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Potential Economic Impact of CAREC Corridor 1b

This report[1] presents detailed estimates for economic impacts of a large road corridor project in Kazakhstan. Using a forward-looking general equilibrium assessment model, we estimate direct and indirect effects of this new transport infrastructure, including trade facilitation, transport cost reduction, and the effects of increased productivity in trade and transport services for sectors using these services intensively. This approach captures not only direct project costs and benefits, but the wide array of economic activities that are facilitated by infrastructure through transport and distribution services. Generally speaking, cumulative indirect benefits far outweigh direct project costs and benefits and these benefits accrue both to Kazakhstan and to many economies linked to it by trade. The latter beneficiaries include not only neighboring countries, but more remote trading partners including the European Union and United States. Because of their pervasive linkages, more efficient trade and transport services benefit every sector of the Kazakhstan economy, and by 2020 indirect benefits of the road corridor are more than 10 times the direct project net benefits.

Project Overview

The CAREC Program is supporting infrastructure and other investments across the greater Central Asia region to facilitate economic growth and regional integration. Included among these is a large road network project in Kazakhstan. As the map indicates, this project implicates not only many regions of Kazakhstan, but also its major trade routes to neighboring and more distant trading partners. Like many large projects, the costs and benefits of this undertaking will be complex and dispersed over time and across domestic, regional, and even global stakeholder groups. Using a new modeling facility being developed for the Central Asia region, we examine the growth effects of the project over the period 2008–2030.

Investment in the Kazakhstan road corridor project is very large in the early years, with negative gross net cash flow exceeding 8% of GDP in the second year, and in excess of

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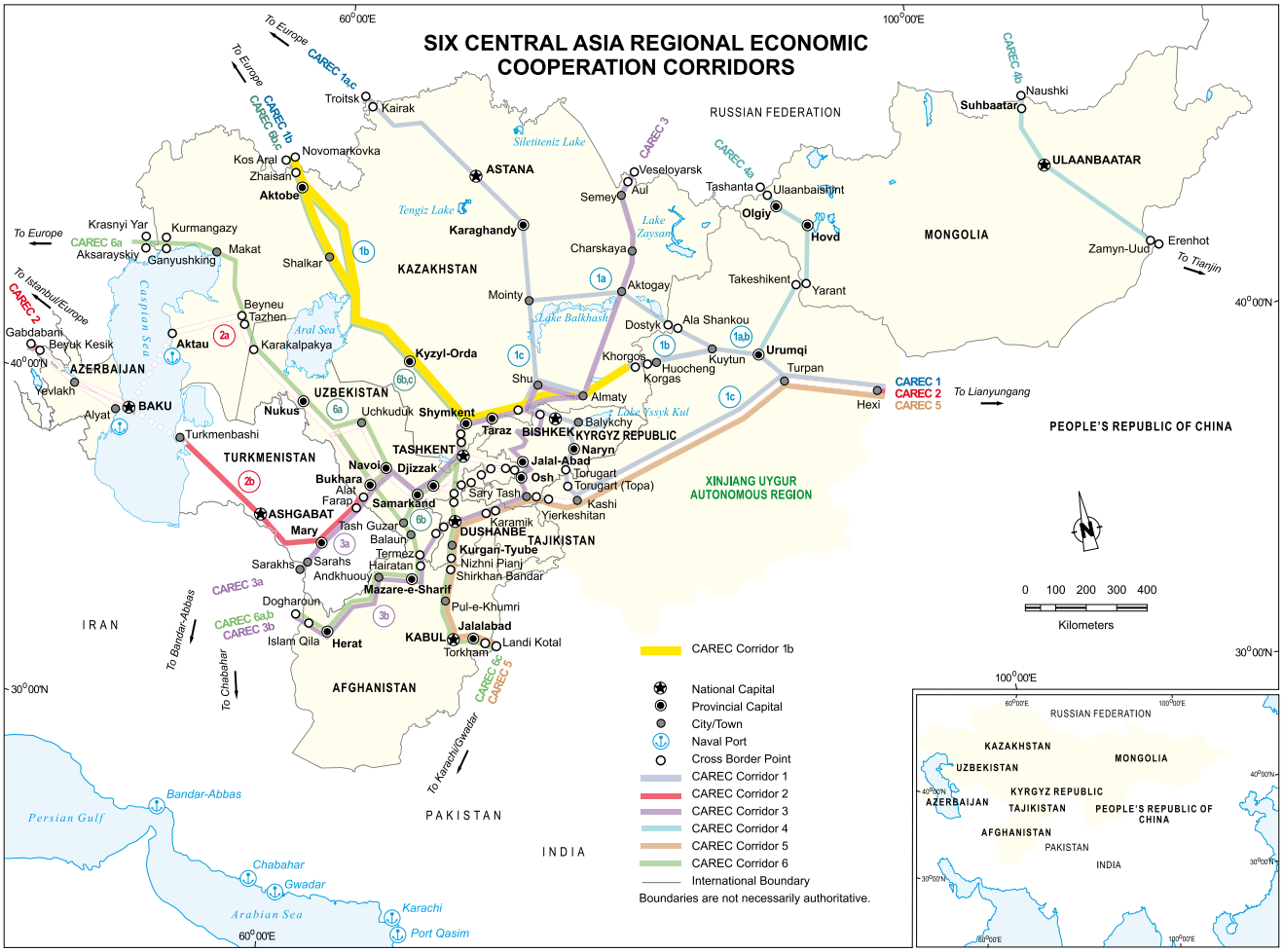


