Regional Infrastructure Projects Involving West Asia:

A General Equilibrium Assessment for Kazakhstan

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Second Workshop for the ADBI's Flagship Study: Infrastructure and Regional Cooperation

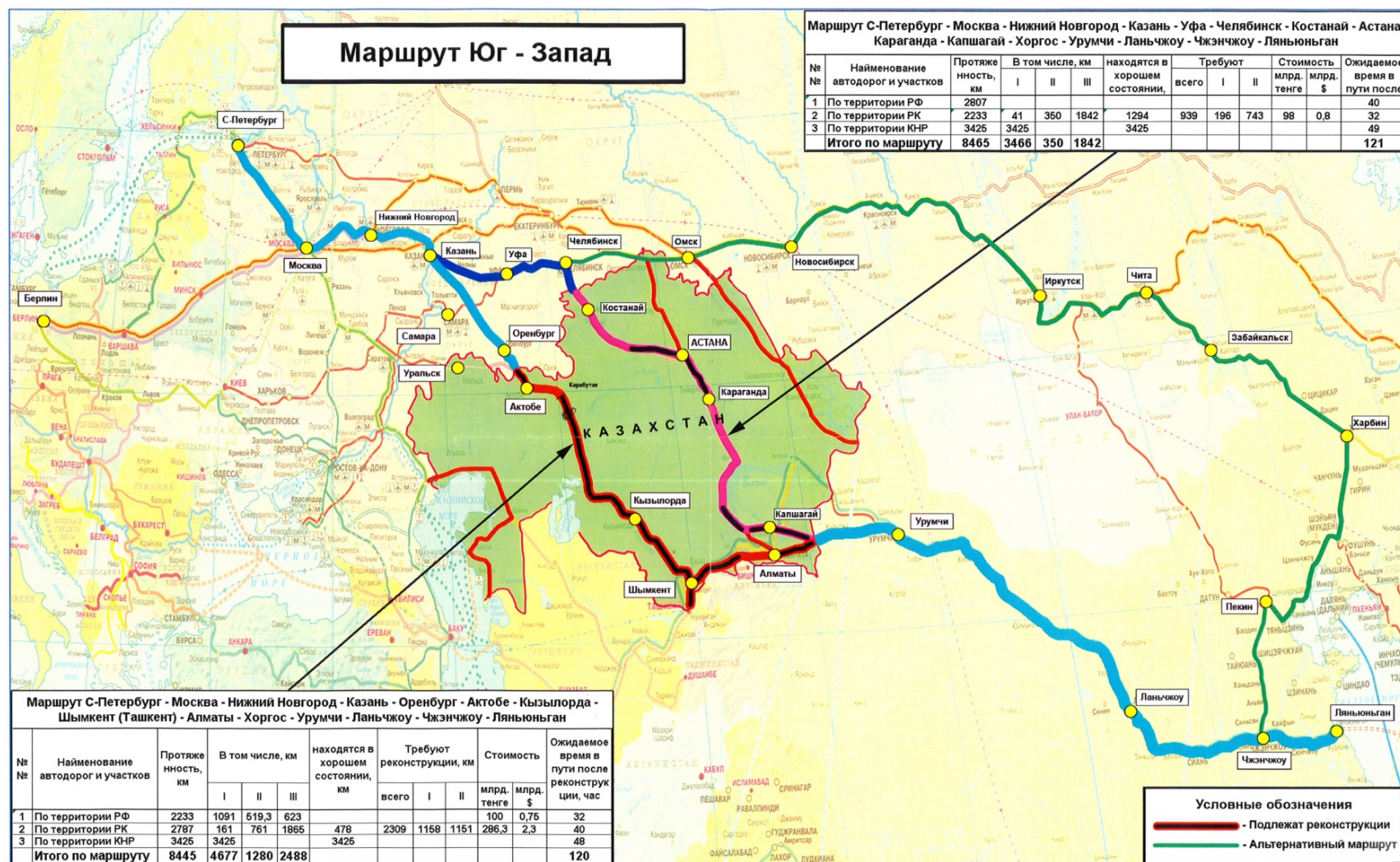**3-4 July 2008**
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Outline

1. Introduction and Motivation

2. Overview of the CAR Forecasting Model

3. Scenarios and assumptions

4. Results

5. Conclusions

6. Next steps

Introduction

- ➤ ADB is engaged across the Central Asian region for infrastructure and other projects to facilitate economic growth and regional integration.
- ➤ Included among these is a large road network project in Kazakhstan, a national project with strong transboundary spillovers
- ➤ Like many large projects, the costs and benefits of this will be complex and dispersed over time and across domestic, regional, and even global stakeholder groups.
- ➤ Using a new modeling facility beings developed for the Central Asian Region (CAR), we examine the growth effects of the project over the period 2008-2030.

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Map of the Corridor Project

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The Project is Very Large at Inception

	Monetary Stream (USD Millions)	Percent of Estimated GDP
2009	-950.174	(5.19)
2010	-1,809.129	(8.17)
2011	-1,915.303	(7.77)
2012	-1,915.303	(6.21)
2013	581.004	1.35
2014	643.909	1.13
2015	685.295	0.89
2016	730.158	0.72
2017	778.805	0.58
2018	831.568	0.46
2019	888.788	0.37
2020	950.838	0.30

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Motivation I: Why use an economic model?

