
The Olympic Effect

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Our opinions are our own, and are not necessarily those of the Federal Reserve Bank of San Francisco or the Federal Reserve Board of Governors.

Motivation

Public enthusiasm
Economists
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Results
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More Robustness

Signaling

Conclusion

Motivation

Public typically enthusiastic about hosting “mega events”

“When the Olympic flame is lit, China will be hoping for a 17-day festival of sport and international friendship. It sees the games as marking not just its re-emergence as a global economic force but also as a country that the rest of the world treats with admiration and respect.”

- *Economist*, August 2, 2008

“Somehow, the good name of France seems to be at issue, and that makes the defeat even worse.”

- Jean-Francois Legaret, mayor 1st arr. Paris

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Economists usually skeptical of benefits

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- Entails expensive construction expenditures
 - Large new stadia
 - Obscure facilities, such as velodromes, aquatic centers
- Ex: Baade and Matheson (2002):
 - \$1.58 billion local expenditure on 1996 Atlanta games
 - 24,742 permanent jobs created, or \$63,860 per job
- China spent \$100 million on 2008 opening ceremonies, while 100 million live on less than \$1 a day
- But governments actively compete to host “mega-events”
 - Are economists missing something?

Perhaps both sides are right?

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- Public enthusiasm may be vindicated by economic benefits of hosting
 - IOC argues visitors drawn to Olympic hosts after games
 - “Taste” for country’s products may also increase
- If economic benefits are large enough, they offset hosting costs
- We are skeptical, so investigate effects of hosting on trade

We find large positive correlation of trade and hosting Olympics

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- Use a number of different trade models
- Find large positive effect on both exports and overall trade
 - Host countries have 30% higher exports permanently
 - Results robust to battery of sensitivity exercises
 - Tetric and matching/treatment estimation
- Other “mega-events” such as World Cup and World’s Fairs have similar impacts
- Plausible? What’s going on?

Failed Olympic bids

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- We expand investigation to countries that launched unsuccessful bids for the games
- Surprisingly, “unsuccessful candidates” experienced positive export impacts statistically similar in magnitude to actual hosts
- Suggests that export effect results from *bidding for* games, rather than *hosting* them
 - Sheds doubt on effects of changes in fundamentals, due to construction, infrastructure, tourism, ...
 - Instead, bidding for mega-event may be a signal of increased outward orientation

Connections between Olympics and Liberalization

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- ▶ Beijing awarded right to host XXIX Olympiad July 2001, 2 months later concluded WTO negotiations
- ▶ Rome awarded 1960 games in 1955, same year Italy moved towards currency convertibility, joined the UN, and, began negotiations that lead to EEC
- ▶ Tokyo games of 1964 coincided with Japanese entry into IMF and OECD
- ▶ Barcelona awarded the 1992 games in 1986, same year Spain joined EEC
- ▶ Korea awarded 1988 games, starts political liberalization
- ▶ 1986 World Cup in Mexico coincides with trade liberalization, GATT entry

Construct model along these lines

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- Bid to host mega event is a signal of policy intentions
- Obtain a separating equilibrium
 - Governments wishing to liberalize trade policy find it profitable to signal intentions by launching bid
 - Those wishing to remain closed do not
- Model also speaks to desirability of signal
 - Distributional effects of cost of sending signal influences its desirability
 - Policy makers may prefer that benefactors of policy change bear brunt of sending signal

Remainder of talk

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- Review of literature on mega-events
- Evidence on effect of hosting on trade
- Sensitivity analysis
- Effect of failed candidacies
- Further robustness checks
- Theoretical model
- Conclusion

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Literature on mega-events

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- Commissioned studies often predict large economic benefits
 - Humphreys and Plummer (1995): \$5.1 billion short-term impact for 1996 Atlanta
 - Fuller and Clinch (2000): \$5.3 billion impact on Washington DC from hosting 2012 games

- More rigorous studies are skeptical
 - Costs considerable, infrastructure benefits minimal [e.g. Baade and Matheson (2002), Owen (2005)]
 - Spending diverted, not added [Siegfried and Zimbalist (2000)]
 - “Consumer surplus” arguments discounted [Coates (2007)]