5% in each of the first four years. The significance of direct project finance tapers off sharply after this, but the economic value of the transport and distribution services this corridor provides, including collateral investments around the corridor, will continue to grow in absolute terms and relative to the rest of the country, where infrastructure services are generally inferior to those provided by this project. The primary objective of this analysis is to elucidate these complex and far-reaching indirect effects, by which the project exerts economic growth leverage across Kazakhstan, the CAREC region generally, and via trade to even more distant regions.

Scenarios

To reveal the effects of the project, we examine its properties with incremental policy scenarios, beginning with a baseline, and estimating component effects of the project according to a conceptual framework set forth below. The scenarios are summarized in Box 1. The baseline takes account of consensus growth estimates over the scenario period (2008–2030), assuming no action is taken on the road corridor project. The first alternative scenario recognizes only the direct project financial effects and assesses these costs and benefits separately. This includes the Keynesian impact of direct project expenditures and other standard transport project assessment

variables such as vehicle operating costs (VOC) and other direct usage benefits of the infrastructure.

These kinds of benefits are of course essential to understanding the local returns to infrastructure. But they fail to capture extensive linkage effects across supply and expenditure chains that implicate transport infrastructure into the wider universe of economic activity. For example, VOC statistics measure the direct cost savings to a vehicle while it is using the corridor, but have nothing to say about the economic implications of actually using the vehicle. For example, a cargo truck may save 10% on transit cost, but these cost benefits will multiply for all the downstream partners of the truck owner, including those who use the truck operator's services, intermediate and final buyers of its contents, and all up and downstream suppliers of the goods and services to the operator across its now expanded range of profitable operation.

As reduced transport costs expand the physical horizon of profitability for all transport services they can be expected to increase capacity use across a broad spectrum of existing transport and distribution activities and to stimulate new private investment. Energy fuel suppliers, appurtenant services (e.g. food and lodging), for example, can be expected to grow not only along the corridor but across a larger network of trade made newly profitable by the corridor. This collateral growth effect not only increases the road use, but also integrates the national and regional economy, increases product variety, and sharpens comparative advantage to increase trade and unit profitability by realizing economies of scale.

The second scenario focuses on a central component of these collateral growth effects: the contribution of trade and transport productivity as distribution sectors experience lower costs and pass these gains on to all their client sectors. The result is more transport-intensive growth for the economy at the national, regional, and global level. Because distribution services are essential to market access, rising productivity in the sector accelerates trade for all other sectors, conferring growth leverage from transport services to the rest of the economy.

The third scenario captures another network growth externality: the benefit of reduced delays, product losses, and depreciation on transport-related products. For perishable products like agriculture outputs such losses can be prohibitive, and reducing them significantly can dramatically increase rural market participation. For other commodities, even non-perishables, delays induce economic losses by escalating inventory and storage costs.

The fourth and final scenario component is designed to show the effect of falling trade, transit, and transportation margins on trade, both domestically and across Kazakhstan's borders. Around the Central Asia region transport margins can be very high, in some cases exceeding 100% because of low quality roads, border delays, and other soft and hard infrastructure obstacles. Corridors like the one being evaluated can dramatically reduce these costs on an average basis, increasing the profitable scope of trade and also its intensity.