➢ Fiduciary assessment of direct project costs and benefits is important, but the indirect effects of infrastructure can far outweigh direct effects.

➢ Large scale infrastructure exerts pervasive influence on economic behavior by changing microeconomic costs, incentives, and terms of market participation.

➢ Much more than a just financial investment, infrastructure can be a critical component of economic development. This broader economic role needs to be better understood.

Motivation II: Why a regional model?

- ➢ Because of unique geographic and institutional characteristics, the CAR needs its own research capacity to support its own policies.

- ➢ The role of trade as a catalyst for growth makes regional and international assessment essential.

- ➢ Policy coherence and evidence-based dialogue: Public and private stakeholders need more accurate prior information about the adjustment process to participate effectively.

- ➢ Projects may be local or national, but spillover effects implicate stakeholders across borders. This can arouse both cooperative and competitive interest, both of which need to be anticipated.

Motivation III: Why a General Equilibrium model?

1. *Complexity* - Given the complexity of today's market economies, policy makers relying on intuition and rules-of-thumb alone are assuming substantial risks.

2. *Linkage* - Indirect effects of policies often outweigh direct effects.

3. *Political sustainability* - Economic policy may be made from the top down, but political consequences are often felt from the bottom up.

GE models, supported by detailed data, can elucidate these linkages and improve visibility for policy makers.
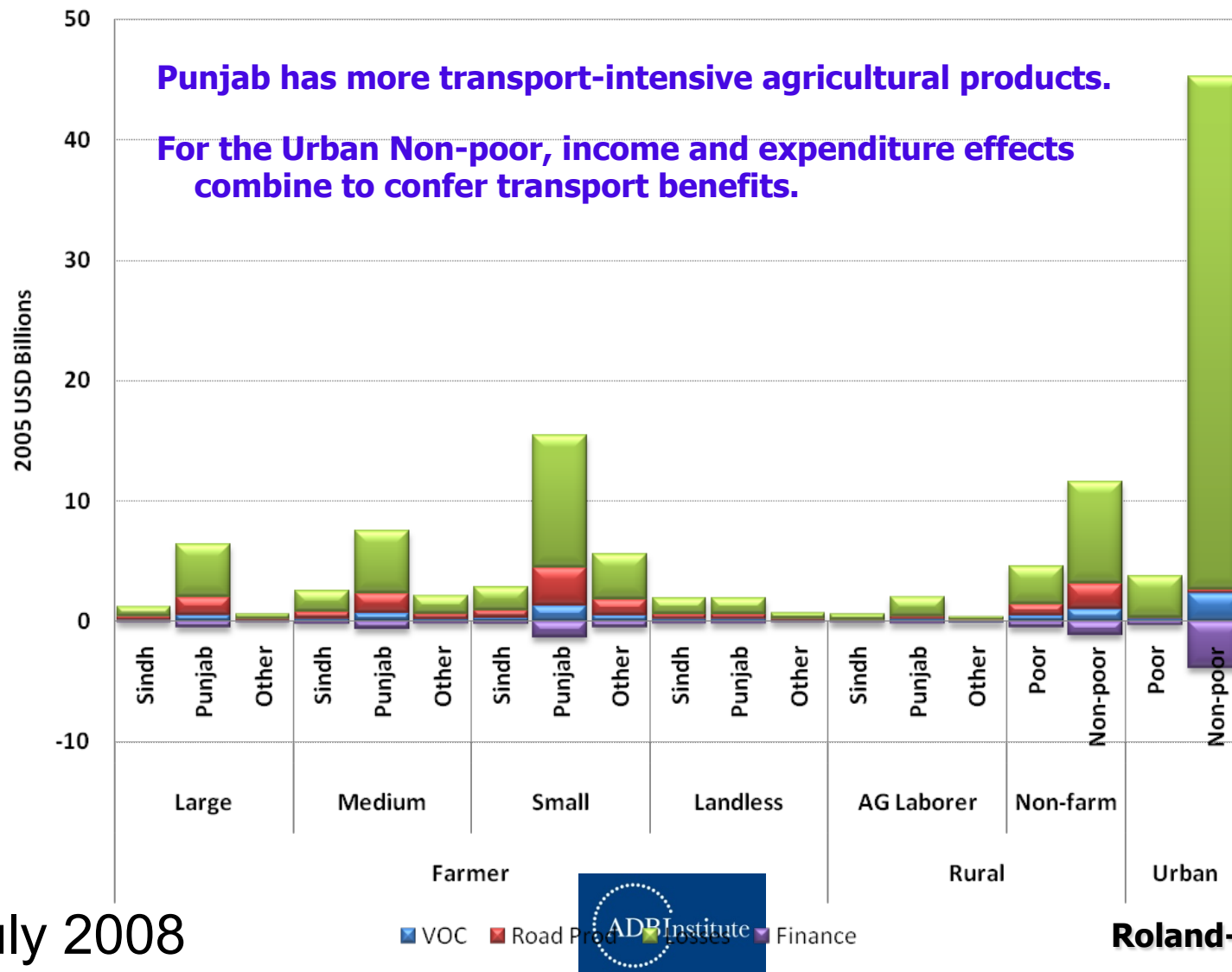
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What is a General Equilibrium Model?

