robust standard errors in parentheses. ***, **, * denotes statistical significance at 1%, 5%, and 10% respectively. Year fixed effects are included in both regressions. CORS (and LLRS) takes the value 1 if it is a coastal (landlocked) resource-scarce economy and 0 otherwise. Resource-rich is a dummy variable that takes the value 1 if the country is resource-rich as defined in footnote 3 and 0 otherwise. SSA takes the value 1 if the country is in the Sub-Saharan African region and 0 otherwise. Regression estimated is specified in equation 2.

Countries in Central Asia share both features: some of them are resource-rich (and of course landlocked), and some of them are both landlocked and resource-scare. Most of the countries in the region (except Mongolia) are newly independent countries that were formed after the disintegration of the former USSR and thus have limited economic history of their own. Before we examine their performance, we look at another region that is also landlocked and resource-rich, Sub-Saharan Africa (SSA). We look at SSA solely because countries in that region are landlocked and resource-rich, just like the Central Asian countries. The two regions differ substantially on many other counts such as institutional quality, geography,

ethnic diversity, past colonial experience, legal origins, and investment climate, etc., factors that also determine the long term growth prospects of an economy. In Column 2 of Table 3, equation 2 is augmented to include interactions of the three groups with a dummy variable (SSA) that equals 1 if the country is in the SSA region (i.e., RR*SSA, LLRS*SSA, and CORS*SSA). Results show that across the three groups, the performance of SSA is below the global average. However, the underperformance, relative to the respective global averages, was most severe for the coastal resource-scarce economies, followed by that of the landlocked resource-scarce countries. This indicates that the non-SSA coastal resource-scarce countries' growth was higher, over the period 1960-2000, than that of the SSA countries; whereas growth in non-SSA landlocked resource-scarce countries was slower and closer to the growth of landlocked resource-scarce SSA countries.

Turning our attention to Central Asia, Figure 2 shows the region's growth performance and that of the rest of the developing world. After the initial slump, growth in the Central Asian countries picked up significantly and outperformed the rest of the developing world. The resource-rich countries witnessed their first commodity boom post 2000. In Table 4 we examine the effect of being landlocked and resource-rich on growth in the Central Asian countries.[8] We estimate the following equation:[9]

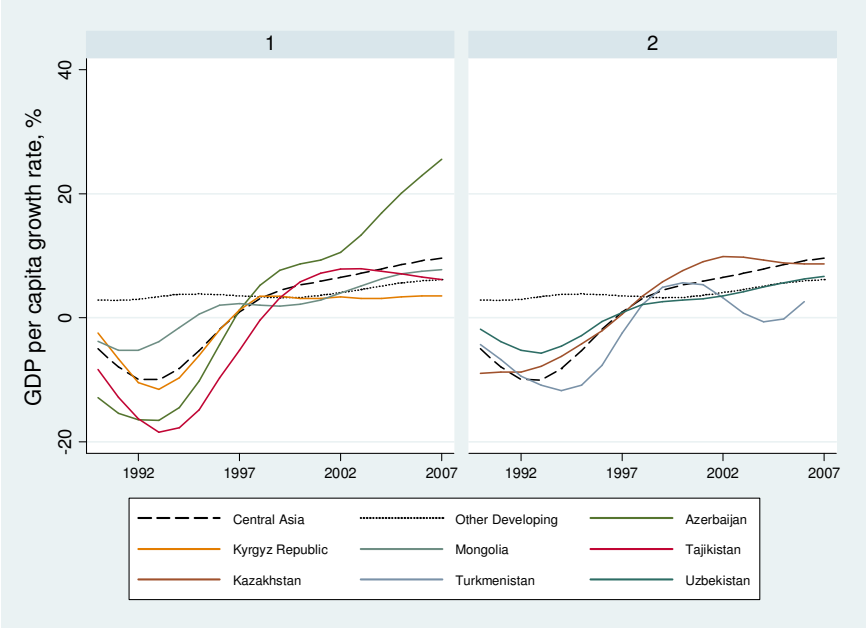
$$\text{Growth } GDPpc_{it} = \beta_0 + \beta_1 CORS_i + \beta_2 RR_i + \beta_3 CASIA_i + \text{Time FE} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

where *RR* is a dummy variable that takes 1 if the country is resource-rich, and 0 otherwise, *CORS*=1 if the country is coastal and resource-scarce, and 0 otherwise; and *CASIA*=1 if it is a Central Asian country and 0 otherwise.