Signals of international policy intentions

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- Governments with superior information signal conditions
 - Bartolini and Drazen (1997): Capital account openness signals future fiscal position
 - Alesina and Drazen (1991): Willingness to delay signals toughness
- Can motivate sending costly signals, even pursuit of perverse policies [Mukand (2006)]
- Our model is of “burning money” type.
 - Also show under certain conditions distributional implications may favor mega-event signal
 - To our knowledge, first that considers distributional consequences of sending signal

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Gravity specification

Ancillary vars

Anc vars (cont)

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Specification is a variant of standard bilateral gravity model

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$$\begin{aligned} \ln(X_{ijt}) = & \beta_0 + \beta_1 \ln(D_{ij}) + \beta_2 \ln(Pop_{it}) + \beta_3 \ln(Pop_{jt}) \\ & + \beta_4 \ln(GDPpc_{it}) + \beta_5 \ln(GDPpc_{jt}) + \beta_6 Cont_{ijt} + \beta_7 CU_{ijt} \\ & + \beta_8 Lang_{ij} + \beta_9 RTA_{ijt} + \beta_{10} Border_{ij} + \beta_{11} Islands_{ij} \\ & + \beta_{12} Area_{ij} + \beta_{13} ComCol_{ij} + \beta_{14} Colony_{ijt} + \beta_{15} EverCol_{ij} \\ & + \beta_{16} SameCtry_{ijt} + \gamma_O Olympics_{it} + \gamma_S Summer_{it} \\ & + \gamma_W Winter_{it} + \varepsilon_{ijt}. \end{aligned} \tag{1}$$

where i denotes the exporting country, j denotes the importer, and t denotes time

and $Olympics/Summer/Winter$ are binary variables, unity if i hosted at or before time t , 0 otherwise

Ancillary variables are defined as

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- X_{ijt} real FOB exports from i to j
- D is the distance between i and j
- Pop is population
- GDP_{pc} is annual real GDP per capita
- $Cont$ unity if i and j share a land border
- CU unity if i and j use same currency at time t
- $Lang$ unity if i and j have common language
- RTA unity if i and j have regional trade agreement at t
- $Border$ unity if i and j share a land border
- $Islands$ number of island countries in pair
- $Area$ is the log of the product of areas

Ancillary variables (continued)

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- *ComCol* unity if i and j colonized by the same country
- *Colony* unity if i colonizes j at time t (or vice versa)
- *EverCol* unity if i ever colonized j (or vice versa),
- *SameCtry* unity if i is part of the same country at time t (or vice versa),
- β vector of nuisance coefficients,
- ε represents omitted other influences, assumed well behaved.

Data and Methodology

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- Bilateral data set includes annual observations between 1950 and 2006 for 196 territories and localities
- Estimate using OLS with robust covariance estimator
- Year-specific fixed effects included
- Additional specifications with dyadic fixed effects and exporter and importer fixed effects
- Variables of interest are γ coefficients on Olympic dummy variables

Permanent Effect of Olympics on Exports in Gravity Model (1 of 3)

Fixed Effects:	None	None	Dyadic	Dyadic	Exporter, Importer	Exporter, Importer
Summer	.31** (.04)		.25** (.03)		.31** (.04)	
Winter	.14** (.04)		-.07 (.04)		-.06 (.05)	
Olympics, either		.33** (.03)		.30** (.03)		.38** (.04)
R2	.61	.61	.85	.85	.69	.69
RMSE	2.1823	2.1822	1.3976	1.3975	1.9356	1.9354

Note: 196 countries, 1950-2006; 449,220 observations.

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Permanent Effect of Olympics on Exports in Gravity Model (2 of 3)