Results

Key project impact indicators are summarized in Table 1. When all direct and indirect impacts are taken into account (the all-inclusive *Trade* scenario), completing the corridor

These results are a testament to the pervasive contributions of infrastructure as an economic growth catalyst, and reach far beyond the direct project financial effects

Box 1: **Scenarios**

1. **Vehicle Operating Costs (VOC):** Includes complete project outlays and estimated economic benefits from improved safety, travel time, and reduced vehicle depreciation
2. **Productivity (Prod):** Includes above and estimates of productivity gains for transport and distribution sectors
3. **Losses:** Includes above and reductions in product losses due to spoilage, damage, delays, and other adverse effects of roadway inefficiency
4. **Trade:** Includes above and estimates of reduced trade and transport cost margins

project would lead to 68% higher real GDP for Kazakhstan by 2020. A decade later (by 2030), these growth benefits would have compounded to achieve real GDP nearly three times higher than in the baseline. These results are a testament to the pervasive contributions of infrastructure as an economic growth catalyst, and reach far beyond the direct project financial effects.

Proceeding with the results assessment, an important caveat should be kept in mind. Scenario results like those reported should be interpreted as indicative of the economy's potential to realize the growth benefits estimated from hypothetical effects on operating costs; productivity; and trade, transit, and transportation margins. In this sense, these dramatic growth benefits represent upper bounds whose realization may be constrained by institutional imperfections and heterogeneity in the underlying environment.

For example, in the Productivity scenario we assume a hypothetical change in productivity of trade and transportation, applied in the model uniformly across all users of these services. In reality, the incidence of productivity effects, and the degree to which they are conferred upon downstream users, will vary across the economy. This heterogeneity will undermine full realization of the potential growth benefits. Having said this, experiments with alternative scenarios indicate that their qualitative nature of outcomes is robust, and that component policy benefits maintain their relative magnitudes, as does the implied distribution of benefits across stakeholder groups.

Within Kazakhstan, the directly affected transport and trade sectors will be even more dramatically affected with real output growth 79% and 77% higher, respectively, by 2020, and more than tripling by 2030. Sector results show some activities benefit less than those directly implicated in the project, but the economy-wide effects are substantial for most sectors.

As would also be expected, foreign trade is stimulated by the project, but by less than domestic economic activity. Exports and imports are 32% and 33% higher, respectively, by 2020, and 63% and 64% higher by 2030. These results are quite significant, yet smaller than domestic GDP growth for several reasons:

- initial domestic infrastructure is weak, and thus the corridor makes a bigger contribution to network effects domestically;
- growth over the next two decades will see significant emergence of

Table 1: **Key Project Impact Indicators**
(annual percentage change from baseline)

Kazakhstan		**2020**	**2030**
Gross domestic product (GDP)		68	290
Output	Transport	79	356
	Distribution	77	345
Exports	Total	32	63
Imports	Total	33	64
GDP	Other Central Asian republic (CAR)	43	152
	Russian Federation	4	12
	People's Republic of China (PRC)	6	17
	EU25	4	11
Kazakhstan exports	Other CAR	50	75
	Russian Federation	25	54
	PRC	36	67
	EU25	28	61
Kazakhstan imports	Other CAR	48	75
	Russian Federation	27	56
	PRC	37	69
	EU25	30	63

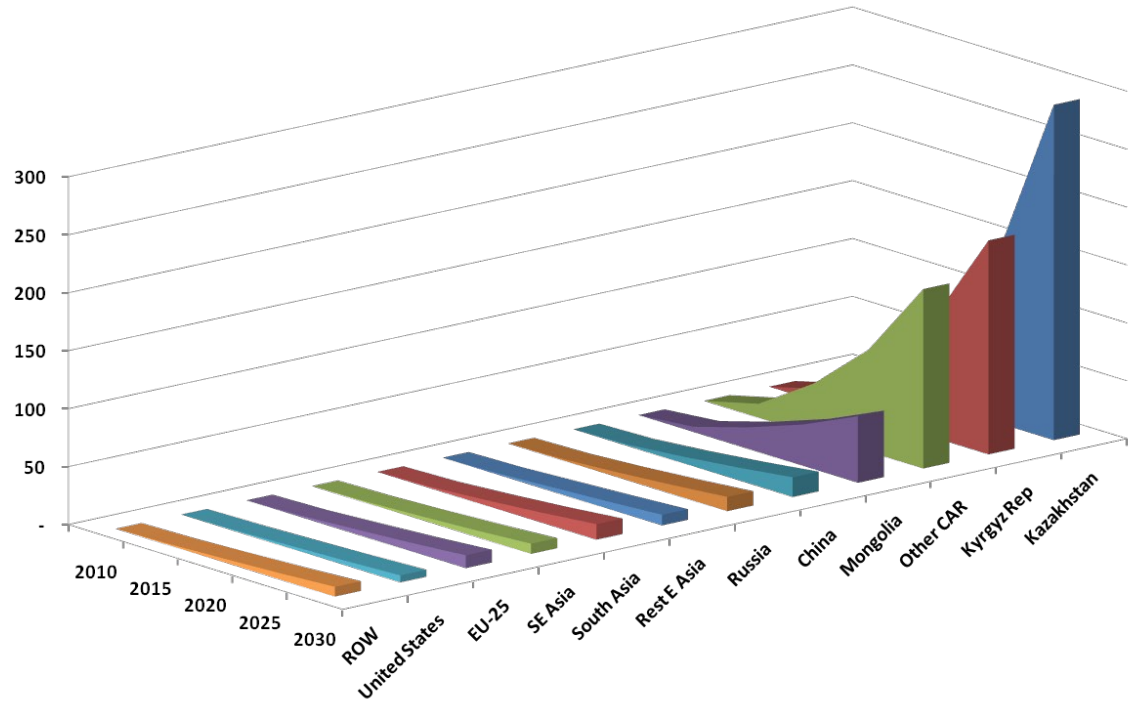
the Kazakhstan internal market and formal sector, reducing the country's very high current trade dependence; and