- ➢ Detailed market and non-market interactions in a consistent empirical framework.

- ➢ Linkages between behavior, incentives, and policies elucidate detailed demand, supply, and resource use responses to external shocks and policy changes.

Two Modeling Perspectives

- Single country
  - More detailed incidence and adjustment
  - Fiscal/finance experimentation
  - Targeting
- Multi-country
  - Captures spillovers and shared growth interactions
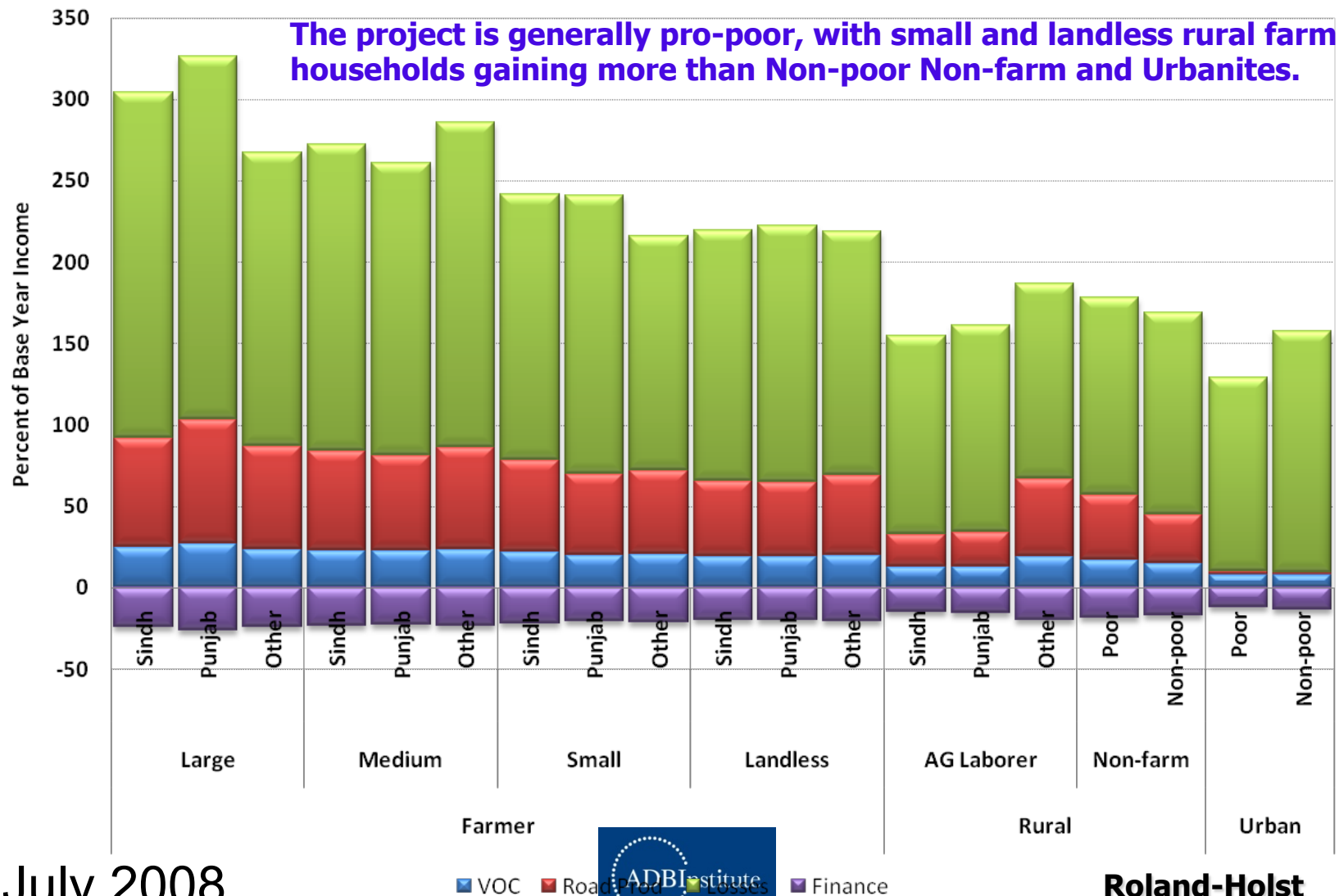 - Supports multilateral policy dialogue and financial analysis

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Household Real Income Growth
Cumulative Over Baseline, Pakistan 2006-2030

Punjab has more transport-intensive agricultural products.

For the Urban Non-poor, income and expenditure effects combine to confer transport benefits.

Household Income Growth as a Percent of 2006 Pakistan Income

The project is generally pro-poor, with small and landless rural farm households gaining more than Non-poor Non-farm and Urbanites.

Multilateral Model Structure

The modeling facility consists of two components:

1. Detailed economic data (2001/2)

   - Social Accounting Matrices (SAMs) for each of six CAR economies (Kazakhstan, Kyrgyz Republic, Mongolia, Russia, Xinjiang (under development)

   - Estimated bilateral trade flow table to integrate the individual country data

   - detailed fiscal accounts

2. Central Asian Regional General Equilibrium (CAGE) Model – a dynamic GE forecasting model

CAGE Data Resources

➢ Version 6 of the Global Trade Analysis Project (GTAP). This provides the core data for the Russian Federation and Chinese economies.