	Fixed Effects:	None	None	Dyadic	Dyadic	Exporter, Importer	Exporter, Importer
<u>Motivation</u>							
<u>Literature</u>	Log Distance	-1.11**	-1.11**			-1.33**	-1.33**
		(.02)	(.02)			(.02)	(.02)
<u>Olympic Effect</u>	Log Exp Population	1.06**	1.07**	.18**	.20**	-.25**	-.23**
Gravity specification		(.01)	(.01)	(.06)	(.06)	(.06)	(.06)
Ancillary vars	Log Imp Population	.88**	.89**	.80**	.79**	.45**	.44**
Anc vars (cont)		(.01)	(.01)	(.05)	(.05)	(.05)	(.05)
Data	Log Exp Real GDP p/c	1.54**	1.54**	1.24**	1.23**	1.25**	1.25**
Table 1		(.01)	(.01)	(.03)	(.03)	(.03)	(.03)
Results	Log Imp Real GDP p/c	1.18**	1.18**	.87**	.87**	.84**	.84**
Sensitivity		(.01)	(.01)	(.03)	(.03)	(.03)	(.03)
Candidates	Currency Union	1.02**	1.02**	.56**	.55**	.67**	.67**
More Robustness		(.10)	(.10)	(.09)	(.09)	(.10)	(.10)
Signaling	Common Language	.45**	.46**			.35**	.34**
		(.04)	(.04)			(.03)	(.03)
Conclusion	RTA	.28**	.27**	.29**	.29**	.43**	.43**
		(.03)	(.03)	(.02)	(.02)	(.03)	(.03)

Permanent Effect of Olympics on Exports in Gravity Model (3 of 3)

	Fixed Effects:	None	None	Dyadic	Dyadic	Exporter, Importer	Exporter, Importer
<u>Motivation</u>							
<u>Literature</u>	Common Border	.68** (.08)	.69** (.08)			.46** (.08)	.46** (.08)
<u>Olympic Effect</u>	No. Islands	.17** (.03)	.18** (.03)			1.92** (.36)	-3.81** (.32)
Gravity specification	Log Product Area	-.07** (.01)	-.07** (.01)			.62** (.05)	.56** (.03)
Ancillary vars	Common Colonizer	.58** (.06)	.58** (.06)			.75** (.05)	.75** (.05)
Anc vars (cont)	Currently Colony	.62* (.24)	.64** (.24)	.39* (.19)	.38* (.19)	.95** (.25)	.95** (.25)
Data	Ever Colony	1.45** (0.10)	1.43** (0.10)			1.42** (.09)	1.42** (.09)
Table 1	Common Country	.09 (.71)	.09 (.71)	.27 (.66)	.27 (.66)	-.95* (.41)	-.95* (.41)
Results							
<u>Sensitivity</u>							
<u>Candidates</u>							
<u>More Robustness</u>							
<u>Signaling</u>							
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Summary of results

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- Gravity variables enter as expected
- Large and statistically significant positive Olympic effect
- Point estimate indicates that countries that have hosted Olympics have 36% increase in exports
- Robust to inclusion of dyadic or country-specific fixed effects
- Winter games insignificant (as expected)

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Table 2

Table 2 (cont)

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Robustness Tests of Olympic Effect (1 of 2)

	Fixed Effects: Olympics:	None Summer	None Either	Dyadic Summer	Dyadic Either	Exp., Imp. Summer	Exp., Imp. Either
<u>Motivation</u>	Default (Table 1)	.31** (.04)	.33** (.03)	.25** (.03)	.30** (.03)	.31** (.04)	.38** (.04)
<u>Literature</u>							
<u>Olympic Effect</u>	Substitute Imports for Exports	.51** (.04)	.63** (.04)	.45** (.04)	.53** (.04)	.58** (.05)	.71** (.05)
<u>Sensitivity</u>	Exporter-Specific Trends (not levels)					.15** (.04)	.36** (.04)
Table 2 (cont)	Stripped Down	2.55**	3.27**	.57**	.69**	.69**	.86**
Robustness	Gravity Model	(.05)	(.05)	(.04)	(.04)	(.04)	(.04)
Endogeneity	Other events						
Table 3	Add Regional Dummies	.21** (.04)	.17** (.03)	.25** (.03)	.30** (.03)	.31** (.04)	.38** (.04)
<u>Candidates</u>	Drop Industrial Importers	.29** (.04)	.31** (.04)	.27** (.04)	.33** (.04)	.30** (.04)	.34** (.04)
<u>More Robustness</u>	Drop Latin America, Caribbean Importers	.26** (.04)	.28** (.04)	.22** (.04)	.32** (.04)	.28** (.04)	.42** (.04)
<u>Signaling</u>	Drop African Importers	.34** (.04)	.35** (.04)	.28** (.04)	.30** (.04)	.36** (.04)	.40** (.04)
<u>Conclusion</u>	Drop Asian Importers	.31** (.04)	.34** (.03)	.27** (.04)	.31** (.04)	.34** (.04)	.39** (.04)
	Drop Middle Eastern Importers	.29** (.04)	.33** (.03)	.26** (.03)	.29** (.03)	.32** (.04)	.37** (.04)
	Drop Small Exporters (Population < 1m)	.26** (.04)	.26** (.03)	.19** (.03)	.24** (.03)	.24** (.04)	.30** (.04)

