

Infrastructure as a Catalyst for Regional Integration, Growth, and Economic Convergence: Scenario Analysis for Asia

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1. Introduction
2. Overview of Initial Conditions
3. Modeling Infrastructure's
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4. Conclusions



1. Introduction

- As Asia's economic growth process matures, regional integration offers important opportunities:
 - Geographic diversification/new markets
 - Superior growth rates
 - Structural differentiation: more rapid evolution from established North-South patterns of trade and specialization
- Propagating growth linkages across this diverse region will also facilitate economic convergence.
- Infrastructure commitments will be an essential guarantor of this process.

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

1. Keynesian – Aggregate demand and employment stimulus.
2. Ricardian – Reducing trade margins and intensifying comparative advantage.
3. Neoclassical – Endogenous growth benefits.



Keynesian Stimulus

- Infrastructure spending is a popular means of direct long term or transitory employment stimulus
 - Examples: WPA (US), Work Relief (PRC), Japan (heavy counter-cyclical and recurrent fiscal commitments)
- Because of its generality, this kind of spending can be targeted across a wide spectrum of regions and socio economic groups
- For public good infrastructure multiplier effects are generally quite substantial

Ricardian Stimulus

By reducing trade margins, infrastructure:

1. Intensifies comparative advantage

$$\frac{P_H + M}{P_F + M} \xrightarrow{M \rightarrow \infty} 1$$

2. Improves international terms of trade

$$M \downarrow \Rightarrow \frac{PWE - M}{P_D} \uparrow \text{ and } \frac{PWM + M}{P_D} \downarrow$$

3. Improves rural terms of trade (pro-poor)

$$\rho = \frac{P_R^R}{P_U^R} = \frac{P_D - M}{P_D + M} \quad \text{and} \quad \frac{\partial \rho}{\partial M} = -2 \frac{P_D}{(P_D + M)^2}$$

4. Extends the horizon of profitable investment and marketing (falling MC means economies of scale)



Neoclassical Stimulus

Modern economic theory recognizes many endogenous growth factors, and these can be greatly facilitated by infrastructure:

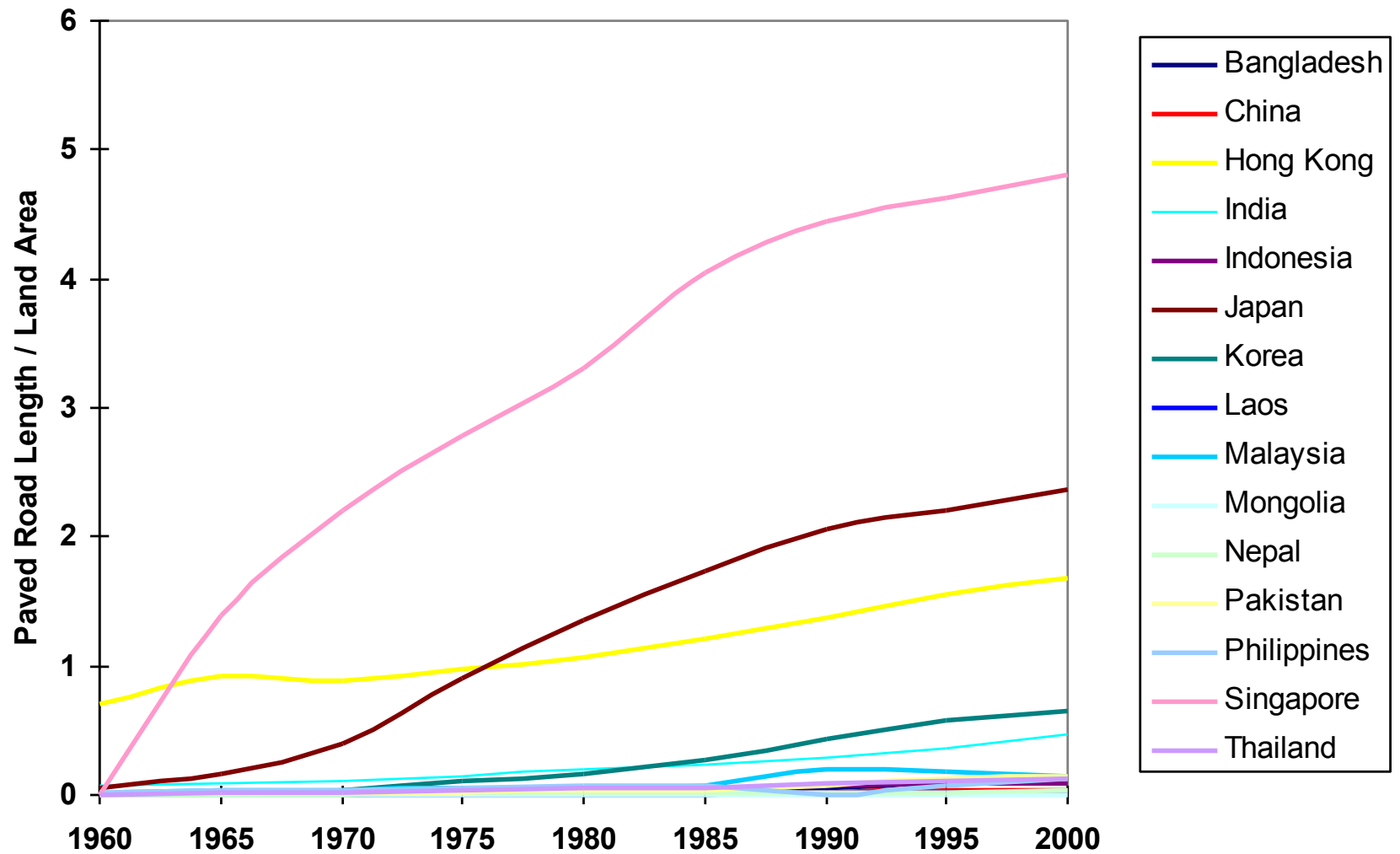
- Productivity enhancement
- Technology diffusion
- Information diffusion
- Supply chain articulation and other network externalities
- Human capital development (migration)