➢ Kazakhstan, Kyrgyz Republic, Mongolia, Xinjiang – 2001 Social Accounting Matrices estimated from official sources by the authors.

➢ Trade data – Estimated from raw data obtained from domestic official and multilateral sources

➢ Other – Trade and transport estimates are under development

Infrastructure from a GE Perspective

Infrastructure's contribution can be seen from three economic perspectives:

1. Keynesian – Aggregate demand and employment stimulus.

2. Ricardian – Reducing trade and distribution margins stimulates trade and intensifies comparative advantage.

3. Neoclassical – Endogenous growth benefits, including productivity, externalities, etc.

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Scenarios

To elucidate the effects of this large scale infrastructure project, we decompose it's properties into one business as usual and four incremental policy impact scenarios:

0. Baseline ("no investment") scenario
1. Vehicle Operating Costs – Includes complete project outlays and estimated economic benefits from improved safety, travel time, and reduced vehicle depreciation.
2. Productivity – 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.

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Real GDP Growth
(Percent of 2010, annual with respect to Baseline)

The main beneficiaries in relative growth terms are Kazakhstan and proximate economies. Regional spillovers are quite significant.
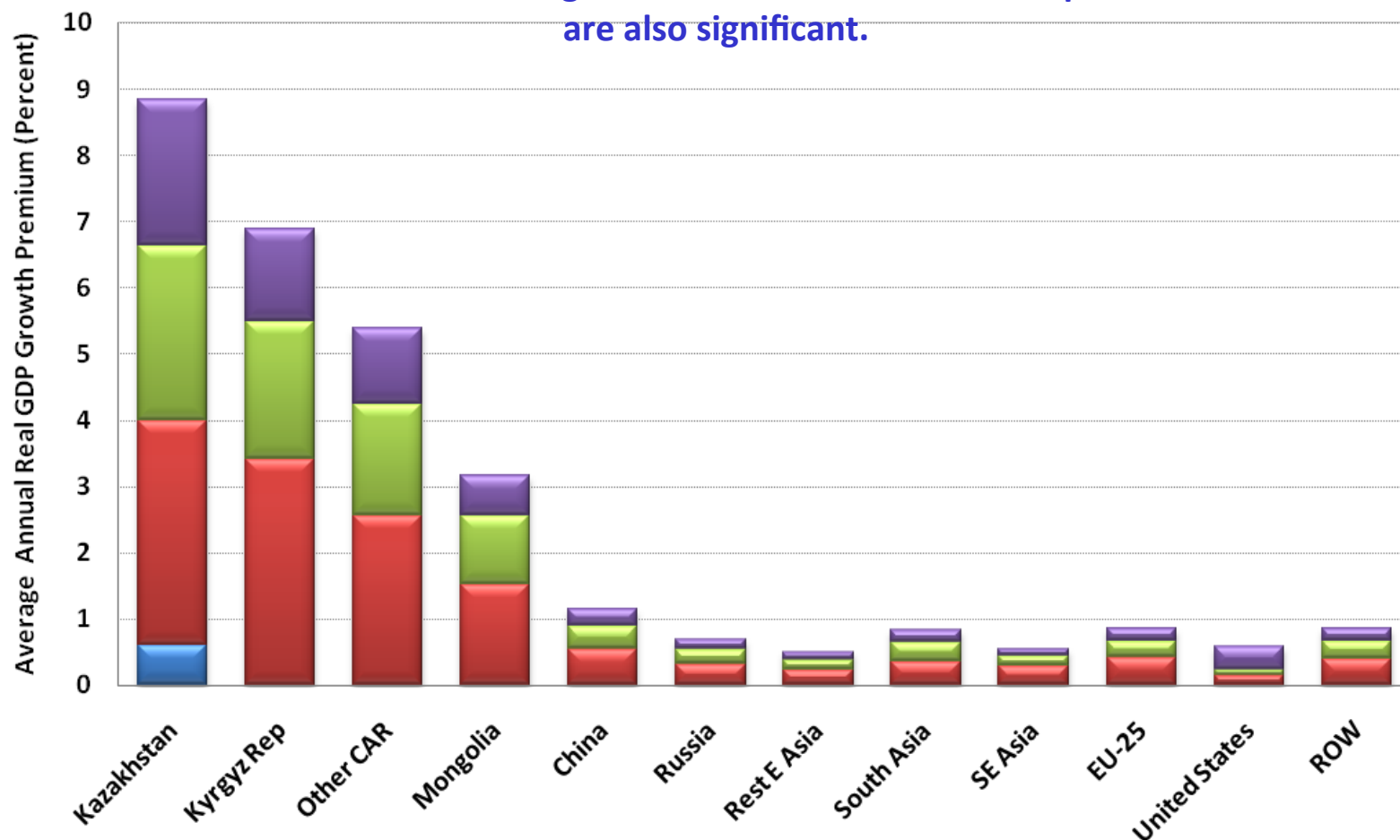