Robustness Tests of Olympic Effect (2 of 2)

	Fixed Effects: Olympics:	None Summer	None Either	Dyadic Summer	Dyadic Either	Exp., Imp. Summer	Exp., Imp. Either
<u>Motivation</u>							
<u>Literature</u>	Drop Poor Exporters (Real GDP p/c < \$1000)	.20** (.04)	.19** (.03)	.20** (.03)	.23** (.03)	.26** (.04)	.30** (.04)
<u>Olympic Effect</u>	Drop Small Importers (Population < 1m)	.33** (.04)	.36** (.04)	.26** (.04)	.31** (.03)	.32** (.04)	.41** (.04)
<u>Sensitivity</u>	Drop Poor Importers (Real GDP p/c < \$1000)	.31** (.04)	.33** (.03)	.27** (.04)	.30** (.03)	.34** (.04)	.40** (.04)
Table 2	Drop poor-poor and small-small dyads	.20** (.04)	.22** (.03)	.15** (.03)	.19** (.03)	.23** (.04)	.31** (.04)
Table 2 (cont)	Drop Late Data (year > 2000)	.33** (.04)	.35** (.03)	.24** (.03)	.28** (.03)	.27** (.04)	.34** (.04)
Robustness	Drop Early Data (year < 1960)	.30** (.04)	.32** (.03)	.19** (.04)	.27** (.04)	.27** (.04)	.36** (.04)
Endogeneity	Drop 2.5 σ Outliers	.26** (.03)	.26** (.03)	.20** (.03)	.23** (.03)	.27** (.04)	.33** (.04)
Other events	Weight by Real GDP	.29** (.04)	.31** (.03)	.23** (.03)	.29** (.03)	.30** (.04)	.37** (.04)
Table 3	Exporter <i>plus</i> Importer Hosting	.29** (.03)	.37** (.02)	.29** (.03)	.24** (.02)	.44** (.03)	.39** (.02)
Candidates	Exporter <i>or</i> Importer Hosting	.23** (.02)	.58** (.03)	-.00 (.01)	.29** (.03)	.02 (.02)	.49** (.03)
More Robustness	Glick-Taylor (1870-1997) trade effect	.47** (.04)	.58** (.04)	.33** (.04)	.29** (.03)	.37** (.04)	.31** (.04)
Signaling							
Conclusion							

Robustness of permanent effect

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Table 2 (cont)

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- Results are fairly insensitive to changes in the specification
 - Also find import effect, suggesting that change is in overall openness
 - Largely insensitive to sample changes as well, including dropping outliers
 - Also robust to using bilateral trade data from 1870

Endogeneity issues?

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Table 2 (cont)

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- Are open countries more likely to host games?
 - Deal with issue using treatment methodology below
- Arguments favoring exogeneity
 - Finding is in time series behavior of trade
 - Cities, rather than countries, bid for games
 - Formal IOC criteria for selecting cities unrelated to trade
- Probit model of hosting fails to indicate endogeneity
- Will do treatment effects later

Other “Mega-events”

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➤ FIFA World Cup

- Held every four years since 1930 ('42 and '46 games skipped)
- Add World Cup dummies to specification

➤ World's fairs

- Date back to 1851 London Great Exhibition
- Have declined in importance over time
- Look at those as well

The Effects of Other Mega-Events on Exports in the Gravity Model

A. Effects of Hosting Olympics and World Cup on Exports

Fixed Effects:	None	None	Dyadic	Dyadic	Exp.,Imp.	Exp.,Imp.
Olympics:	Summer	Either	Summer	Either	Summer	Either
Olympic Effect	.25**	.33**	.20**	.27**	.23**	.33**
	(.04)	(.03)	(.03)	(.03)	(.04)	(.04)
World Cup Effect	.34**	.34**	.18**	.19**	.27**	.27**
	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)
Olympic=World Cup?	.11	.79	.76	.08	.45	.25
(p-value)						