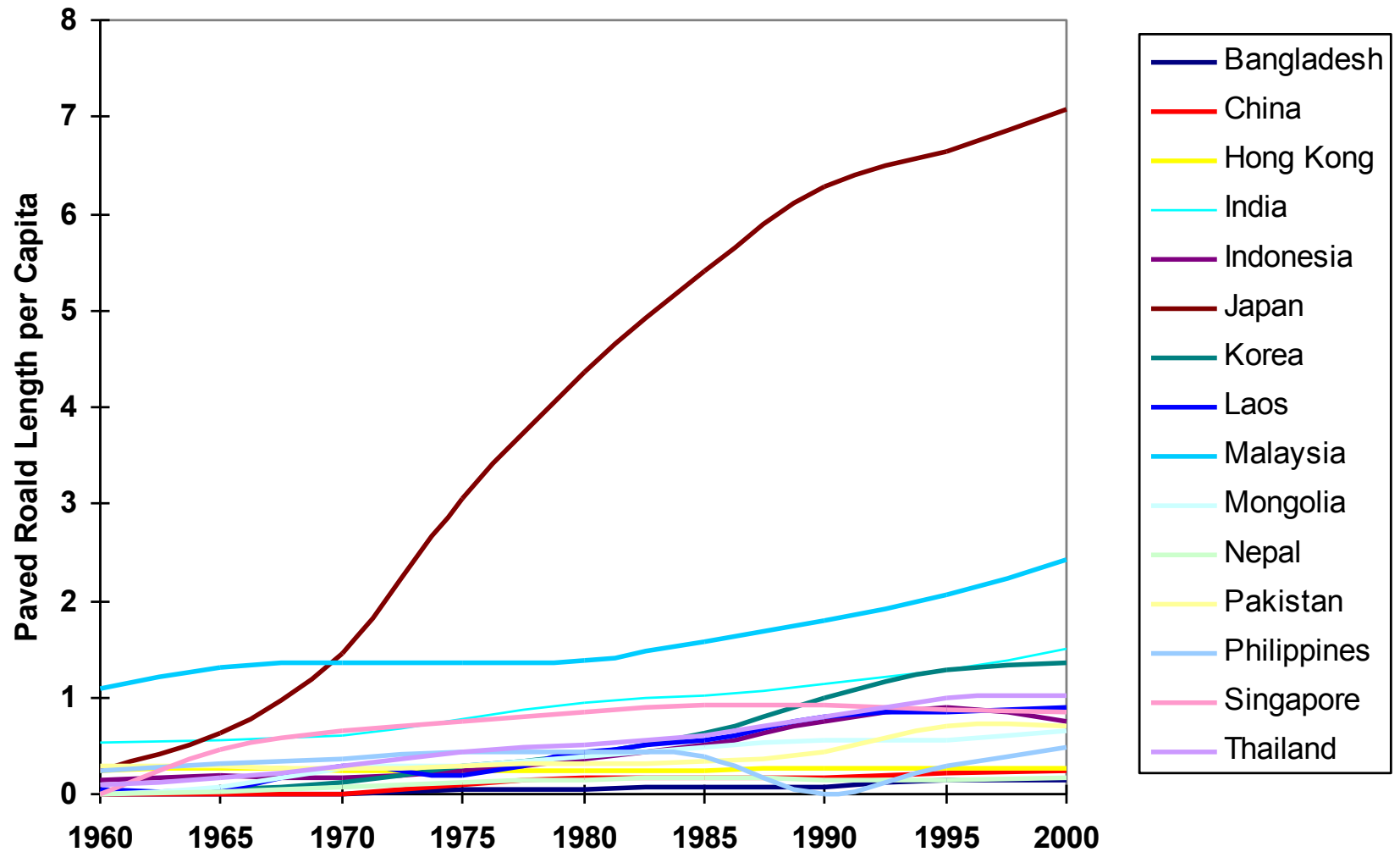
2. Overview of Initial Conditions

- Infrastructure conditions across Asia are highly variegated, even between neighboring countries.
- Infrastructure expansion trends have been dramatic, but only in a few countries.
- Public investment needs to extend its development leadership, increasing returns to market participation and private investment across the region.
- Public and private capital commitments must be complementary if the former is to be effective.