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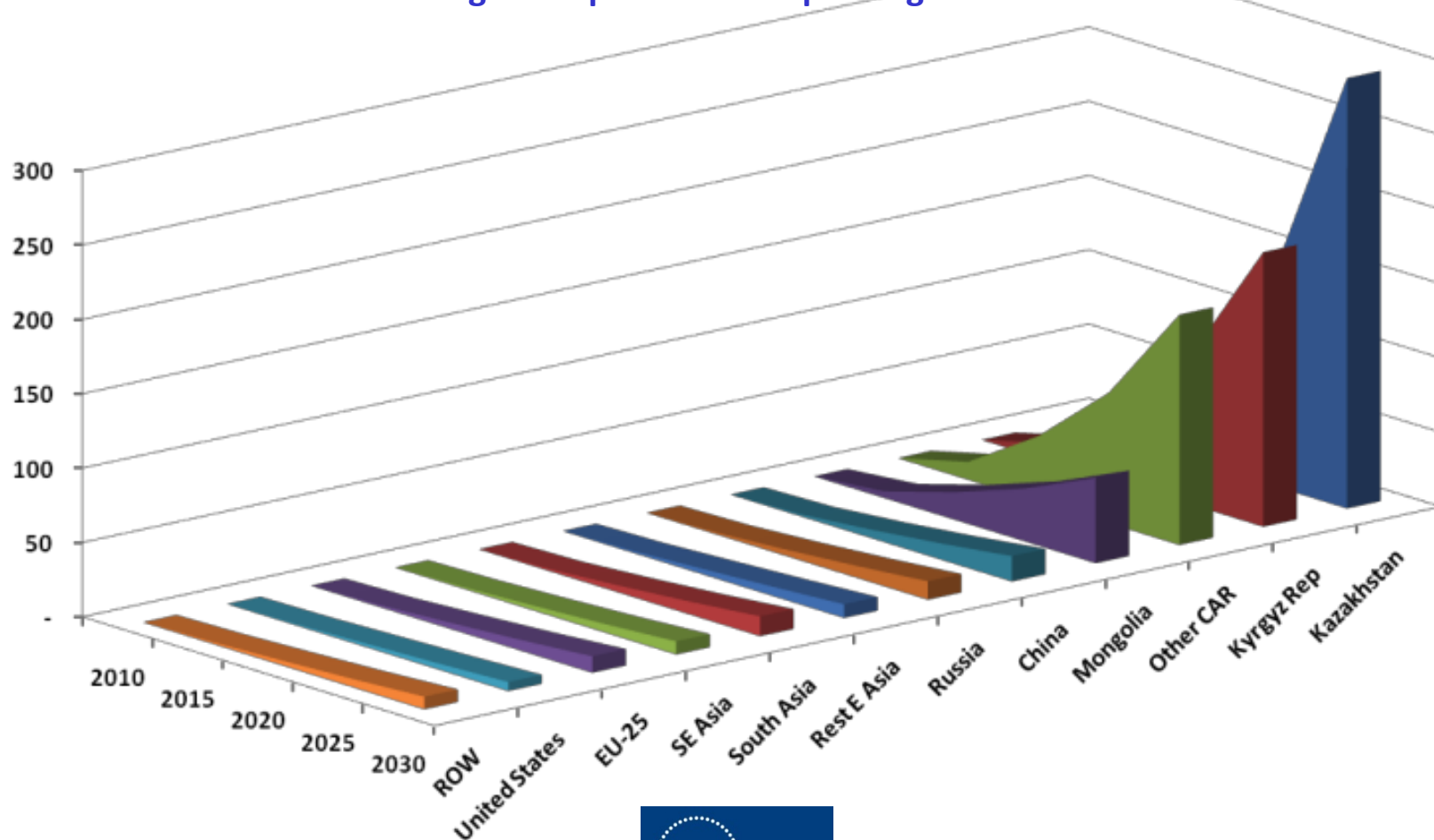
Real GDP Growth Premium by Scenario
(Percent wrt 2030 Baseline)

