

Extensive Offshoring: The Role of Middle Management

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Introduction

- Offshoring involves cross-country collaboration between heterogeneous agents
- Key to this collaboration is the communication of knowledge, which is needed to produce
 - Cross-country teams tend to locate production in South, but regularly use knowledge of managers in the North
- Some developing countries have been used much more as targets for offshoring than others
- What qualifies certain countries as particularly attractive locations to offshore? What determines the extensive margin of offshoring?

Introduction (continued)

Two key ingredients:

- **Knowledge:** location of knowledge is crucial for the location of production
 - cross-country differences in the distribution of skills important
- **Communication:** communicating knowledge across borders is costly in terms of time
 - individuals have limited time – role for organizational structure
 - middle layers of management may be time-saving (protect top management from easy questions)

Our take: Production is organized so as to best use available knowledge under costly communication across and within borders

Approach

- As in Antràs, Garicano and Rossi-Hansberg (2006), we develop these ideas in a general equilibrium framework with two countries, the North and the South.
- Agents with heterogenous abilities sort into teams competitively and their earnings are determined in equilibrium.
- Here we allow for
 - richer hierarchial structures;
 - differences in local vs. international communication costs
- Both crucial for understanding the **extensive** margin of offshoring.

The Model

- Production requires solving the problems that arise in production.
- Agents are endowed with time and a skill level, and can work alone or in teams
- Teams are formed by production workers, who draw problems, and problem solvers (managers), who answer questions and communicate solution.
- Role of an agent in a team is endogenous: agents are income maximizers and so choose the occupation that pays them the highest wage given their ability (competitive sorting).

The Model (continued)

- The world economy is inhabited by agents with three skill levels (high in North; medium and low in South).
- We can focus on studying three-layer teams, two-layer teams, and self-employment.
- Communication costs depend on the circumstance in which communication occurs.
 - $h_S \equiv$ communication costs within local southern teams that are not part of a larger hierarchy;
 - $h_L \equiv$ communication costs between southern agents within a multinational team;
 - $h_I \equiv$ communication costs across borders.
- We assume throughout that $h_I > h_L \geq h_S$.

Equilibrium: Inefficient Southern Communication

- We analyze three scenarios:
 - Inefficient Southern Communication (h_S too high for domestic southern two-layer team)
 - Efficient Southern Communication ($h_S = h_L$)
 - Intermediate cases
- Southern communication technology impacts wages and thereby profitability of offshoring and optimal organizational structure.