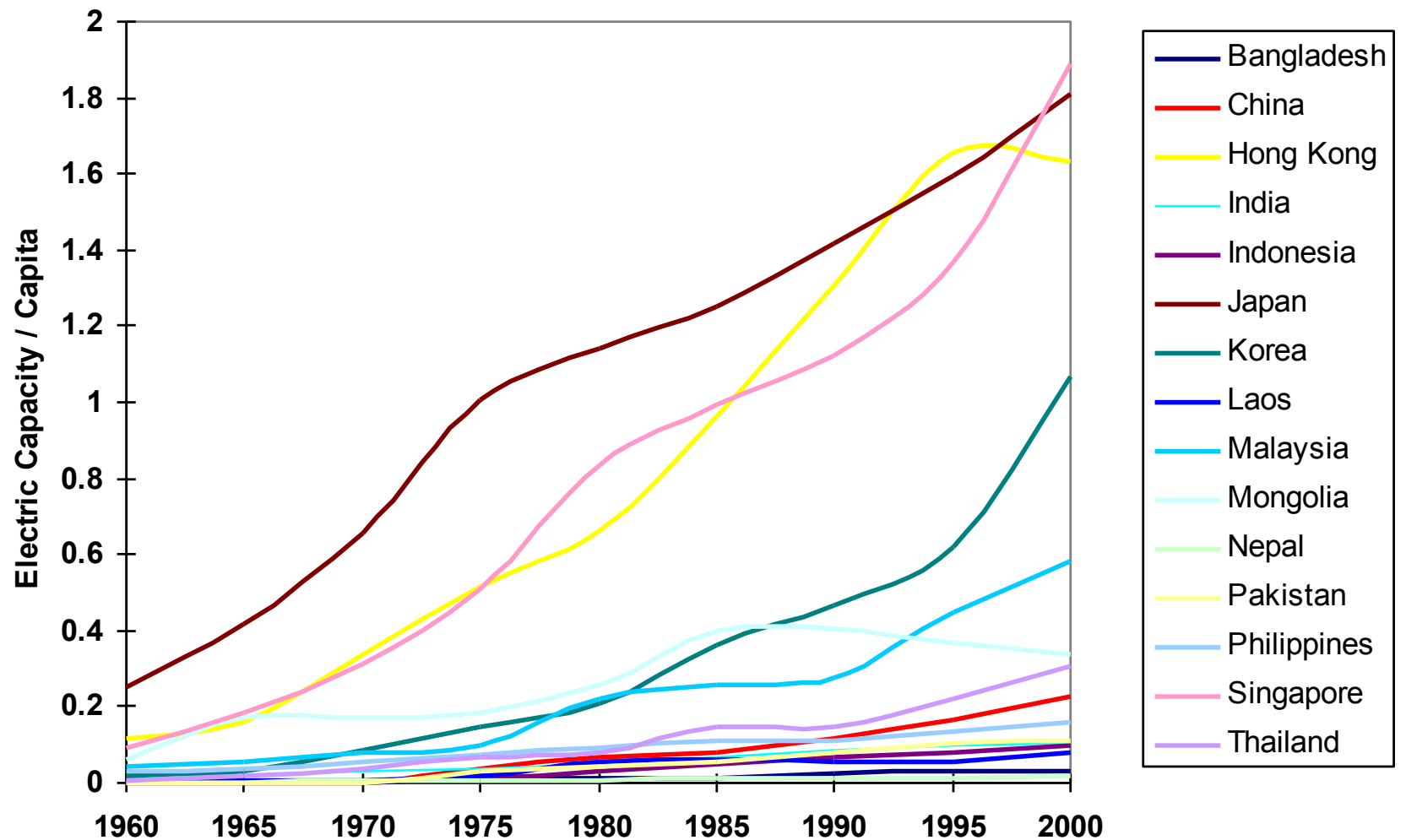
Paved Road Systems I



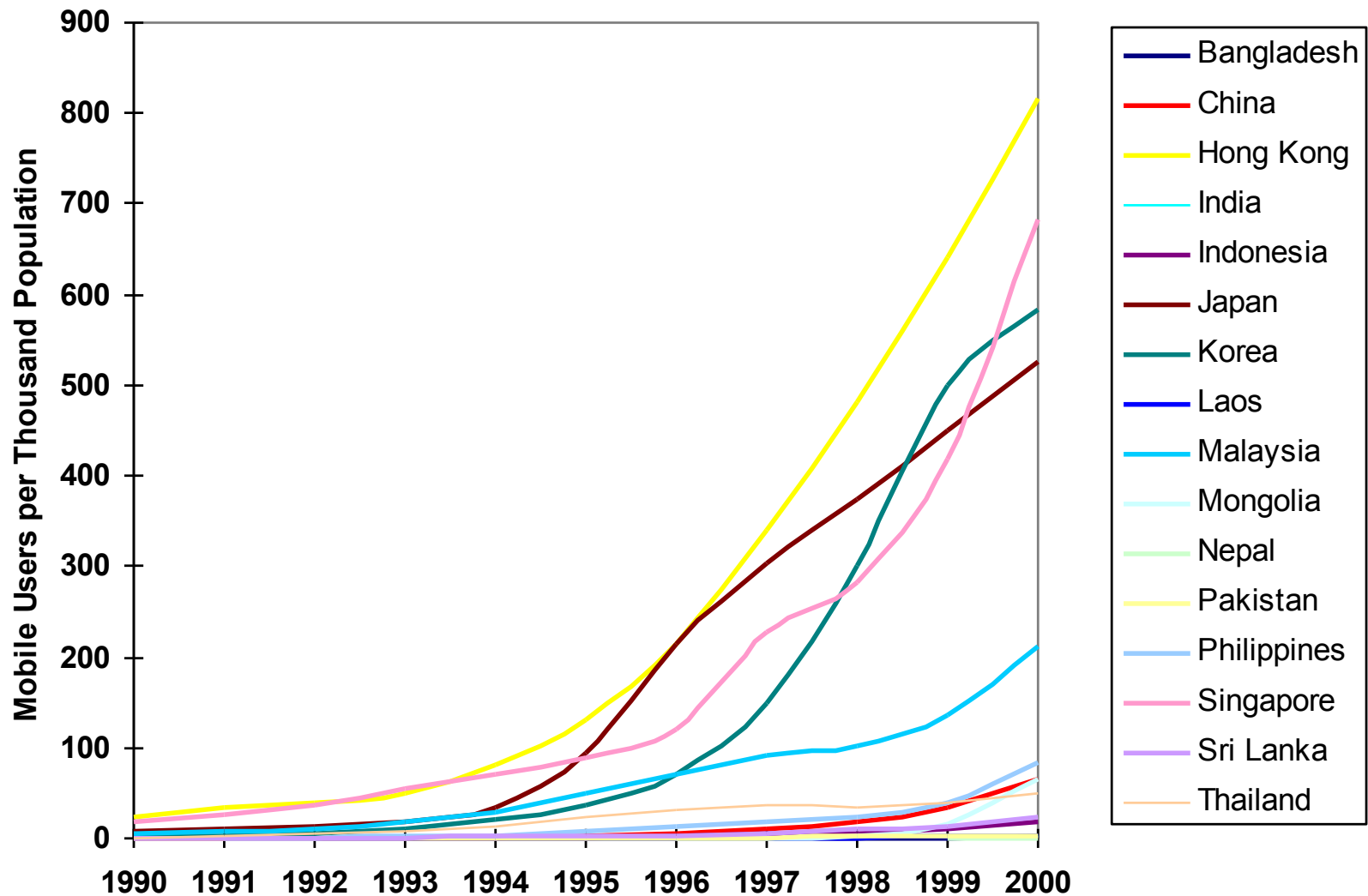
Paved Road Systems II



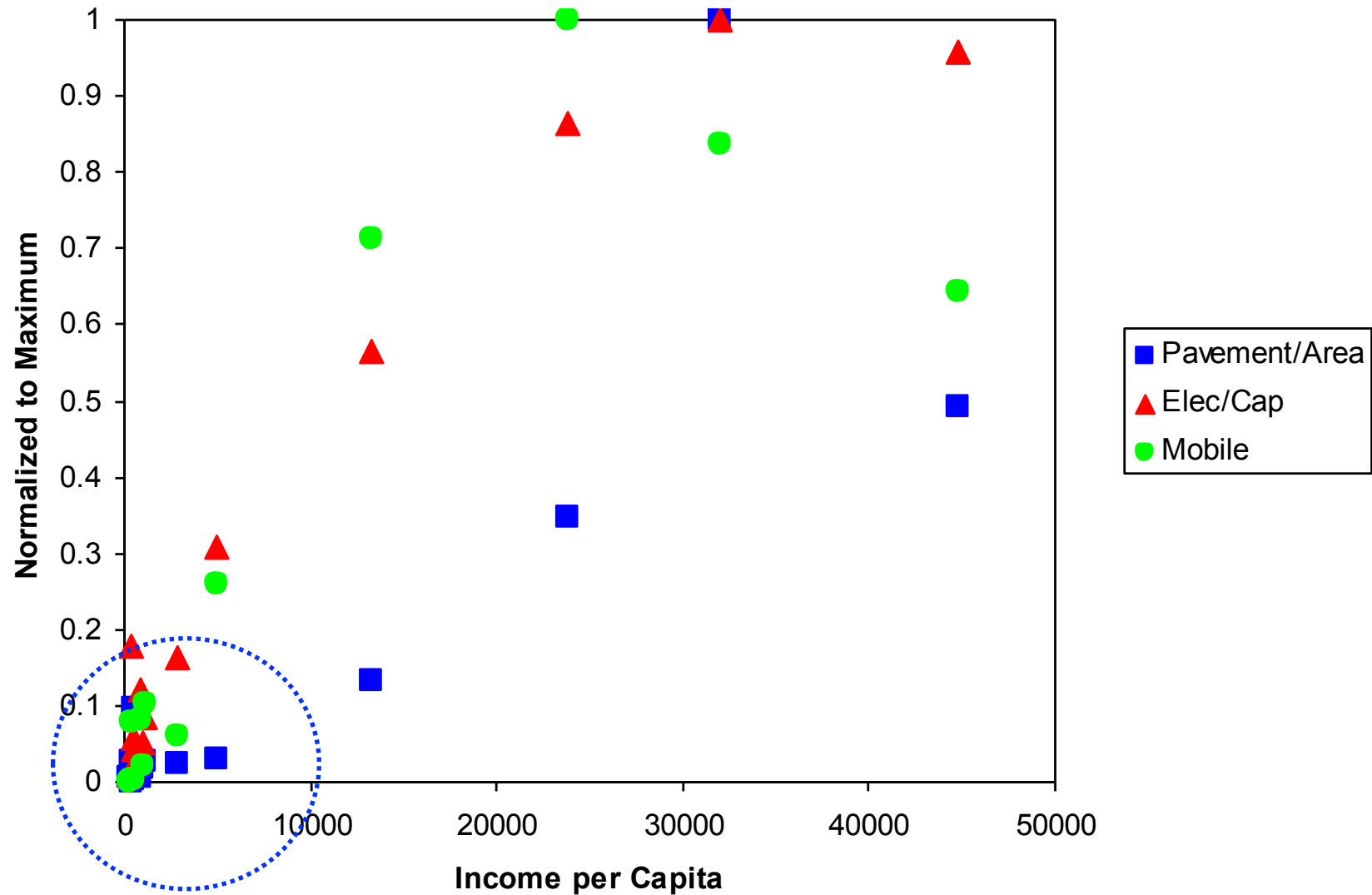
Electrification



Mobile Telephony



Income and Infrastructure



Domestic private and public savings pose a serious constraint.



Infrastructure and Trade

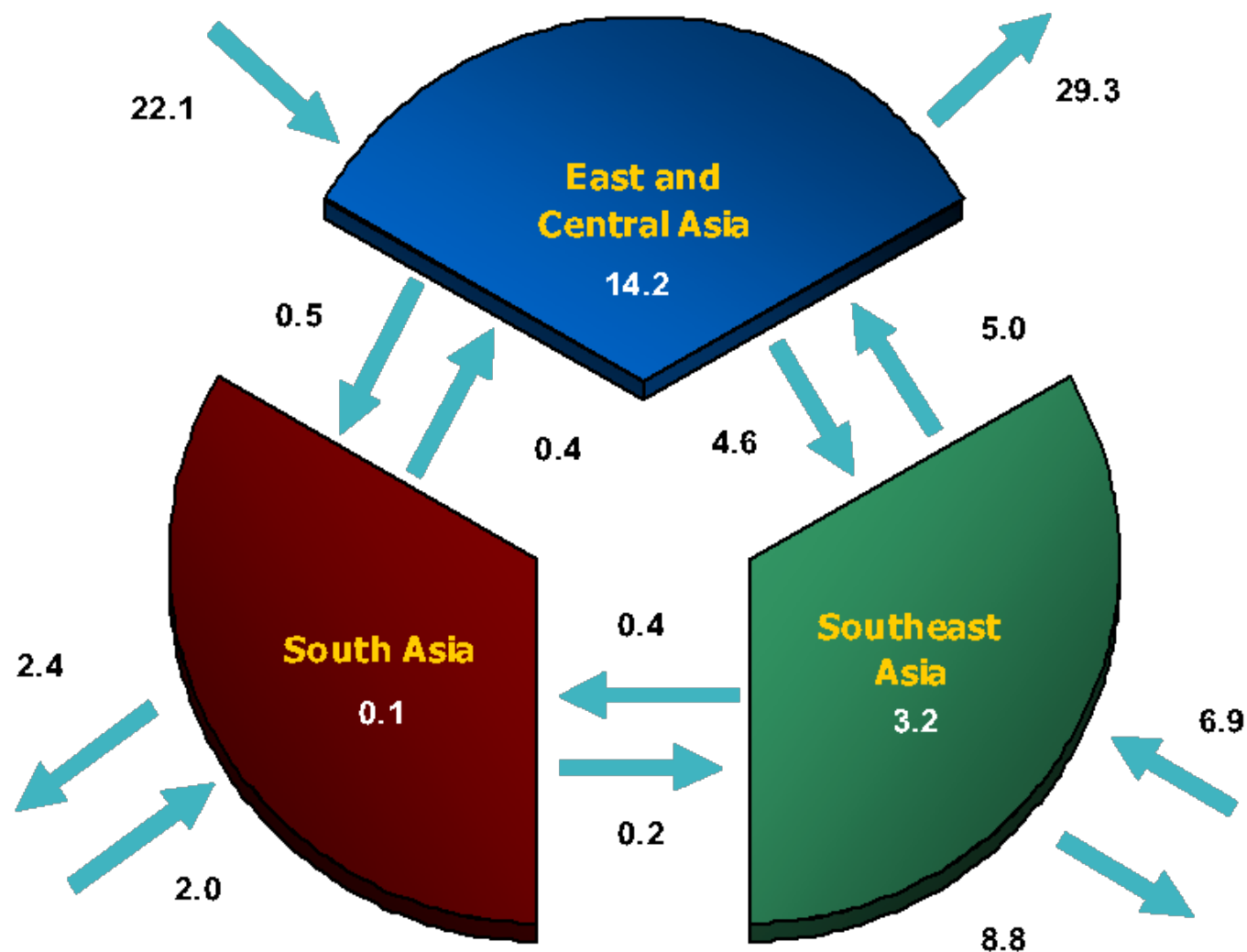
- Trade has been a primary driver of Asian growth.
- Infrastructure is an essential complement to trade.
- Past reliance on demand outside the region was facilitated by maritime expansion, with higher income countries leading and limited spillovers.
- To support greater regional trade/integration, more diverse infrastructure will be needed, financed collaboratively and propagating growth externalities.
- This approach will facilitate economic diversification, growth, and convergence.