B. Effects of Expos/World Fairs on Exports

Fixed Effects:	None	None	Dyadic	Dyadic	Exp.,Imp.	Exp.,Imp.
Olympics:	Summer	Either	Summer	Either	Summer	Either
Olympic Effect	.24**	.28**	.08**	.28**	.28**	.35**
	(.04)	(.03)	(.03)	(.03)	(.04)	(.04)
Worlds Fair/Expo Effect	.19**	.22**	.22**	.06*	.09**	.06*
	(.04)	(.04)	(.03)	(.03)	(.03)	(.03)
Olympic=Worlds Fair?	.45	.27	.00**	.00**	.00**	.00**
(p-value)						

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Candidate Countries

Table 4

Candidates sum

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Failed "candidate" countries

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Candidates sum

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- Compare trade patterns with failed candidate countries
- Specification similar to host countries
 - Dummies: 0 before failed candidacy, 1 afterwards

Effects of Olympic Hosting and Candidacy on Exports

Fixed Effects:	None	None	Dyadic	Dyadic	Exp.,Imp.	Exp.,Imp.
Olympics:	Summer	Either	Summer	Either	Summer	Either
Hosts	.15**	.28**	.20**	.25**	.26**	.31**
	(.04)	(.03)	(.03)	(.03)	(.04)	(.04)
Candidates	.16**	.14**	.27**	.21**	.36**	.27**
	(.03)	(.03)	(.03)	(.03)	(.03)	(.03)
Host=Candidate?	.79	.01**	.11	.31	.02*	0.37
(p-value)						

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Results with failed "candidate" countries

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- Effects of both hosting and candidacy positive and significant
- Similar in size
 - Can't reject hypothesis that two effects are equal in most specifications
 - In one of two cases where differences were observed, candidacy effect was larger
- Results suggest that effect comes from *bidding*
- No change in fundamentals from hosting games
- Suggests bidding as a signal

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Tetradic estimates

Table 5

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Use tetradic estimates to deal with "monadic" problems

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- Anderson and Van Wincoop (2003): "multilateral resistance"
- Adopt "method of tetrads" [Head, et al (2008)]
 - Compare export observations to pair of base countries
 - Avoids estimation of large number of fixed effects
- Consider 3 pairs of base countries
 - US - UK
 - Japan - France
 - Germany - Canada
- Head, et al methodology to correct error correlations

Tetradic Estimates of Olympic Hosting/Candidacy Effect on Exports

	Summer	Either	Summer	Either	Summer	Either
Olympics:	Summer	Either	Summer	Either	Summer	Either
Base Exporter	USA	USA	Japan	Japan	Germany	Germany
Base Importer	UK	UK	France	France	Canada	Canada
Effect of Host/ Candidacy	.61** (.04)	.38** (.04)	.65** (.04)	.38** (.04)	.81** (.04)	.38** (.04)
Observations	534,820	534,500	521,887	523,207	515,063	513,628

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Treatment methodology

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- Compare exports for hosts or candidates with matched counterparts
- Adjusts for possibility that candidates and hosts are not randomly selected
- Match using stratification technique
 - Non-candidates to candidates
 - Non-candidates to host and candidates

Results Using Treatment Methodology for Export Effects

	Olympics:	Summer	Either
<u>Motivation</u>	Treatment	Control	
<u>Literature</u>	Host	Candidate	
<u>Olympic Effect</u>		.08*	.05
<u>Sensitivity</u>		(.04)	(.04)
<u>Candidates</u>	Host or Candidate	Non-Candidate	
<u>More Robustness</u>		.18**	.19**
		(.07)	(.03)

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Multilateral data

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- Effect of hosting or being a candidate on aggregate export/GDP ratio
- Also consider being a World Cup host
- Coefficients on hosting and candidacy are positive and significant, and similar in magnitude