[8] For Tables 4 through 7, real GDP per capita (measured in PPP terms, 2005 prices) is used to calculate the growth rates. Data for Turkmenistan in the estimating sample for Tables 4 and 5 is from The Conference Board's Total Economy Database (see footnote 5).

[9] This specification corresponds to column 2 of Table 4. See footnote 3 for a definition of resource-rich countries and footnote 1 for a list of the Central Asian countries.

Figure 2: Annual GDP per capital growth rate in Central Asia and rest of the developing world



Source: WDI. Notes: GDP per capita growth rates shown here are three year moving averages. Group average for Central Asia and other developing are population weighted growth rates of countries in the respective group.

The time period is limited to 1994-2006 to include all the Central Asian countries with data for all the years. As a result, the sample expands to 136 countries.[10] Results indicate that there was no difference in the growth performance of the three groups during 1994-2006, with an average growth rate for the period of 2.37% (column 1). Second, average growth performance in the Central Asian countries is the same as in the rest of the developing world (column 2). In the last two columns we augment equation 3 with dummy variables for Central Asia and SSA, and their interactions with RR, LLRS, and CORS. The last column shows that the landlocked resource-scarce Central Asian countries grew 3 percentage points below the average of other developing countries, whereas the resource-rich Central Asian countries grew 1.4 percentage points above the average of other developing countries (though the coefficient is statistically insignificant).

As shown in Figure 2, the Central Asian countries differ in their growth performance. Replacing the Central Asia dummy with country specific dummies (using the specification in column 2 of Table 4), we find that Azerbaijan (4 percentage points), Kazakhstan (2 percentage points), and Mongolia (1 percentage points) grew above the global average; but

[10] Resource-rich countries in Central Asia are: Azerbaijan, Kazakhstan, Mongolia, Turkmenistan, and Uzbekistan. Landlocked resource-scarce countries are the Kyrgyz Republic and Tajikistan. There are no coastal countries in Central Asia.

the Kyrgyz Republic (1.6 percentage points), Tajikistan (2 percentage points), Turkmenistan (2 percentage points) and Uzbekistan (0.6 percentage points) grew below the global average.[11]

Table 4: Growth experience of the Central Asian countries

Dependent Variable: Growth in Real GDP per capita				
	(1)	**(2)**	**(3)**	**(4)**
CORS	0.25	0.26	0.11	-0.55
	(0.36)	(0.36)	(0.36)	(0.43)
RR	0.58	0.58	0.33	-1.35***
	(0.49)	(0.50)	(0.51)	(0.47)
CASIA		0.05		
		(0.88)		
LLRS*CASIA			-1.87	-3.03*
			(1.66)	(1.67)
RR*CASIA			0.87	1.39
			(1.03)	(0.99)
CORS*SSA				-2.01***
				(0.33)
LLRS*SSA				-2.14***
				(0.64)
RR*SSA				1.22
				(0.89)
Constant	2.37***	2.36***	2.51***	3.67***
	(0.33)	(0.33)	(0.33)	(0.40)
Observations	1768	1768	1768	1768
R-squared	0.05	0.05	0.06	0.07

Notes: OLS estimates are reported. Sample consists of 136 developing countries with data for all the years for the period 1994-2006. Robust standard errors in parentheses. ***, **, * denotes statistical significance at 1%, 5%, and 10% respectively. Year fixed effects are included in both regressions. CORS (and LLRS) takes the value 1 if it is a coastal (landlocked) resource-scarce economy and 0 otherwise. Resource-rich is a dummy variable that takes the value 1 if the country is resource-rich as defined in footnote 3 and 0 otherwise. SSA=1 if the country is in the Sub-Saharan African region and 0 otherwise. CASIA=1 if the country is in the Central Asia region and 0 otherwise (see footnote 1 for countries considered as Central Asia for purposes of estimation). Regression estimated is specified in equation 3.