Asian Trade Flows, 2005

(percent of total Asian trade)

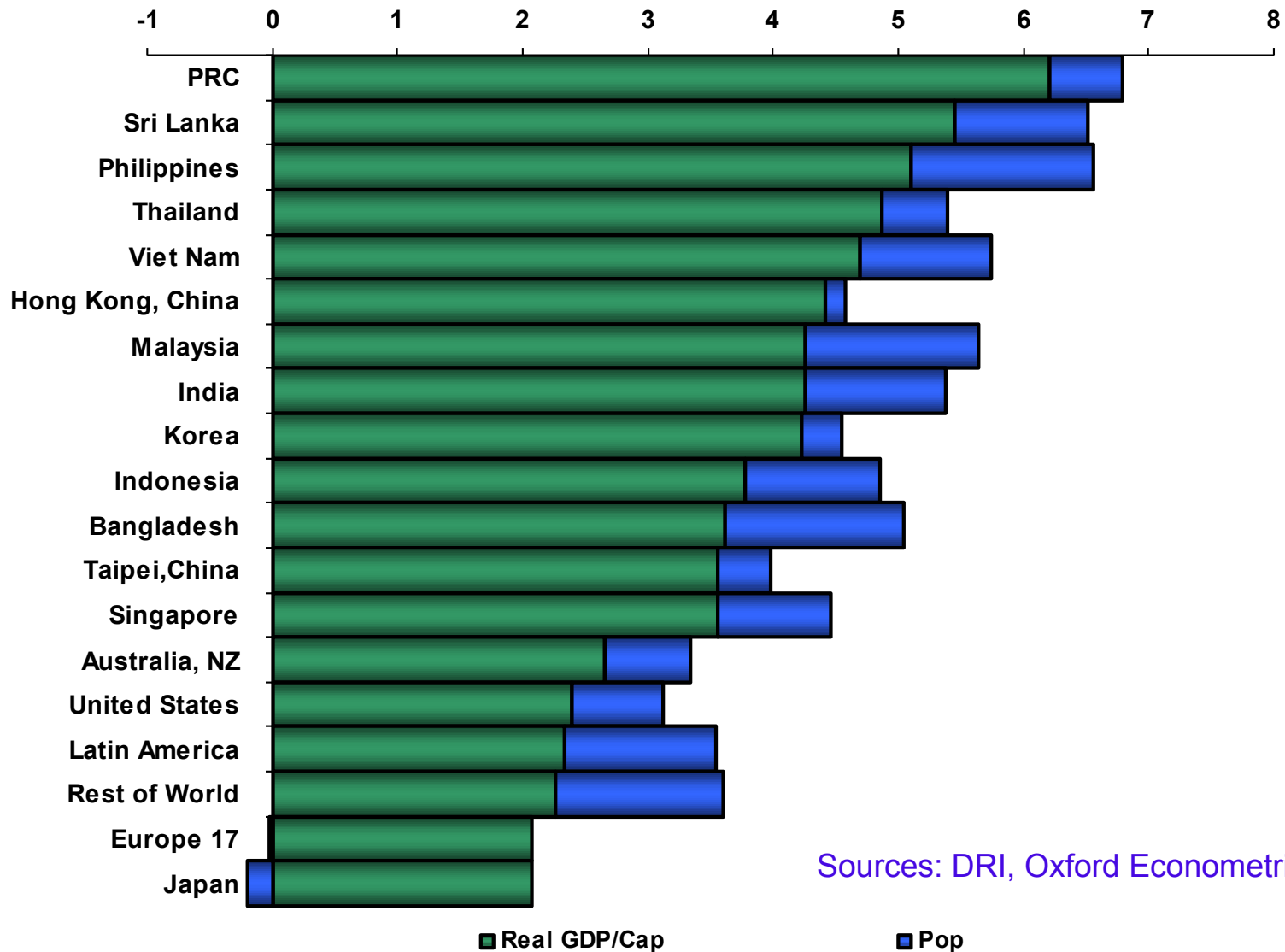
Extra-regional demand remains a primary economic driver.

Asian regional trade is far from reaching its potential.



Baseline Per Capita GDP Growth (annualized percent change, 2005-2025)

On a global basis, Asia continues to represent superior growth.



Sources: DRI, Oxford Econometrics, IMF.



Notes on “Soft Infrastructure”

- Much emphasis is given to physical infrastructure and its services, but there is also a broad universe of “soft” infrastructure.
- Concentrated in national and multilateral public institutions, they constitute an essential element of trade facilitation.
- Trade negotiating institutions are only the most conspicuous members of a large family of institutions promoting more coherent market linkages and policy dialogue.
- In this context, an Asian OECD could make important contributions.



3. Modeling Infrastructure's Economic Growth Potential

- To assess the role of Asian infrastructure empirically, and economywide and regionwide approach is needed.
- For this reason ADB/ERD has developed multi-country macro and CGE models in parallel.
- Appropriate use of these tools depends on the kind of infrastructure issues to be addressed.