Aggregate Effects Using Multilateral Data

A. Aggregate Effects on Export/GDP ratio using Multilateral Data

Motivation	Summer Games	Summer	Winter	World Cup	Any Event
Literature	Host Olympics	.14*	.14*		
Olympic Effect		(.06)	(.07)		
Sensitivity	Candidate	.14	.10		
Candidates	for Olympics	(.08)	(.07)		
More Robustness	Host or Candidate	.14	.14		
Tetradic estimates	for Olympics	(.06)	(.08)		
Table 5	World Cup			.18**	
Treatment				(.06)	
Table 6					

B. Comparing Effects of Different Events on Aggregate Export/GDP Ratio

Signaling	Summer Games	Summer	Winter	World Cup	Any Event
Conclusion	(1)	.12		.16**	
		(.08)		(.06)	
	(2)		.13	.17**	
			(.08)	(.06)	
	(3)				.19*
					(.08)

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- Consistent with empirical results that Olympic effect not associated with hosting games but rather from bidding for them

- Model is of the “burning money” type
 - Countries that intend to pursue liberal trade policies signal intent by bidding for costly hosting assignment
 - Payoff for sending signal is increased investment in the export sector

- Under appropriate conditions, obtain separating equilibrium
 - Countries that liberalize bid for the Olympics
 - Those that remain closed do not send signal

Liberalization has distributional consequences

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- 2-sector specific factors model of a small open economy
- Liberalization increases prices in export sector and lowers them in import-competing sector
- National governments differ in relative valuations on returns to sectors
 - Cannot credibly reveal these valuations to potential investors
- Government makes discrete liberalization and signaling decision based on maximizing expected utility

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- Both sectors produce using a fixed domestic factor, which can be considered sector-specific capital
- Putty capital, k , is mobile across sectors and earns an international market rate of return, r^*
- Real output levels in the export and import-competing sectors satisfy $y_j(k)$, where $y'_j > 0$ and $y''_j < 0$, $j = x, m$.
- Putty capital is imported by domestic entrepreneurs, who have claims on the fixed factors and earn any residual profits

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- ▶ Country is small; takes world prices as given
- ▶ *Domestic* prices are a function of the government's liberalization decision
- ▶ Prices prior to liberalization are denoted p_x^c and p_m^c
- ▶ After opening they are p_x^o and p_m^o respectively, where $p_x^o > p_x^c$ and $p_m^o < p_m^c$

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➤ Model has three stages

- Government bid decision
- Agents' investment decision
- Government liberalization decision, naming of winning host, payoffs determined

➤ To ensure sub-game perfection, we solve model backwards

Equilibrium investment decision

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- Subsequent to signal, investors know liberalization policy
- k invested in each sector to equate marginal product to r^*
- Return to domestic agents in each sector, v_j^l , satisfies

$$v_j^l = p_j^l y_j(k_j^*) - (1 + r^*)k_j^*; j = x, m, l = c, o. \quad (2)$$

- Return in export sector greater under liberalization

$$v_x^o - v_x^c = (p_x^o - p_x^c) y_x(k_x^{*c}) + \int_{k_x^{*c}}^{k_x^{*o}} [p_x^o y_e(\sigma) - (1 + r^*)\sigma] d\sigma > 0. \quad (3)$$

- Opposite result for return in import sector

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- Let c represent net cost of hosting the Olympics
- Let π represent probability bid is successful
- Assume that the reputation cost of backing out is prohibitive
 - Highly embarrassing and adverse impact on reputation
 - Infrequent, visible events with long lead times
- Expected cost of sending signal therefore equal to πc .
- Government finances cost of signal by taxing each sector, where export sector pays $\gamma\pi c$, and import-competing pays $(1 - \gamma)\pi c$.