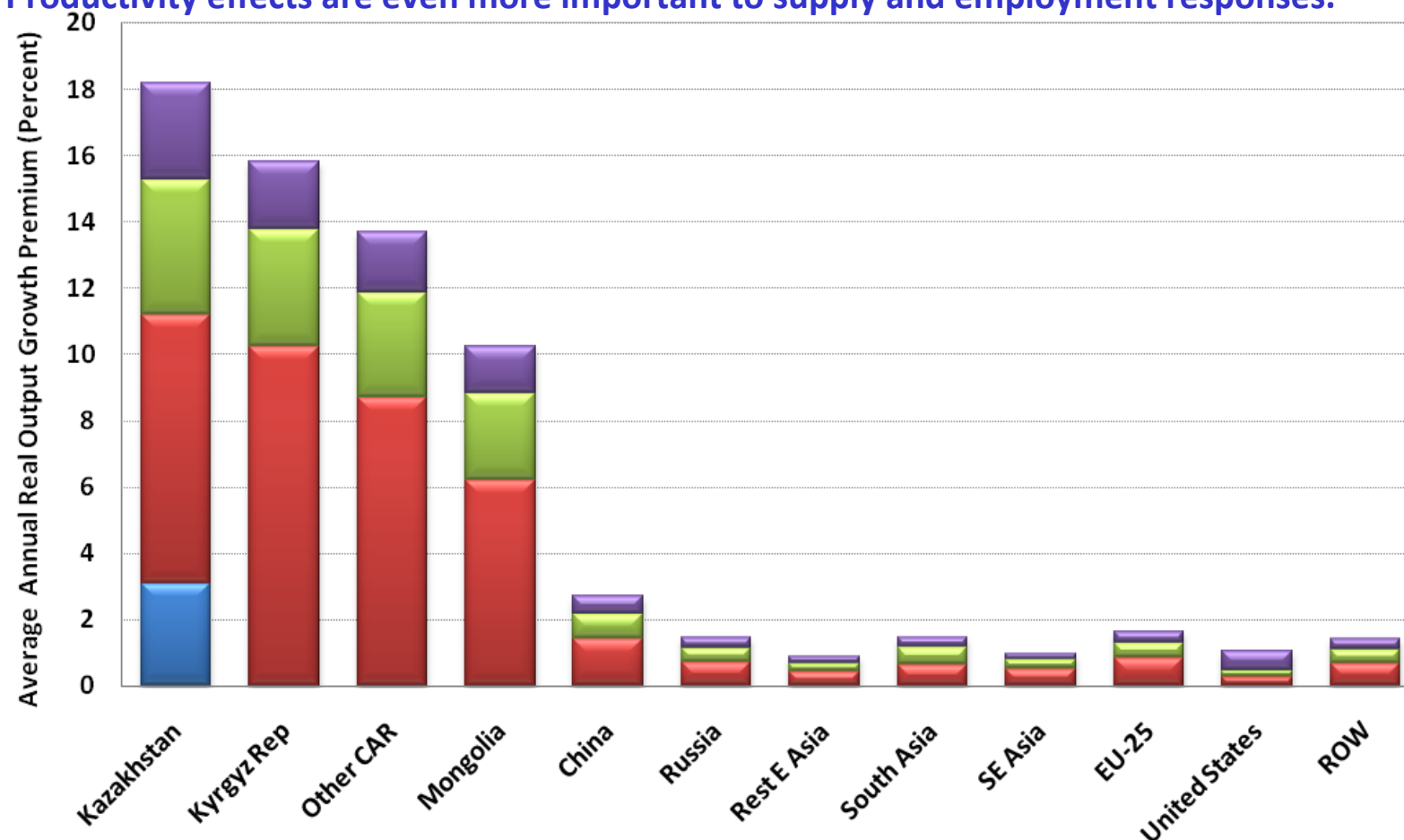Neoclassical effects dominate the growth stimulus, but trade and product conservation are also significant.

Growth of Output by Sector and Scenario
(Percent wrt 2030 Baseline)

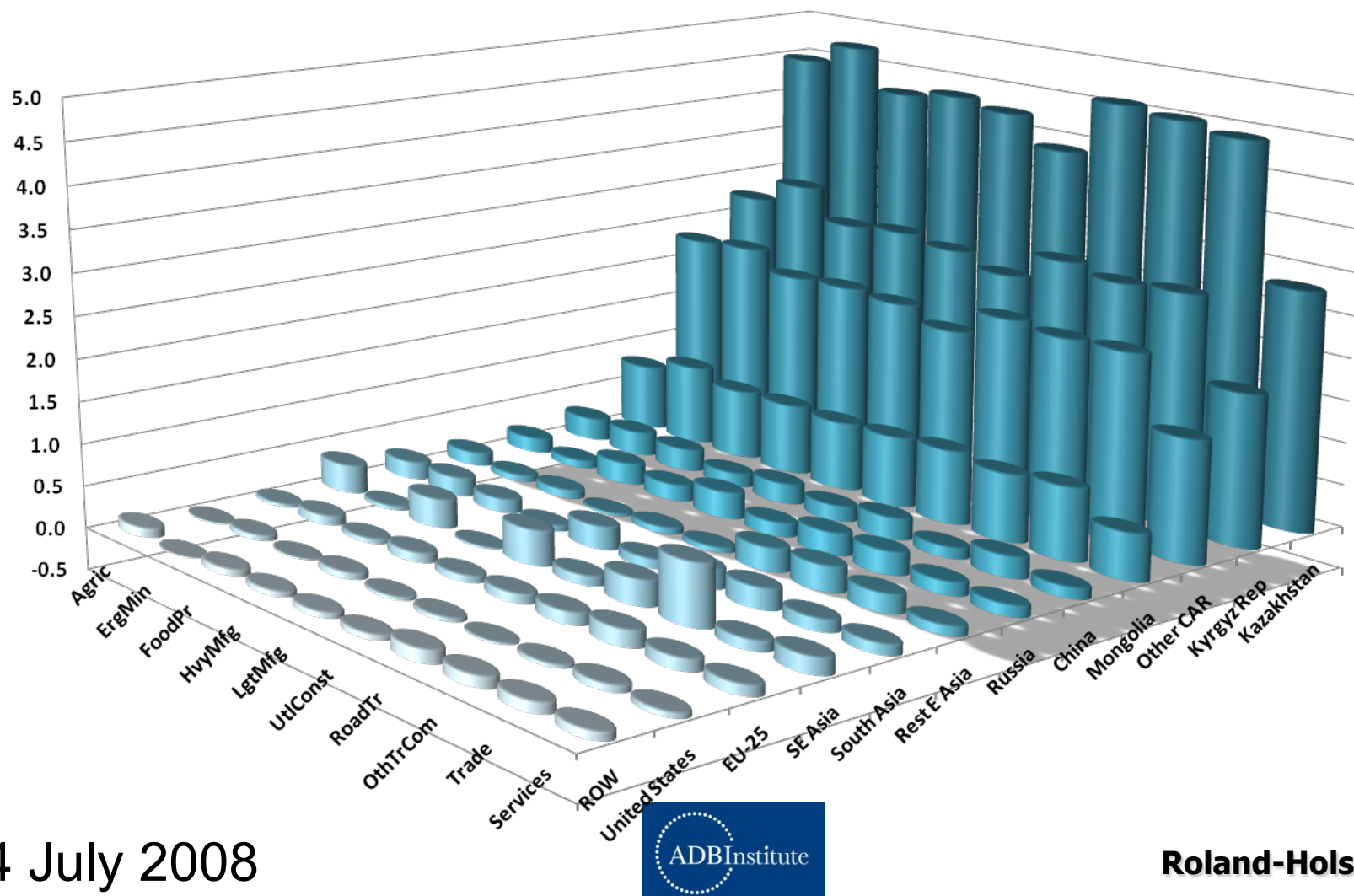Productivity effects are even more important to supply and employment responses.