1. Keynesian Experiments

- Asian economies with below average baseline infrastructure accelerate investment
- New investment needs are met by a combination of higher domestic saving and external capital inflows

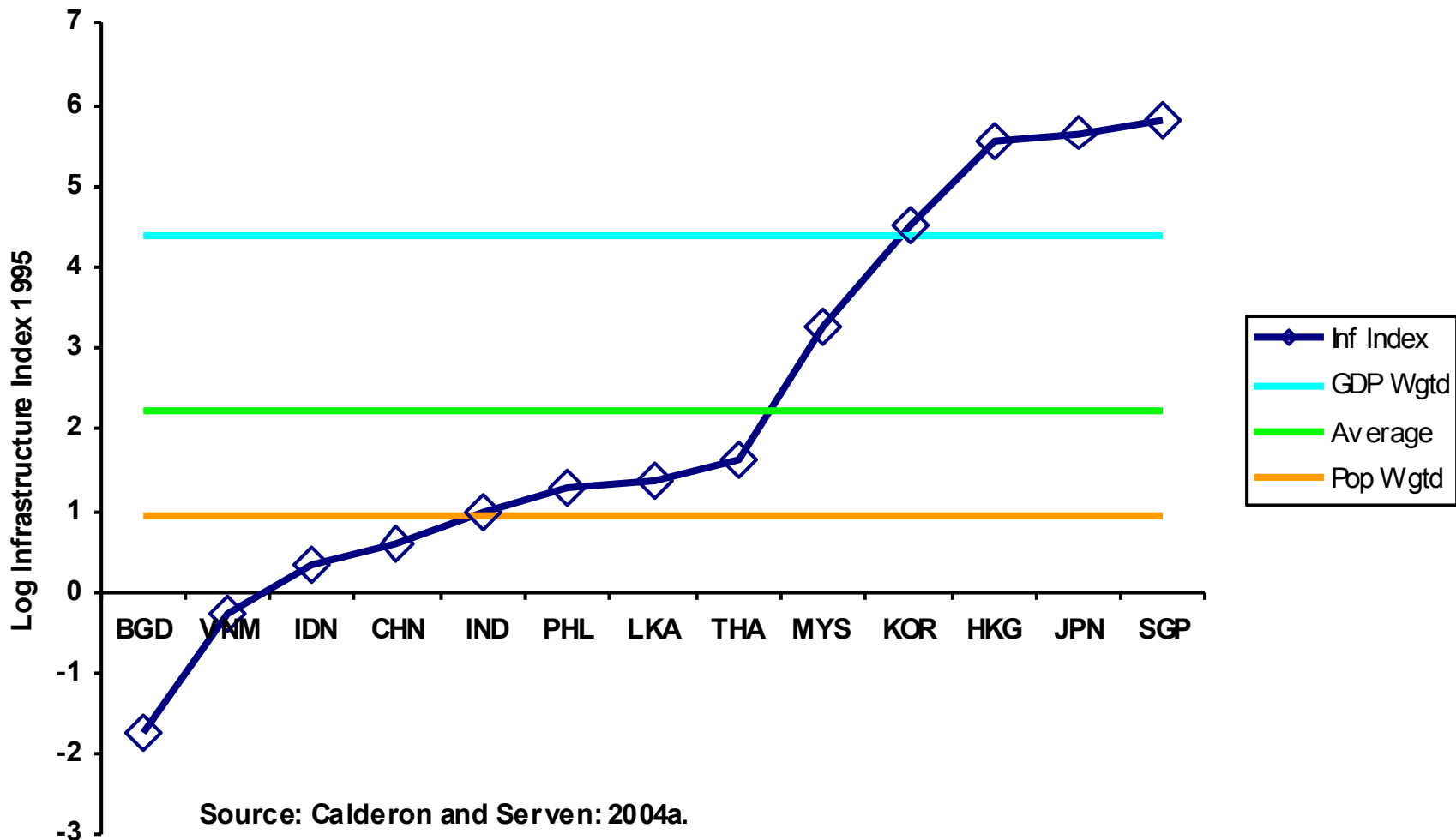
2. Ricardian Experiments

- Productivity growth in the trade and distribution sectors is assumed to occur as a result of the accelerated Keynesian investment prescribed above
- A variety of different elasticities of sector total factor productivity growth with respect of investment are considered (0, 0.5, 1.0, 2.0, 4.0)

3. Neoclassical Experiments

- Productivity growth in all sectors is assumed to occur as a result of the accelerated prescribed above
- A variety of different elasticities of sector total factor productivity growth with respect of investment are considered (0, 0.5, 1.0, 2.0, 4.0)

Aggregate National Indexes of Infrastructure Resources (1995)



Necessary Increase in Baseline Aggregate Investment, by Type of Target Mean (percent)

	GDP Weighted	Simple Average	Pop Weighted
Bangladesh	613	397	267
Viet Nam	464	249	118
Indonesia	407	191	60
China	378	162	31
India	341	125	
Philippines	312	96	
Sri Lanka	302	87	
Thailand	276	60	
Malaysia	114		
Korea			
Hong Kong, China			
Japan			
Singapore			



Keynesian Results

Annual and Cumulative Real GDP (Percent changes from 2005-2025 baseline)

<u>Country</u>	2010	2015	2020	2025	Cum
Bangladesh	5%	26%	53%	74%	47%
PRC	1%	6%	11%	15%	10%
Indonesia	2%	15%	32%	46%	28%
Viet Nam	3%	21%	44%	65%	40%

Annualized Growth Rate of Real GDP (percentage point premium over baseline)

<u>Country</u>	2010	2015	2020	2025	Average
Bangladesh	1.0%	4.0%	4.1%	2.9%	3.0%
PRC	0.3%	1.0%	1.0%	0.7%	0.7%
Indonesia	0.5%	2.5%	2.9%	2.1%	2.0%
Viet Nam	0.6%	3.5%	3.9%	2.8%	2.7%

