

DISCUSSION PAPERS IN ECONOMICS

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Outsourcing Globally During the Product Life Cycle:
A Theory and Some Evidence

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1. Introduction

1

2

3

n
 $i; i \dots ; \dots n$

3.1. The consumer

$$U \quad x \quad \text{---} \quad q y \quad z \quad \text{---} \quad \text{---} \quad > \quad ;$$

$$x \quad \text{---} \quad p y \quad z \quad \text{---} \quad l$$

$$z \quad \text{---} \quad \text{---} \quad p y ; q$$

$$i \quad \text{---} \quad l ; l >$$

6

$\forall i$

$$p - C - M y \quad q y - C - M y:$$

y

$$y = \frac{\mu \otimes q}{C - M} \frac{\eta_{1-1}}{\eta_{1-1}}$$

$$P = \frac{C - M}{\otimes}$$

$$- \otimes \frac{\mu \otimes q}{C - M} \frac{\eta_{1-1}}{\eta_{1-1}}$$

3.3. Production Quality

q

$$q = A H e^{i(1)};$$

⁷The marginal costs C and M can be respectively associated with the assembly of products and the production of the intermediate inputs. In general, the assembly stage is more labor intensive, and the production of intermediates is more knowledge based. Therefore, it is relatively easier to contract out the assembly of products to developing countries, which in general have more (less) abundant unskilled (skilled) labor. Alternatively, C and M can be respectively assoM

$$S \quad z - v \quad z - v \quad (1_i)$$

°; < ° <

$$z ; z \in \{G \cap z ; z \mid z \geq v \quad z \geq v \}; \quad G$$

$v ; v$

ve

z T - cy

4. Estim

PLCI 1 1 CUMEXP i 1 2 SCHOOL 3 X A

PLCI i t 1

CUMEXP

tm e (p) 1.6.760 el (D) 0.75.0e.25.02592TJ5.05 0j 9D4rT

CUMEXP

PLCI

GROWTH
SCHOOL
OPEN

F D I

PLCI

PLCI

PLCI

PLCI

PLCI;

CUM ~~te In(x)ental~~ ^{pt el} - 0.204 6.7c 6 (Tj) (Tj) 3 Tj 5.25D 0.03D

7. References

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Table 1.a. Descriptive Statistics for Developing Countries

The Correlation Matrix

	Mean	S. D.	PLCI	CUMEXP	SCHOOL	IIT	OPEN	FDI	GDPCAP	GDPGR
PLCI	.996	.688	1.00	:::	:::	:::	:::	:::	...	...
CUMEXP	.020	.060	.577	1.00	:::	:::	:::	:::	...	...
SCHOOL	38.73	25.47	.389	.316	1.00	:::	:::	...	...	...
IIT	30.11	18.44	.496	.447	.511	1.00	:::	...	...	...
OPEN	64.65	44.69	.462	.741	.290	.324	1.00	...	...	...
FDI	3.81E+7	..								

Table 2.a. Fixed Effects Estimation{ Developing Countries (Lag One)

Dependent Variable: PLC index									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS			Robust Errors			Robust Regressions		
EXPRATIO _{t-1}	9.267 ^{**} (.800)	6.731 ^{**} (1.011)	3.344 ^{**} (1.425)	9.267 ^{**} (1.573)	6.731 ^{**} (1.390)	3.344 ^{**} (1.550)	7.568 ^{**} (.274)	7.053 ^{**} (.405)	4.916 ^{**} (.574)
SCHOOL _t	.006 ^{**} (.003)	.003 (.003)	.002 (.003)	.006 ^{**} (.003)	.003 (.002)	.002 (.002)	.001 (.001)	.0001 (.001)	.0001 (.001)
IIT _t	...	.013 ^{**} (.002)	.012 ^{**} (.002)	...	.013 ^{**} (.003)	.012 ^{**} (.002)	...	.006 ^{**} (.001)	.005 ^{**} (.001)
OPEN _t	...	.003 ^{**} (.001)	.003 ^{**} (.001)	...	.003 (.002)	.003 (.002)	...	-.00004 (.0005)	-.000004 (.0005)
FDI _t	...	.474 ^{**} (.204)	.355 ^{**} (.204)	...	.474 ^{**} (.221)	.355 ^{**} (.204)	...	.129 (.082)	.103 (.082)
GDPCAP _t	...	...	.102 ^{**} (.031)	...	...	.102 ^{**} (.031)	...	...	.062 ^{**} (.012)
GDPGR _t	...	...	-.006 (.005)	...	...	-.006 (.005)	...	...	.001 (.002)
R _i squared	.84	.88	.89	.88	.92	.92	...	...	...
No: of obs:	384	369	369	384	369	369	384	369	369

Note: Country-specific and time-specific fixed effects estimate. Heteroskedasticity-corrected standard errors are in parenthesis. *, ** respectively denote significance at the 5 percent and 10 percent levels.