It is important to note that the growth performance is being examined over a very short period, 1994-2006. The latter half of this period was characterized by an increase in commodity prices, benign global conditions, and easy access to credit. Resource-rich countries in Central Asia and around the world witnessed a tumultuous 2008, with a crash in commodity prices and a drastic decline in access to foreign capital. Recent work by Collier and Goderis (2007 and 2008) has shown that the increase in output following an increase in commodity prices is a short-run phenomenon and that over the long run the gains are offset by

[11] It is to be noted that though the point estimates are positive in the case of Azerbaijan, Kazakhstan, and Mongolia; and negative for the Kyrgyz Republic, Tajikistan and Uzbekistan, the coefficients in all cases are statistically insignificant.

a contraction in economic activity. A resource-rich economy ends up, within two decades, producing less than it would have in the absence of the price increase.

The Effect of Neighbors' Growth

Growth opportunities in Central Asia are dependent on whether the country is landlocked or rich in natural resources. Historical experience has shown (Table 3) that the countries neighboring landlocked resource-scarce countries are more fortunate by virtue of being either coastal resource-scarce or resource-rich (note that in Table 3 we divide the sample into these three mutually exclusive categories).[12] Consequently, landlocked resource-scarce economies' fortunes are tied to those of their neighbors. To test the hypothesis that neighbors' growth matters, i.e., that there are significant spillovers, we estimate the following specification:

$$\begin{aligned}\text{Growth } GDPpc_{it} &= \beta_0 + \beta_1 RR_i + \beta_2 LLRS_i + \beta_3 Ngr_{it} + \beta_4 LLRS_i * CASIA_i + \\ &\beta_5 RR_i * CASIA_i + \beta_6 Ngr_{it} * LLRS_i + \beta_7 Ngr_{it} * RR_i + \beta_8 Ngr_{it} * CASIA_i * LLRS_i \quad \ldots (4) \\ &+ \beta_9 Ngr_{it} * CASIA_i * RR_i + \text{Time FE} + \varepsilon_{it}\end{aligned}$$

Annual growth in GDP per capita is the dependent variable. *RR* is a dummy variable that takes 1 if the country is resource-rich, and 0 otherwise, *LLRS*=1 if the country is landlocked and resource-scarce, and 0 otherwise; *Ngr* is the neighbor's growth rate; and *CASIA*=1 if it is a Central Asian country, and 0 otherwise. The data used is for the period 1994-2006 and covers 135 countries. We use instrumental variable estimation and instrument neighbors' growth in the current period with its first and second lags. Results are shown in Table 5.

[12] This holds unless a country is double-landlocked like, for example Uzbekistan.

Table 5: Effect of neighbors' growth

Dependent Variable: Growth in Real GDP per capita			
	(1)	**(2)**	**(3)**
RR	-0.51**	-0.51**	0.25
	(0.22)	(0.22)	(0.29)
LLRS	-0.00	-0.00	0.05
	(0.17)	(0.17)	(0.40)
Neighbor Growth (Ngr)	0.19***	0.19***	0.29***
	(0.04)	(0.04)	(0.05)
LLRS*CASIA	-4.45***	-3.52***	-3.31***
	(0.91)	(1.05)	(1.10)
RR*CASIA	-0.20	-0.59	-1.09
	(0.64)	(0.72)	(0.73)
Ngr*LLRS			-0.01
			(0.12)
Ngr*RR			-0.32***
			(0.07)
Ngr*CASIA	0.53***		
	(0.11)		
Ngr*CASIA*LLRS		0.27	0.19
		(0.17)	(0.20)
Ngr*CASIA*RR		0.65***	0.87***
		(0.13)	(0.14)
Constant	-0.15	-0.13	-0.26
	(0.41)	(0.41)	(0.43)
Observations	5870	5870	5870

Notes: IV estimates are reported (first and second lags of neighbor growth rates are used as instruments for neighbor growth rates). Sample consists of 136 developing countries with data for all the years for the period 1994-2006. Robust standard errors in parentheses. ***, **, * denotes statistical significance at 1%, 5%, and 10% respectively. Year fixed effects are included in both the regressions. CORS (and LLRS) takes the value 1 if it is a coastal (landlocked) resource-scarce economy and 0 otherwise. Resource-rich is a dummy variable that takes the value 1 if the country is resource-rich as defined in footnote 3 and 0 otherwise. CASIA takes the value 1 if the country is in the Central Asia region and 0 otherwise (see footnote 1 for countries considered as Central Asia for purposes of estimation). Regression estimated is specified in equation 4.