- GDP growth always includes an important compounding effect of savings-investment accumulation, which is absent from trade linkages.

GDP effects of the project for Kazakhstan's trading partners reveal significant regional spillovers, including above all the Central Asian economies, whose combined GDP is 43% percent higher in 2020 and 152% higher by 2030 (see Figure 2). The effect is greatest for immediate neighbours, like Kyrgyz Republic, which have high trade shares with and through Kazakhstan and relatively low initial GDP. These growth spillovers can be expected to radiate across the Central Asia region and beyond, and are an important justification for this project in the regional policy dialogue. Despite their size and diversity, both the Russian Federation and People's Republic of China (PRC) gain significantly from the project through trade linkages, with real GDP gains of 4% and 6%, respectively, by 2020 and 12% and 17% percent by 2030.

Bilateral trade flows reveal part of the growth leverage process, as Central Asian economies receive 50% more Kazakhstan exports and send 48% more imports by 2020, with these flows rising to 54% and 75%, respectively, by 2030. Bilateral trade with PRC is the next most dynamic, with demand for Kazakhstan exports rising 36% by 2020 and 67% by 2030, while PRC shipments to Kazakhstan grow 37% and 69% in the same periods with the project. Russian trade with Kazakhstan is about 25% higher in both directions by 2020 and more than 50% higher by 2030.

Figure 2: **Real GDP Growth** (annual change from baseline)



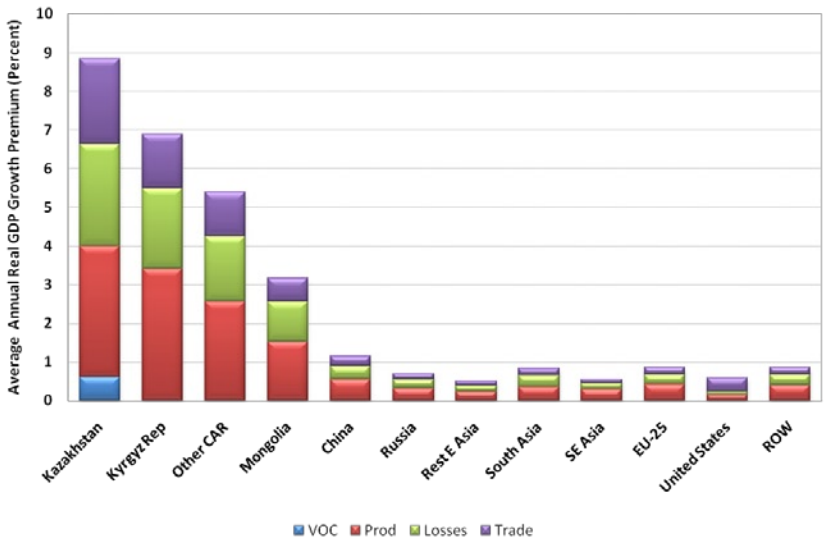
Transboundary spillovers confer significant growth leverage on other regional economies and can substantially benefit even more distant trade partners

Having said this, it is important to recognize the stakes that all Kazakhstan's trading partners have in regional infrastructure. It is clear that, while percentage effects vary with proximity, level effects depend on the volume of trade and size (capacity for export production and import absorption) of trading partners. Thus the European Union and even the distant U.S. economy capture significant nominal benefits from improved Central Asian transport infrastructure because of strong ties to the region through energy and capital goods markets, and relatively high import and export elasticities. These results support the essential message that the benefits of this large national project are truly multilateral. Significant nominal income gains accrue to larger economies, suggesting a broader basis for financing and policy support.