Government's utility function

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- Government has a utility function that is concave in earnings from each sector

$$U_g = \sum_j \theta_j u(v_j); j = x, m. \quad (4)$$

- where $u' \geq 0, u'' \leq 0$. Normalize by setting $\theta_m = 1$.
- Prior to sending signal, U_g satisfies

$$U_g = \theta u(v_x^c) + u(v_m^c). \quad (5)$$

- Subsequent to sending signal and liberalizing, U_g satisfies

$$\hat{U}_g = \theta u(v_x^o - \gamma \pi c) + u(v_m^o - (1 - \gamma) \pi c). \quad (6)$$

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- Signal, liberalization decisions by government maximizing expected utility; sectoral investment decisions maximize expected returns to domestic entrepreneurs, conditional on government signal

- Government always liberalizes following a bid iff

$$\theta \geq \frac{u(\tilde{v}_m^c - (1 - \gamma)\pi c) - u(v_m^o - (1 - \gamma)\pi c)}{u(v_x^o - \gamma\pi c) - u(\tilde{v}_x^c - \gamma\pi c)} \quad (7)$$

- Government never liberalizes after not making a bid iff

$$\theta < \frac{u(v_m^c) - u(\tilde{v}_m^o)}{u(\tilde{v}_x^o) - u(v_x^c)}. \quad (8)$$

- Combined with Lemma 1, "Government utility with liberalization increasing in θ ," conditions rule out off-equilibrium path strategies

Extension to z heterogeneous countries

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- ▶ Number countries such that $\theta^z \leq \theta^{z+1}$
- ▶ Define θ^* as value of θ^z at which government indifferent between being closed (without signal) and liberalizing (with signal)
- ▶ Sufficient, but not necessary conditions that θ^* satisfies conditions(7) and (8) above

$$v_x^c \geq \tilde{v}_x^c - \gamma\pi c. \quad (9)$$

$$v_x^o - \gamma\pi c \geq \tilde{v}_x^o. \quad (10)$$

- ▶ $\gamma\pi c$ must be sufficiently large to achieve separating equilibrium (but not too large)

We adopt these restrictions, which leads to first proposition

Proposition 1 *There exists a separating equilibrium where countries with $\theta^z \geq \theta^*$ send the signal and liberalize, and countries with $\theta^z < \theta^*$ neither send the signal nor liberalize.*

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- Desirability of sending signal and liberalizing function of γ
- Show in text that sign of $\partial\theta^*/\partial\gamma$ is negative iff

$$\theta^* \leq \frac{u'[v_m^o - (1 - \gamma)\pi c]}{u'[v_x^o - \gamma\pi c]}. \quad (11)$$

- Intuitively, restriction implies post-liberalization earnings in import-competing sector sufficiently low relative to export sector, even after adjusting for weight (θ^*)
- Benchmark case ($\theta^* = 1$): Condition satisfied if post-liberalization earnings in the export sector, less than or equal to import-competing sector

This leads to second proposition

Proposition 2 *Given a separating equilibrium for all countries $z \in [z, \bar{z}]$, and satisfaction of condition (11), an increase in γ reduces θ^* , raising the set of countries that choose to send the signal and liberalize, while if (11) is violated, an increase in γ increases θ^* .*

- Intuition: Increased γ aligns of costs and benefits of liberalization
 - Losses to import-competing sector are reduced
- If the marginal country's government does not favor the export sector too heavily, raises the share of countries choosing to send the signal

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- Model suggests that countries bid for mega-events to signal future liberalization intentions
- Under the proper parameter conditions, obtain a separating equilibrium
- Distribution of signaling costs may impact desirability of signal
- Increase in share borne by gaining sector may increase willingness to bid if
 - Government does not favor the gaining (export) sector too greatly
 - Substantive distribution consequences of liberalization
- "Mega-events" like Olympics may be high γ signals

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Conclusion: Find that countries that host Olympics enjoy substantive permanent increase in trade

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- Result is large and robust (30% in default specification)
- Similar results for World cup and World's fairs
- However, observe same effect for failed candidates
 - Suggests that Olympic effect not from “big push” activity
 - Instead, signal of willingness to pursue open policies
- Develop a model where this is the case
 - Separating equilibrium with signaling
 - Distributional implications may make signal attractive

Results reconcile enthusiasm for hosting with idea that host-country loses money in process

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- Liberalization is difficult (redistribution)
 - “Back-sliding” quite common
 - Suggests motivation for government to signal serious intent
 - “Mega-events” may be good signals: large, costly, visible, infrequent, long leads
- Incidence of hosting costs fall disproportionately on national government, host city
 - Aligns costs with agents favoring openness
- Ironically, while bidding to host is desirable ex ante, country with “winning” bid may end up worse off