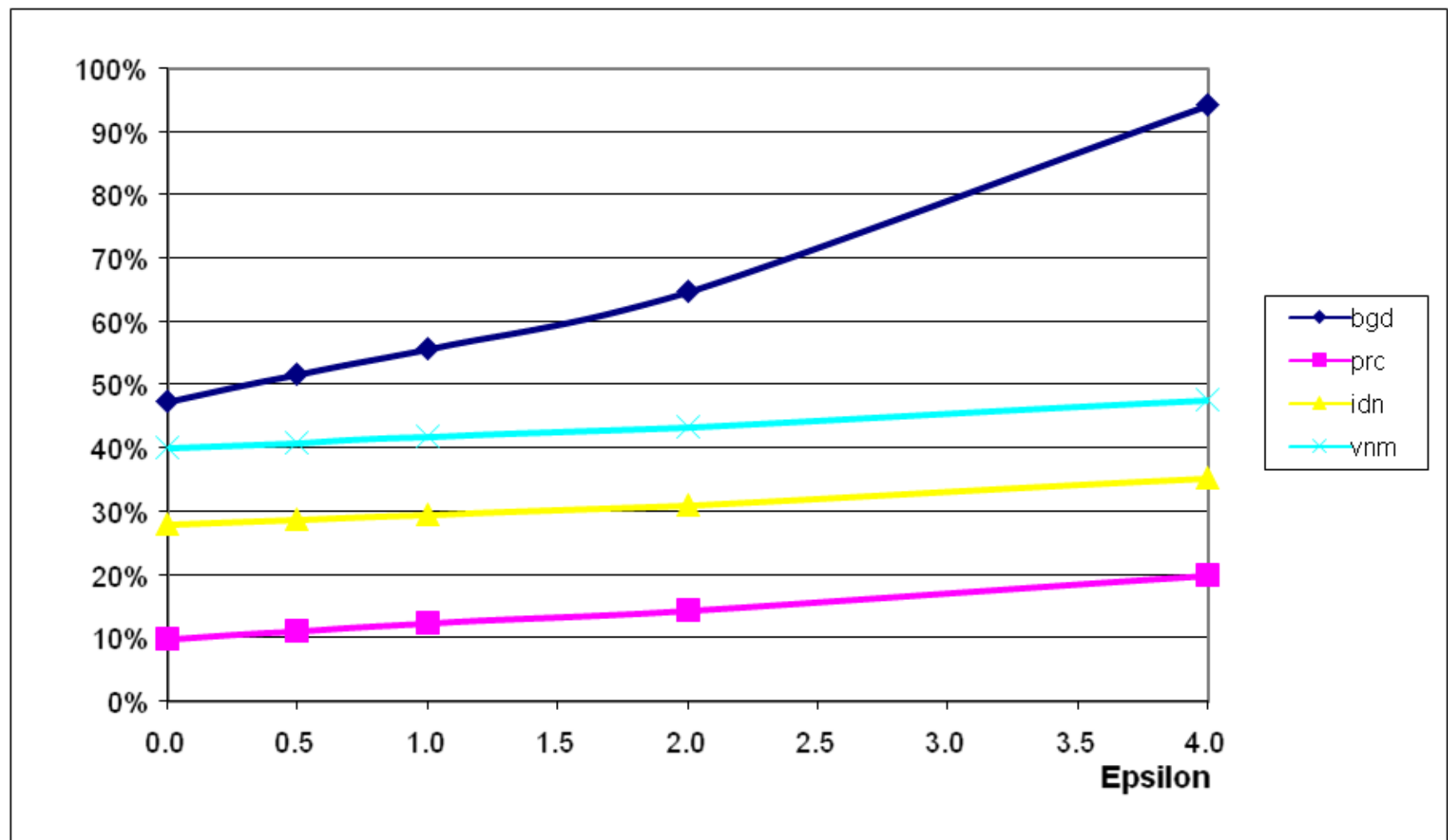
Ricardian (Margin/Price) Results

Cumulative Real GDP, 2006-2025

(percent changes from baseline)

Country	Epsilon				
	0.0	0.5	1.0	2.0	4.0
bgd	47%	52%	56%	65%	94%
prc	10%	11%	12%	14%	20%
hkg	0%	2%	3%	6%	14%
idn	28%	29%	29%	31%	35%
ind	0%	1%	3%	5%	12%
jpn	0%	1%	1%	2%	5%
kor	0%	1%	1%	3%	6%
lka	0%	2%	4%	8%	26%
mys	0%	2%	3%	5%	14%
phl	-1%	0%	0%	1%	3%
sgp	1%	2%	2%	4%	8%
tha	0%	1%	1%	3%	6%
twm	0%	1%	2%	4%	9%
vnw	40%	41%	42%	43%	48%

Cumulative Real GDP, 2006-2025 (percent change from baseline trend)



Ricardian (Margin/Price) Results

Annualized Growth of Real GDP, 2006-2025

(percent changes from baseline)

Country	Epsilon				
	0.0	0.5	1.0	2.0	5.0
bgd	3.0%	3.2%	3.4%	3.7%	4.9%
prc	0.7%	0.8%	0.9%	1.0%	1.2%
hkg	0.0%	0.1%	0.2%	0.3%	0.8%
idn	2.0%	2.0%	2.1%	2.1%	2.3%
ind	0.0%	0.1%	0.2%	0.3%	0.8%
jpn	0.0%	0.0%	0.1%	0.1%	0.3%
kor	0.0%	0.1%	0.1%	0.2%	0.4%
lka	0.0%	0.1%	0.3%	0.6%	1.7%
mys	0.0%	0.1%	0.2%	0.4%	0.9%
phl	-0.1%	0.0%	0.0%	0.0%	0.2%
sgp	0.1%	0.1%	0.2%	0.3%	0.5%
tha	0.0%	0.1%	0.1%	0.2%	0.4%
twm	0.0%	0.1%	0.2%	0.3%	0.6%
vnm	2.7%	2.7%	2.8%	2.8%	3.0%