Sectoral Output Growth
(Multiple of Baseline in 2030)

Sectoral benefits are relative uniform for local economies, more varied for trading partners.

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Sectoral Output Growth
(USD 2010 Millions wrt Baseline in 2030)

Nominal gains are much more varied, depending on initial scale and trade shares.

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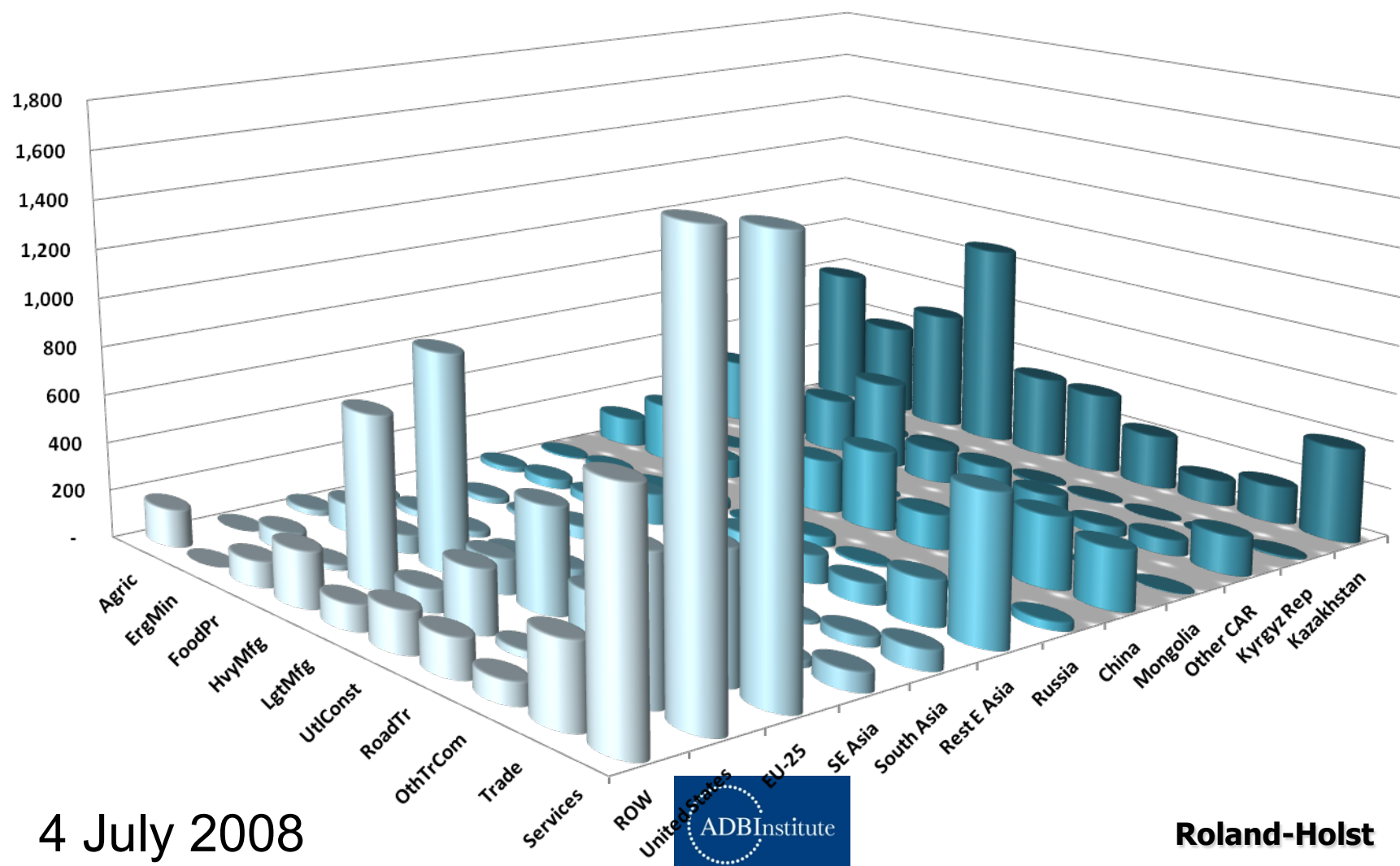
Real Household Income Growth
(Percent wrt 2030 Baseline)

Households gain as much from trade as other sources of stimulus, with greater marketing opportunities and increased purchasing power for imports.