Results indicate that one additional percentage point growth in the neighboring countries generates a spillover of 0.2 percentage points (column 1). In the case of the Central Asian countries, the spillover effects are stronger: one additional percentage point growth in the neighboring country yields a spillover of 0.7 percentage points. Both resource-rich (0.8 percentage points) and landlocked resource-scarce countries (0.5 percentage points) in Central Asia benefit from neighbors' growth (columns 2 and 3). These results suggest that the Central Asian countries can benefit from increased regional integration through lower trade barriers and improved trade facilitation measures. In particular, greater regional integration will help landlocked resource-scarce economies benefit from growth spillovers in the region.

3. THE EFFECT OF EXPORT STRUCTURE ON GROWTH

Thus far we have seen that resource-rich countries tend to underperform other countries in the long run. Over the short period 1994-2006, resource-rich countries in Central Asia region have outperformed the rest of the developing world. On the other hand, landlocked resource-scarce countries in Central Asia have performed below average. An alternative but complementary way to examine the impact of natural resource abundance on growth is to analyze the export structure. Using a cross-section of 109 countries for the period 1994-2006, we examine if countries with a higher share of manufacturing exports in GDP faster. The data is restricted to the period 1994-2006 so that we can include the Central Asian countries. We also include the rule of law (data for 2000-2001 as reported in Kaufmann et al. (2002) is used in all specifications) and primary enrolment (data for 2000-2001, from the Global Development Network Growth Database, is used in all specifications so that all the Central Asian countries can be included) to control for possible omitted variable bias arising out of the fact that both the share of manufacturing and GDP per capita growth could be higher due to good institutions and a more educated labor force. We estimate the following specification:

$$\text{Growth } GDPpc_i = \beta_0 + \beta_1 \ln(GDPpc_{iInitial}) + \beta_2 (prim\exp_gdp)_{iInitial} + \beta_3 (manuf\exp_gdp)_{iInitial} + \beta_4 Rule_i + \beta_5 (prim_enrol)_i + \varepsilon_{it} \quad \ldots\ldots\ldots (5)$$

where the dependent variable is the average annual growth rate of GDP per capita, (*GDPpc*) is initial GDP per capita, (*prim exp_gdp*) is the share of primary exports in GDP, (*manuf exp_gdp*) is the share of manufacturing exports in GDP, (*Rule*) is the rule of law, and (*prim_enrol*) is primary enrolment. Results from OLS estimation are shown in Table 6. [13,14]

[13] Due to lack of data on primary and tertiary enrollment, Turkmenistan drops out of the estimation sample in Tables 6 and 7.

[14] In column 2, the dependent variable is the average annual growth rate of GDP per capita over the period 1994-2000. In column 3, the dependent variable is the average annual growth rate of GDP per capita over the period 2000-2006, and initial values for the year 2000 are used as explanatory variables. In columns 4 and 5, the panel has two time periods, 1994 to 2000 and 2000 to 2006. In this case growth rates over the respective periods are the dependent variables and initial values in each period are the explanatory variables.

Table 6: Share of manufacturing exports and primary exports in GDP and growth

Dependent variable: Average annual growth rate of GDP per capita					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	1994-06	**1994-00**	**2000-06**	**Panel**	**Panel**
Log of Initial GDP per capita	-0.29	-0.71***	0.02	-0.43**	-9.33***
	(0.24)	(0.22)	(0.31)	(0.19)	(2.14)
Initial Share of Primary Exports in GDP	-3.98	-4.13*	1.43	0.37	2.68
	(2.46)	(2.33)	(2.63)	(2.06)	(3.02)
Initial Share of Manufacturing Exports in GDP	2.41	5.51***	3.97*	4.48**	7.57***
	(2.24)	(1.86)	(2.38)	(1.78)	(2.71)
Rule of Law	0.80**	1.33***	-0.07	0.67**	
	(0.34)	(0.38)	(0.43)	(0.29)	
Primary Enrolment	0.02	0.03***	-0.003	0.02*	
	(0.01)	(0.01)	(0.01)	(0.01)	
Constant	3.59*	4.48**	3.01	3.55**	99.92***
	(2.04)	(1.97)	(2.49)	(1.54)	(22.79)
Time FE				Yes	Yes
Country FE				No	Yes
Observations	109	109	109	218	218
R-squared	0.09	0.26	0.04	0.15	0.78