Neoclassical (Endogenous Growth) Results

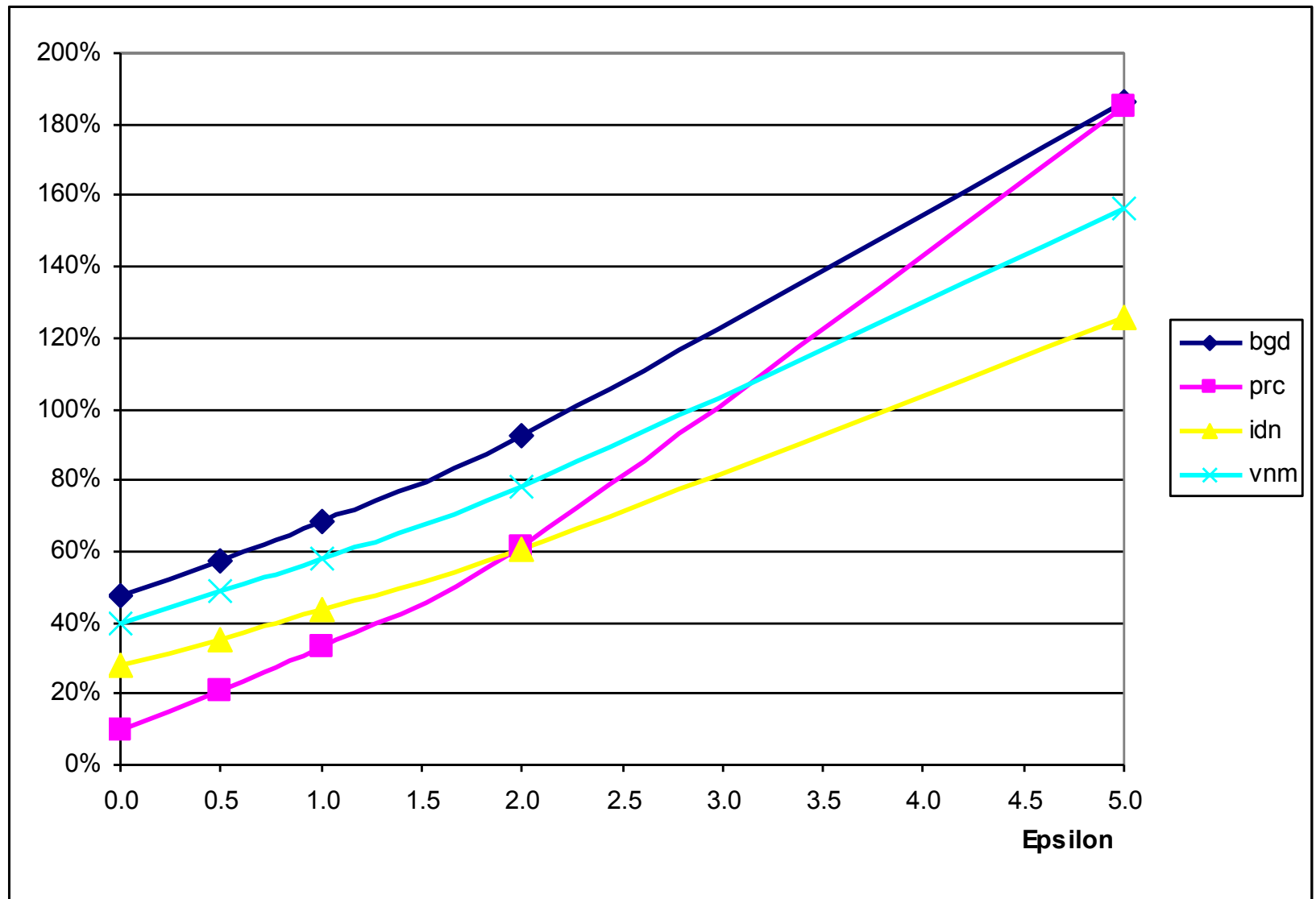
Cumulative Real GDP, 2006-20

(percent changes from Baseline trajectory)

Country	Epsilon				
	0.0	0.5	1.0	2.0	5.0
bgd	47%	58%	68%	92%	187%
prc	10%	21%	33%	61%	185%
hkg	0%	3%	6%	13%	33%
idn	28%	35%	43%	61%	126%
ind	0%	7%	15%	32%	101%
jpn	0%	2%	4%	7%	19%
kor	0%	4%	8%	17%	46%
lka	0%	5%	11%	23%	71%
mys	0%	8%	17%	36%	111%
phl	-1%	2%	5%	12%	36%
sgp	1%	5%	8%	16%	42%
tha	0%	4%	8%	17%	49%
twn	0%	4%	9%	18%	49%
vnm	40%	49%	58%	78%	156%

Cumulative Real GDP, 2006-2025

(percent change from baseline trend)



Neoclassical Results: Annual Real GDP Growth Rates, 2006-2025

Country	Epsilon				
	0.0	0.5	1.0	2.0	5.0
bgd	3.0%	3.4%	3.9%	4.7%	7.3%
prc	0.7%	1.4%	2.0%	3.2%	6.9%
hkg	0.0%	0.2%	0.4%	0.8%	1.8%
idn	2.0%	2.4%	2.8%	3.5%	5.8%
ind	0.0%	0.5%	1.0%	1.9%	4.7%
jpn	0.0%	0.1%	0.3%	0.5%	1.3%
kor	0.0%	0.3%	0.5%	1.1%	2.6%
lka	0.0%	0.3%	0.7%	1.4%	3.6%
mys	0.0%	0.6%	1.1%	2.1%	5.1%
phl	-0.1%	0.1%	0.3%	0.7%	2.0%
sgp	0.1%	0.3%	0.6%	1.0%	2.3%
tha	0.0%	0.3%	0.6%	1.1%	2.8%
twm	0.0%	0.3%	0.6%	1.1%	2.7%
vnm	2.7%	3.0%	3.4%	4.1%	6.4%



4. Conclusions

- Regional trade and integration offer Asia great potential for more rapid and sustained growth.
- Our review of initial conditions shows that structural barriers to trade within the region remain significant.
- Applying a regionally focused CGE to evaluate indicative scenarios, we show how infrastructure can be a strong catalyst for growth.
- Because infrastructure is most deficient in the poorest areas, its promotion can make an important contribution to Asian economic convergence.



Infrastructure Development Goals

- Goal 1: Eradicate Infrastructure Poverty: Halve, between 1990 and 2015, the proportion of people who lack access to basic infrastructure services*
- Goal 2: Achieve Universal Access to Primary Education: Ensure that by 2015, children everywhere, boys and girls alike, have local access to full-time primary educational resources*
- Goal 3: Improve Access to Information and Communication Technology: Reduce by three-quarters, by 2015, the number of households without local and affordable access to telecommunication and digital information services*
- Goal 4: Improve Electrification: Reduce by two-thirds the number of households without access to in-home electricity*
- Goal 5: Improve Market Access: Promote investment in transport infrastructure that can reduce average domestic seller and worker travel times by two-thirds*
- Goal 6: Improve Public Health Access: Promote more extensive investment in public health resources, increasing local access for urban and rural populations generally and for the poor in particular. Reduce by 3/4 by 2015, the average combined travel and queuing time for access to licensed health care services.*
- Goal 7: Promote Environmental Sustainability: Integrate the principles of sustainable development into infrastructure policies and programs, and reverse the losses of environmental resources. In particular, reduce by $\frac{3}{4}$ by 2015*
 - the proportion of people without sustainable access to safe drinking water*
 - proportion of people without sustainable access to sanitation services*
- Goal 8: Develop a global partnership for Infrastructure*
Establish the institutional framework needed to facilitate coherent multilateral approaches to infrastructure development, including regional policy coordination, financial market integration, and standards and technology sharing.



Discussion