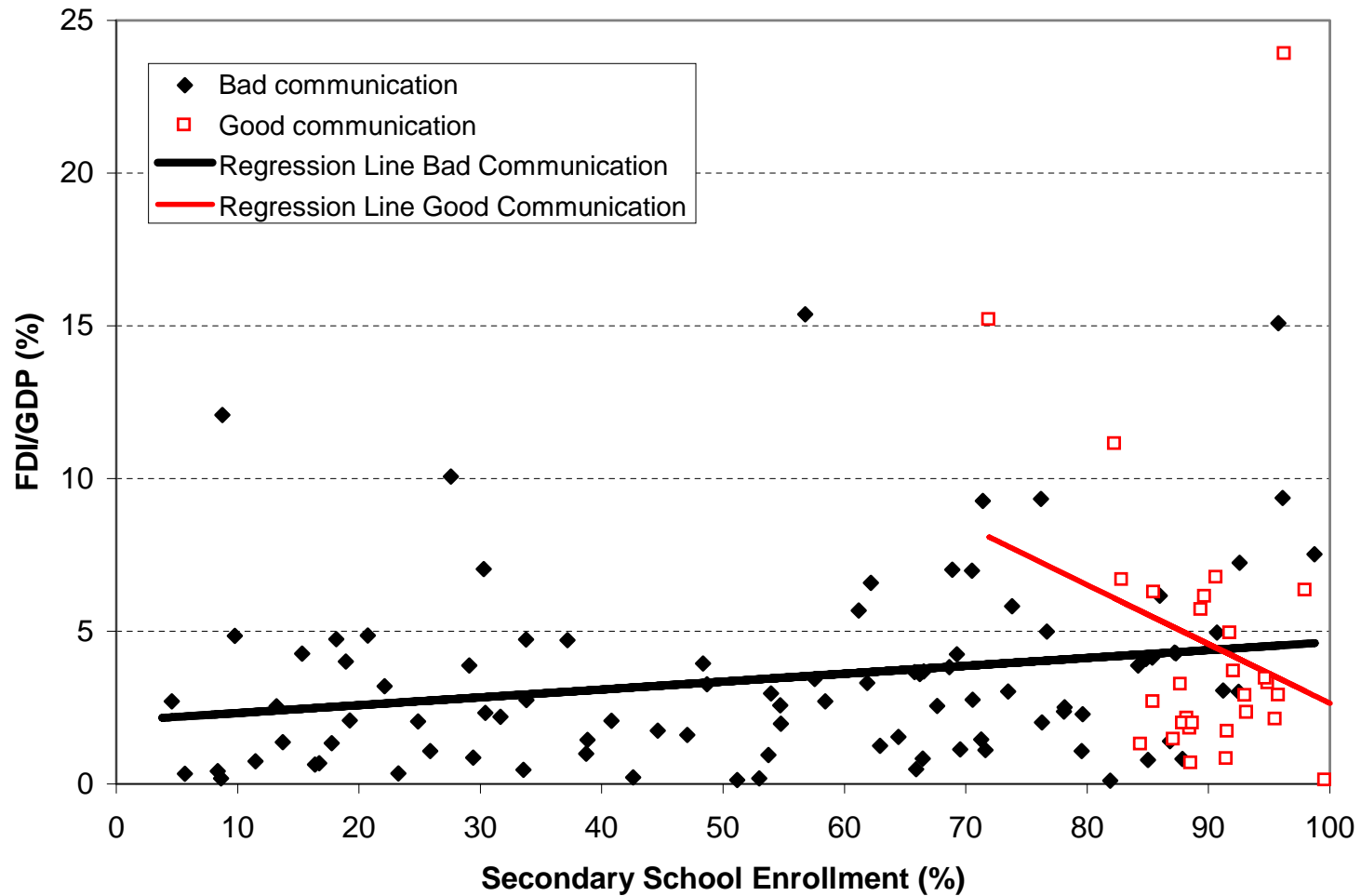
Main Results

- Our theory highlights the role of host-country management skills (middle management) in bringing about the emergence of international offshoring.
 - e.g. a country that would not be chosen as an attractive location to offshore if production is organized in two layer hierarchies could be chosen if three layer hierarchies, with middle managers in the offshore location, are possible
- But important that international communication costs are high relative to local ones (h_I relative to h_L)
- General equilibrium implies that the availability of middle skills in a country has a positive effect in attracting investment by foreign firms, but only if communication technologies in that country are sufficiently underdeveloped.

Empirical Evidence

- We test whether the volume of offshoring (relative to the size of the economy) increases more with intermediate skills in countries where communication technology is relatively bad than in countries where communication technology is relatively good.
- We use the data from the World Bank's World Development Indicators:
 - FDI inflows as a fraction of GDP averaged over 1993-2002 is our measure of offshoring;
 - percentage of inhabitants in the relevant age range enrolled in secondary school (SSE) is our measure of intermediate skills;
 - we construct index of communication costs using data on telephone, computer and internet usage;
 - divide countries into 92 countries with bad communication technology ($BCI = 1$) and 30 countries with good communication technology ($BCI = 0$).

**Figure 1: FDI and Secondary Education
(1993-2002 Averages)**



Source: World Bank Development Indicators. All data points are averages for the decade 1993-2002. For visibility we left out Luxembourg and Equatorial Guinea with FDI/GDP equal to 459.47% and 43.84% respectively. The regression line coefficients and estimation procedure are reported in the text.

Table 1: Median Regression Results

		Dependent Variable: $\frac{FDI}{GDP}$				
		Years: 1993-2002 Averages				
Constant	1.062* (.6015)	36.74** (13.37)	36.74*** (8.718)	36.74*** (9.453)	-1.039 (11.31)	19.98 (13.59)
<i>SSE</i>	.0357*** (.0100)	-.3627** (.1490)	-.3627*** (.0971)	-.3395*** (.1002)		-.3738*** (.104)
<i>SSE * BCI</i>			.3984*** (.0979)	.3826*** (.1008)		.4008*** (.1056)
<i>BCI</i>			-35.68*** (8.749)	-34.72*** (9.054)	2.318 (11.21)	-19.02 (13.43)
<i>PSE * BCI</i>					-.0321 (.1156)	-.1767 (.1315)
<i>PSE</i>					.0881 (.1138)	.2021 (.1287)
$\frac{GDP}{Pop}$				-.2116 (.3733)	-.4453 (.3075)	-.2267 (.3768)
Countries	<i>BCI = 1</i>	<i>BCI = 0</i>	All	All	All	All
# of Obs.	92	30	122	122	122	122

Conclusion

- Two main points of the paper:
 - ability of organizations to change their organizational form (and introduce intermediate layers of managers) is important to understand the extensive margin of offshoring.
 - local communication technology of a country determines the opportunity costs of workers and, therefore, the desirability of such a country as a target for offshoring.
- We provide empirical evidence that, consistently with the model, the availability of middle-skilled agents increases offshoring by relatively more in countries where communication technology is bad, than in countries where communication technology is relatively good.

Table 2: OLS Regression Results

Dependent Variable: $\frac{FDI}{GDP}$
 Years: 1993-2002 Averages

	<i>BCI</i> = 1	<i>BCI</i> = 0	All	All	All	All
Constant	2.105*** (.7107)	22.00 (14.91)	22.00** (10.78)	23.09** (11.35)	-5.205 (17.45)	7.304 (18.40)
<i>SSE</i>	.0257** (.0118)	-.1935 (.1655)	-.1935 (.1197)	-.1905 (.1205)		-.2284* (.1255)
<i>SSE</i> * <i>BCI</i>			.2192* (.1205)	.2210* (.1211)		.2497* (.1271)
<i>BCI</i>			-19.89* (10.81)	-20.24* (10.91)	5.555 (17.42)	-5.476 (18.34)
<i>PSE</i> * <i>BCI</i>					-.0635 (.1790)	-.1803 (.1863)
<i>PSE</i>					.1057 (.1781)	.2057 (.1838)
$\frac{GDP}{Pop}$				-.1394 (.4364)	-.0485 (.3786)	-.2216 (.4424)
Countries	<i>BCI</i> = 1	<i>BCI</i> = 0	All	All	All	All
# of Observations	91	29	120	120	120	120