Notes: OLS estimates are reported. Sample consists of 109 developing countries for the period 1994-2006. Robust standard errors in parentheses. ***, **, * denotes statistical significance at 1%, 5%, and 10% respectively. Regression estimated is specified in equation 5.

Column 1 shows the results for the period 1994-2006. Columns 2 and 3 split the period under study into two halves, and in columns 4 and 5 we create a panel of 109 countries and two time periods (1994-00 and 2000-06). Broadly, we find that there is convergence i.e., countries with lower initial income per capita grew faster. Our key variable of interest is the share of manufacturing exports in GDP. Countries with a higher share of manufacturing exports to GDP grow faster. Likewise, a higher share of primary exports in GDP has a statistically insignificant effect on growth.[15] This result is different from that of Sachs and Warner (1995), who found a negative and a statistically significant effect of a higher share of primary exports in GDP on growth. This could stem from a difference in the time period under study and also the countries included in the sample. In addition, we are looking at a relatively short time period because of our interest in the Central Asian countries. Typically, these relationships should be examined over a longer time horizon.

[15] Primary exports are defined as in Sachs and Warner (1995). This includes all exports in SITC (Rev 2) categories of 0, 1, 2, 3, 4 and 68. Manufacturing exports are exports in SITC categories 5 to 8 (except 68). Export data is from the UN COMTRADE, and GDP data comes from WDI. This definition of primary exports is different from the one used for figure 1 (see footnote 2) which focuses only on natural resources.

Despite the caveats about the sample size and the period under study (including recession), our results highlight the importance of the manufacturing sector as engine of growth (consistent with Kaldor's first law).[16]

Export Sophistication Matters

Hausmann et al. (2007) show that the composition of a country's export basket has important consequences for its growth prospects; and that countries with more sophisticated export baskets grow faster. On these grounds, Hidalgo et al. (2007) argue that development should be understood as a process of accumulating more complex sets of capabilities and of finding paths that create incentives for those capabilities to be accumulated and used. The implication is that a sustainable growth trajectory must involve the introduction of new goods and not merely involve continual learning on a fixed set of goods. Such diversification will allow a shift towards high value added products in the core of the "product space" (Hidalgo et al. 2007) and will make it easy for countries to shift to other products.[17]

Using a sample of 81 countries for the period 1994-2006, we examine if export sophistication (EXPY) affects future growth. We also control for tertiary enrolment (data for 2000-01, from Global Development Network Growth Database, is used in all specifications so that all the Central Asian countries can be included) and institutional quality (data for 2000-01 as reported in Kaufmann et al (2002) is used for all specifications). This is to control for omitted variable bias that may affect both GDP per capita growth and EXPY. The sophistication level of a product is the weighted average of the per capita GDPs of all the countries exporting that product, where the weights are the ratio of the share of that product in a country's export to the sum of the share of that product in the exports of each country. Using the ordinary least squares (OLS) approach, we estimate the following specification:

$$\text{Growth } GDPpc_i = \beta_0 + \beta_1 \ln(GDPpc_{iInitial}) + \beta_2 \ln(EXPY)_{iInitial} + \beta_3 Rule_i + \beta_4 (tert_enrol)_i + \varepsilon_{it} \quad \ldots (6)$$

where the dependent variable is the average annual growth rate of GDP per capita, (*GDPpc*) is initial GDP per capita, (*EXPY*) is a measure of the sophistication level of the country's

[16] Kaldor's first law states that manufacturing acts as the engine of growth.