Real Household Income Growth (2032 as a Multiple of 2010)

Categories: Kazakhstan, Kyrgyz Rep, Other CAR, Mongolia, China, Russia, Rest E Asia, South Asia, SE Asia, EU-25, United States, ROW

Legend: VOC, Prod, Trade
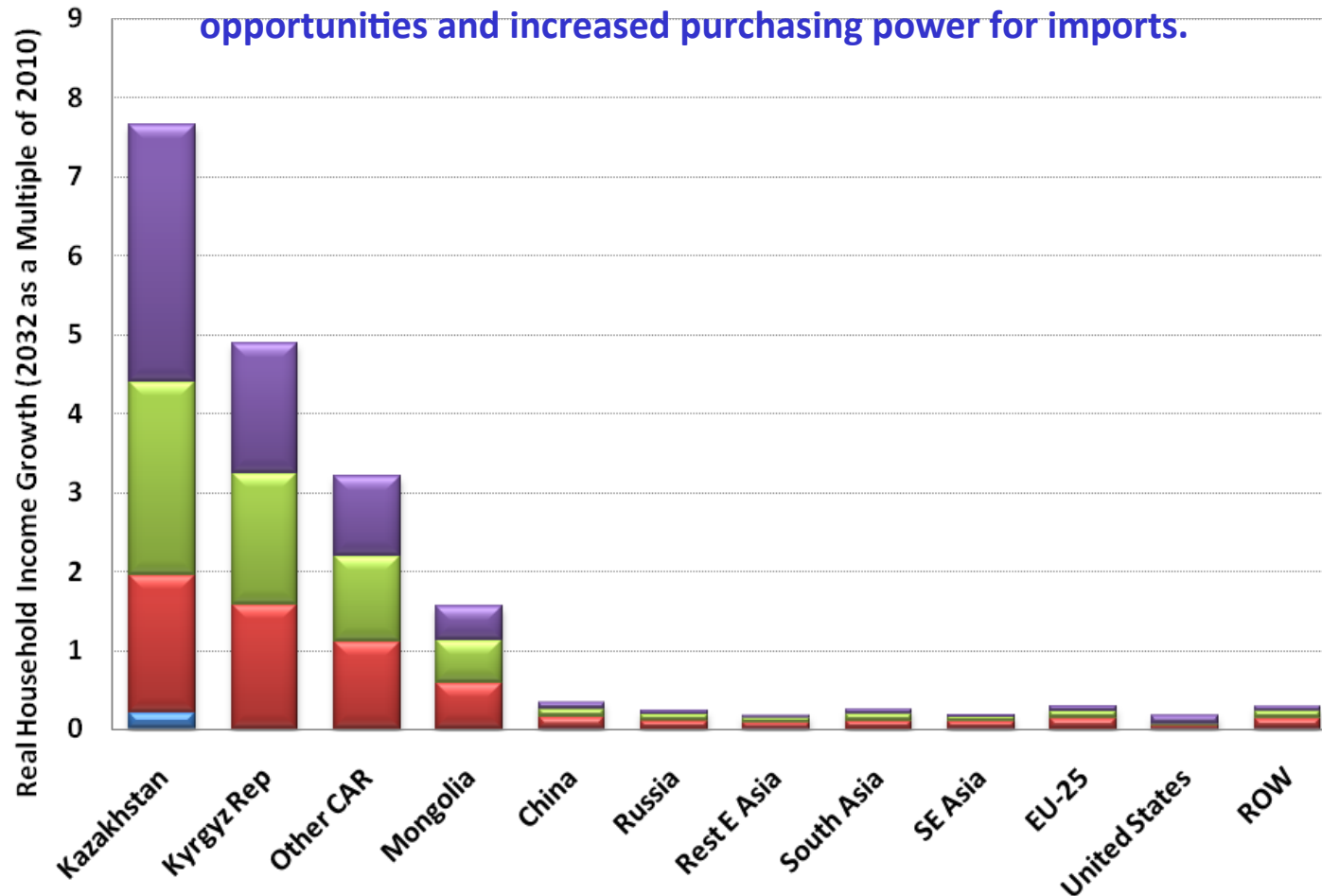
Conclusions

1. The overall benefits of the Kazakhstan road project far outweigh it's costs.

2. Transboundary spillovers confer significant growth leverage on other regional economies and benefit more distant trade partners.

3. Keynesian (project finance) benefits are small compared to productivity, efficiency, and trade stimulus effects.

4. Productivity gains are the largest source of growth benefits, but reduced losses and trade stimulus are of nearly equal benefit.

Next Steps

GTAP Version 7 will incorporate some of this data and provide a more complete and up-to-date basis.

Public Finance: Other and complementary financing options, including multilateral and public/private partnerships. GE models have a long history of contributions here.

Other regions (e.g. comparison to SEA corridors).

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Thank You!