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**A General Equilibrium Model of Bilateral Trade with Strategic Public Investment in
Commercial Infrastructure**

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A General Equilibrium Model of Bilateral Trade with Strategic Public Investment in Commercial Infrastructure

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Research Questions

- How does strategic public investment in commercial infrastructure among trading partners affect patterns of trade and worker welfare?
- How much should a country invest in commercial infrastructure so as to maximize representative worker welfare?

Background

- In Ricardian trade models, comparative advantages determines the trade patterns
- Recent literature theorizes that countries endowed with “better institutions” specialize in production of “complex” goods requiring more “sophisticated” commercial legal & regulatory environment
- We explore how comparative advantage is shaped by public investment in commercial infrastructure
- Comparative advantage is thus endogenous to our model

Modeling Framework

- We develop a game theoretic model to show how prices, wages and goods produced respond to changes in public investment in commercial infrastructure.
- We first explore unilatateral changes in public investment by one country.
- We then derive Cournot-Nash and Stackelberg game.

Model Set-up

- DFS-type model of bilateral trade in which two countries produce, consume, and trade a continuum of goods
- Labor productivity depends on quality of commercial infrastructure, which includes transportation and communication networks, regulatory and legal institutions, basic research and educational institutions
- Public investment in commercial infrastructure raises general labor productivity
- One country is better endowed, enjoys greater labor productivity for any given level of public infrastructure investment
- Workers are taxed to fund public investment
- Resulting pattern of trade will depend on both relative endowments and levels of public investment
- Better endowed country may still end up producing goods requiring least labor input, if it invests less in infrastructure

Results

Figure 1. Labor Requirement Function

Figure 2. Trade Equilibrium with Fixed Labor Productivity

Figure 3. Labor Productivity as a Function of Per-Capita Public Investment

Figure 4. Boundary Good and Goods Produced by Country 1 as a Function of Per-Capita Public Investment in Country 1

Figure 5. Panel AB. Wages as a Function of Per-Capita Public Investment in Country 1

Figure 6. Panel AB. Representative Worker Utility as a Function of Per-Capita Public Investment in Country 1

Figure 7. Country 1 Reaction Function

Figure 8. Cournot-Nash Equilibrium

Figure 9. Panel AB. Stackelberg Equilibria

Table 1. Estimation Results: Exports vs. Infrastructure Investment, 2000

Dependent Variable: Exports in Millions of Dollars	Bilateral Exports		Exports to World	
	High-End Industries	Low-End Industries	High-End Industries	Low-End Industries
<i>Continuous Independent Variable</i>				
Infrastructure Investment as Percent of GDP	0.082** (0.015)	-0.021 (0.011)	0.829** (0.198)	-0.203 (0.103)
Adjusted R-squared	0.025	0.018	0.092	0.029
<i>Categorical Independent Variable</i>				
Infrastructure Investment greater than 0.5%	0.119* (0.054)	0.078 (0.051)	1.320* (0.615)	0.628 (0.347)
Infrastructure Investment between 0.5% and 0.7%	0.162** (0.053)	0.074 (0.050)	1.912** (0.608)	0.588 (0.342)
Infrastructure Investment between 0.7% and 1%	0.214** (0.053)	0.054 (0.050)	2.125** (0.622)	0.466 (0.342)
Infrastructure Investment between 1% and 2%	0.311** (0.054)	0.039 (0.051)	2.577** (0.607)	0.251 (0.348)
F Statistic	11.273**	2.410	24.874**	2.084
Adjusted R-squared	0.025	0.019	0.094	0.030
No. of Observations	124,240	19,539	10,993	2,912

Conclusions

- Increased public investment in infrastructure in one country reduces prices and raises wages in both countries
- Net of taxes collected to finance investment, worker welfare in investing country may increase or decrease.
- Nash equilibrium implies less well endowed country will invest more in public infrastructure and specialize in production of goods requiring greater labor input.
- Stackelberg equilibrium implies leader will invest more in public infrastructure, produce goods with greatest unit labor requirement
- Our empirical analysis supports the hypothesis that countries who invest more in infrastructure will significantly increase the exports of “high-end” goods that require advanced technology and higher labor productivity.
- However, infrastructure investment does not necessarily encourage the exports of less technically sophisticated “low-end” goods.