[17] The product space is a map of all products exported in the world, drawn using network theory. It shows how close products are to each other in terms of the likelihood of exporting one given that the other one is exported. See Hidalgo et al. (2007) for details.

export basket, (*Rule*) is the rule of law, and (*tert_enrol*) is tertiary enrolment. Results from the estimation of the above equation are shown in Table 7. [18]

Table 7: Export Sophistication (EXPY) and growth

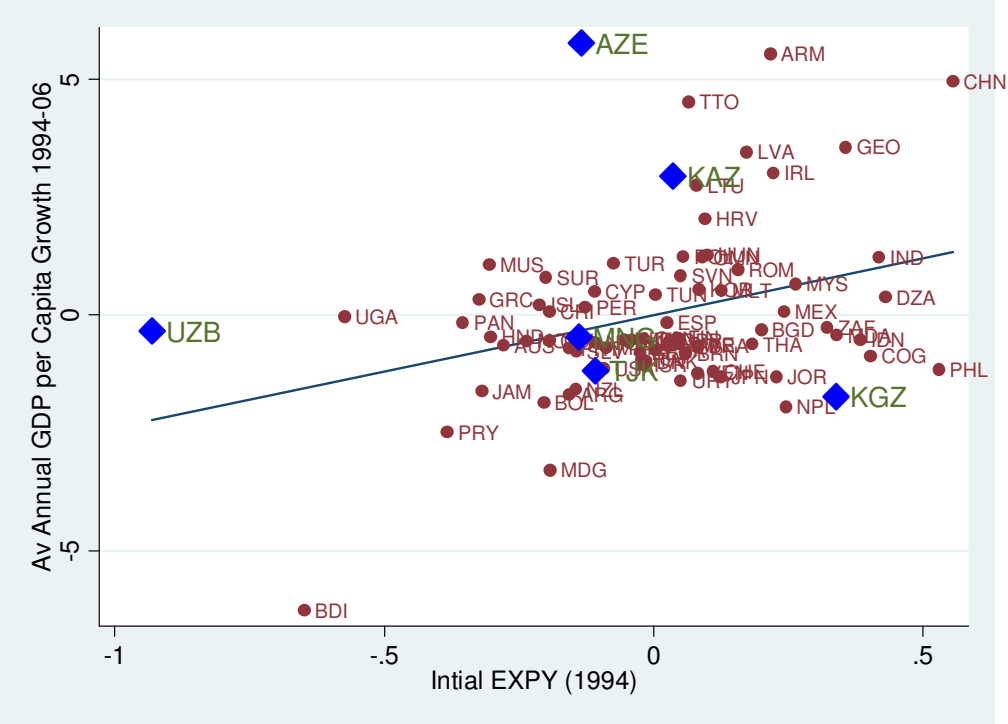
Dependent variable: Average annual growth rate of GDP per capita					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	1994-06	**1994-00**	**2000-06**	**Panel**	**Panel**
Log of Initial GDP per capita	-1.65***	-1.45***	-1.82***	-1.67***	-9.53***
	(0.41)	(0.42)	(0.66)	(0.38)	(3.15)
Log of Initial EXPY	2.40**	2.25**	3.78**	3.30***	3.07
	(1.03)	(1.08)	(1.57)	(0.94)	(2.79)
Rule of law	0.54	1.20***	-0.32	0.44	
	(0.32)	(0.35)	(0.49)	(0.31)	
Tertiary Enrolment	0.02*	0.02*	0.02	0.02	
	(0.01)	(0.01)	(0.02)	(0.01)	
Constant	-6.11	-7.27	-16.78	-14.68**	59.22
	(8.18)	(8.54)	(11.47)	(7.09)	(39.62)
Time FE				Yes	Yes
Country FE				No	Yes
Observations	81	81	79	158	158
R-squared	0.23	0.30	0.22	0.20	0.73

Notes: OLS estimates are reported. Sample consists of 81 countries for the period 1994-2006. Robust standard errors in parentheses. ***, **, * denotes statistical significance at 1%, 5%, and 10% respectively. Regression estimated is specified in equation 6.