How do the growth benefits of the project decompose by scenario, or between the various types of growth effect? To see this, Figure 3 shows how real GDP increases by 2030 as a result of the project, separating the total benefit for each economy into each of the four sources of stimulus (scenarios 1–4). These results clearly indicate the importance of indirect project effects. Direct or Keynesian effects (isolated in the VOC scenario) are negligible for Kazakhstan's trading partners because this is a national project, yet they benefit quite significantly from linkages of their economies through the corridor.

Even in Kazakhstan, which captures all the Keynesian and other direct project benefits (VOC scenario, light blue), indirect effects are about 10 times greater as the efficiency benefits of improved transport propagate across all market-related activities in the economy. Indeed, higher productivity from transport and distribution services (*Productivity* scenario) make up the largest component of project-induced

Figure 3: **Real GDP Growth Premium by Scenario** (percent from baseline)



growth. Although neoclassical effects dominate the growth stimulus, trade and product distribution efficiency are also significant sources of growth advantage.

Given the dominance of indirect effects among infrastructure contributions to the growth and wider development process, it is reasonable to argue that project finance and assessment is seriously incomplete without an accounting of these. The direct project impacts, or the Keynesian impacts (light blue in Figure 3), represent less than 10% of the overall gains for the country hosting the project and none of those that (in some cases significantly) accrue to neighbours and more distant trade partners. It would be much easier to sustain constructive multilateral dialogue with evidence of this kind, in no small part because investments of this kind often lead to unilateral competition for scarce multilateral resources.

While productivity (*Prod*) effects are significant aggregate growth stimulus, they are even more important to real output. Cost factors in trade and transport confer profitability and enlarge marketable horizons for intermediaries, which in turn stimulates final and intermediate demand. Productivity growth, however, increases supply elasticities and accelerates the responsiveness of domestic producers to these opportunities. Demand expansion without this would be significantly dissipated in price escalation, but productivity benefits enable producers to meet rising demand with higher real output.

Results for Kazakhstan households are consistent with aggregate indicators, but the scenario components contribute in different ways. In particular, the Trade component is more important to households than to firms because the project improves international market access, both in terms of product variety and prices. Greater import competition also disciplines domestic prices, further enhancing domestic purchasing power.

Conclusions

The effects of infrastructure on economic activity are so pervasive that general equilibrium assessment is among the most appropriate tools for project assessment. In the case of large transport projects, like the road corridor project in Kazakhstan, extending national assessment to a multi-country framework is also advisable. Using this approach, it is apparent that the overall benefits of the Kazakhstan corridor project far outweigh project costs. Transboundary spillovers confer significant growth leverage on other regional economies and can substantially benefit even more distant trade partners.

More specifically, direct project finance (Keynesian) benefits are positive, but small compared to productivity, efficiency, and trade stimulus effects. Productivity gains are the largest source of growth benefits, but reduced losses and trade stimulus are of nearly equal benefit. Trade benefits confer growth leverage on CAREC regional neighbours, and also extend far beyond the borders of Kazakhstan to large but distant trading partners like the European Union and the United States. Trade margin reductions also increase domestic purchasing power and household real incomes. ■

Endnote

[1] This note is drawn from Roland-Holst, David, *Assessing Macroeconomic Effects of the Western Europe–Western China Transportation Corridor Investment: A General Equilibrium Perspective*. Working paper, Asian Development Bank, Manila, 2008.

About CAREC

The Central Asia Regional Economic Cooperation (CAREC) Program is a robust development partnership; a concrete example of countries and institutions cooperating to achieve a common purpose. The Program's overarching goal is development through cooperation, leading to accelerated economic growth and poverty reduction. By promoting and facilitating regional cooperation in transport, trade, energy, and other key areas of mutual interest, the CAREC Program helps the countries of greater Central Asia realize their immense potential in an increasingly integrated Eurasia.

The CAREC Program is a partnership of eight countries—Afghanistan, Azerbaijan, People's Republic of China, Kazakhstan, Kyrgyz Republic, Mongolia, Tajikistan, and Uzbekistan—and six multilateral institutions—Asian Development Bank (ADB), European Bank for Reconstruction and Development, International Monetary Fund, Islamic Development Bank, United Nations Development Programme, and World Bank—working together to promote regional economic cooperation. ADB serves as the CAREC Secretariat.

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