Column 1 shows the results for the period 1994-2006. Columns 2 and 3 split the period under study into two halves, and in columns 4 and 5 we create a panel of 79 countries and two time periods (1994-00 and 2000-06). We find that after controlling for initial per capita income, institutional quality, and rule of law, the initial sophistication level of a country's export basket (EXPY) has a positive and a statistically significant impact on future growth. A ten percentage point increase in EXPY adds 0.25-0.35 percentage points to the average annual growth rate. This result is also summarized in the partial regression plot shown in Figure 3, which shows the positive relationship between EXPY and GDP per capita growth obtained after controlling for other factors. Given the positive impact of export sophistication on future growth, Central Asian countries should take a more aggressive stance in supporting export diversification and export upgrading.

[18] In column 2, the dependent variable is the average annual growth rate of GDP per capita over the period 1994-2000. In column 3, the dependent variable is the average annual growth rate of GDP per capita over the period 2000-06, and initial values for the year 2000 are used as explanatory variables. In columns 4 and 5, the panel has two time periods, 1994 to 2000 and 2000 to 2006. In this case growth rates over the respective periods are the dependent variables and initial values in each period are the explanatory variables.

Figure 3: Partial relationship between export sophisitication (EXPY) and growth



Source:UN COMTRADE, WDI, Author calculations.

4. CONCLUSIONS AND POLICY IMPLICATIONS

The Central Asian countries are landlocked and resource-rich. These two features bring with them significant growth challenges for the Central Asian countries. This paper has documented the growth experience of the Central Asian countries and examined their performance in the context of the historical experience of other landlocked and resource-rich countries. The key results are as follows:

(i) Over the period 1994-2006, the landlocked and resource-scarce countries of Central Asia have registered a slower GDP growth rate than other landlocked resource-scarce developing countries around the world; and resource-rich Central Asian countries grew at the same rate as other resource-rich developing economies. At the same time, one should keep in mind the short period under study, only 13 years. Historical experience shows that an increase in output following higher commodity prices is temporary. In the long-run, any increase in output disappears leaving a resource-rich country worse off than it would otherwise have been.

(ii) There are benefits derived from having "good" neighbors in the form of growth spillovers. In the case of the Central Asian countries, spillovers are even higher. This calls for greater regional cooperation and enhanced regional integration through regional transport infrastructure, improved trade facilitation, and improved neighbors' economic policies.

(iii) Countries with a higher share of manufacturing exports in GDP grow faster. And the more sophisticated a country's export basket is, the higher its future growth. Central Asian countries should, therefore, take a more aggressive stance in supporting export diversification and export upgrading.

Figure 4: Policy matters: resource abundance and geography

	Landlocked	**Coastal**
Resource Poor	Challenge: high transport cost; limited access to global market Key: link with good neighbors to use their infrastructure	Challenge: identify correct policies to harness trade potential Key: capitalize on your access to global markets through labor-intensive manufacture exports
Resource Rich	Challenge: avoid "Dutch Disease"; move out of the periphery of the product space Key: optimize use of resource revenue to finance infrastructure investment	Challenge: avoid "Dutch Disease"; move out of periphery of the product space Key: optimize use of resource revenue to finance expansion into high value-added activities

The policy matrix shown in Figure 4 summarizes the challenges that come with different combinations of geographic location and availability of resources. Historical experience shows that landlocked resource-scarce economies grow, on average, the least. Landlocked economies face high transport cost and have limited access to global markets. As a result, landlocked countries depend on their neighbors and on the existing regional infrastructure. A possible growth avenue for landlocked resource-scarce countries is to

venture into service exports, which are not likely to be affected by the geographic location (i.e., lack of access to the sea).

At the other extreme, the coastal resource-poor countries have easy access to world markets and do not face the challenges of a resource-rich economy. These countries need to identify correct policies to harness their trade potential and have to upgrade their export package toward more sophisticated goods. The challenges that natural resource-abundant economies face, whether landlocked or coastal, are the same. These include avoiding the "Dutch disease," avoiding deterioration of institutional quality, and diversification of their export basket toward manufactures. The key is the optimal use of the resource revenues to finance infrastructure investment, especially in the case of landlocked resource-rich countries, and the expansion into high value-added activities.

Summing up, the resource-rich economies of Central Asia have to accelerate their rate of structural transformation; while the landlocked economies have to deepen regional integration and develop their service sectors.

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