Table 2.b. Fixed Effects Estimation (All Countries (LagOne))

Dependent Variable: PLC index									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS			Robust Errors			Robust Regressions		
EXPRATIO _{t-1}	5.793 ^{**} (.489)	5.366 ^{**} (.430)	4.695 ^{**} (.479)	5.793 ^{**} (.857)	5.366 ^{**} (.800)	4.695 ^{**} (.790)	4.382 ^{**} (.187)	4.348 ^{**} (.185)	3.540 ^{**} (.208)
SCHOOL _t	.004 ^{**} (.002)	.003 (.002)	.001 (.002)	.004 ^{**} (.002)	.003 (.002)	.001 (.002)	.004 ^{**} (.001)	.002 ^{**} (.001)	.001 (.001)
IIT _t	...	.013 ^{**} (.002)	.013 ^{**} (.002)	...	.013 ^{**} (.003)	.013 ^{**} (.002)	...	.005 ^{**} (.001)	.005 ^{**} (.001)
OPEN _t	...	.002 ^{**} (.001)	.003 ^{**} (.001)	...	.002 (.002)	.003 (.002)	...	-.00002 (.0005)	-.00004 (.0005)
FDI _t	...	.059 ^{**} (.017)	.030 (.019)	...	.059 ^{**} (.018)	.030 ^{**} (.017)	...	.055 ^{**} (.007)	.035 ^{**} (.008)
GDPCAP _t	...	...	.035 ^{**} (.011)	...	...	.035 ^{**} (.012)	...	...	.031 ^{**} (.005)
GDPGR _t	...	...	-.005 (.005)	...	...	-.005 (.005)	...	...	.001 (.002)
R _i squared	.88	.91	.91	.91	.93	.94	...	...	...
No: of obs:	485	463	463	485	463	463	485	463	463

Note: Country-specific and time-specific fixed effects estimate. Heteroskedasticity-corrected standard errors are in parenthesis. *, ** respectively denote significance at the 5 percent and 10 percent levels.

Table 3.b. Fixed Effects

Table 4.a. Fixed Effects Estimation{Dev. Countries (Controlling For Lagged

Table 4.b. Fixed Effects Estimation{All Countries (Controlling For Lagged PLC)

Dependent Variable: PLC index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS			Robust Errors			Robust Regressions		
EXPRATIO _{t_i-1}	2.308 [□] (.426)	2.608 [□] (.395)	2.427 [□] (.420)	2.308 [□] (.578)	2.608 [□] (.592)	2.427 [□] (.573)	2.139 [□] (.190)	2.306 [□] (.191)	2.279 [□] (.206)
PLC _{t_i-1}	.692 [□] (.042)	.592 [□] (.042)	.582 [□] (.043)	.692 [□] (.091)	.592 [□] (.086)	.582 [□] (.085)	.669 [□] (.019)	.633 [□] (.020)	.633 [□] (.021)
SCHOOL _t	.003 [□] (.001)	.002 [□] (.001)	.002 [□] (.001)	.003 [□] (.001)	.002 [□] (.001)	.002 [□] (.001)	.002 [□] (.001)	.001 [□] (.001)	.0014 [□] (.001)

Table 5.a. Reverse Causality{Developing Countries

Dependent Variable: Cumulative Per Capita Exports						
	(1)	(2)	(3)	(4)	(5)	(6)
PLC _{t_i 1}	.001 (.003)	.001 (.002)	.0002 (.0002)	-.003 [*] (.001)	-.003 ^{**} (.002)	-.0001 (.0001)
EXPRATIO _{t_i 1}	...	...	...	.917 [*] (.033)	.917 [*] (.074)	.827 [*] (.003)
SCHOOL _t	-.221 [*] (.110)	-.221 [*] (.105)	-.012 (.009)	.067 (.057)	.067 (.043)	.009 ^{**} (.006)
IIT _t	-.170 (.105)	-.170 ^{**} (.091)	.021 [*] (.009)	.061 (.054)	.061 (.040)	.014 [*] (.005)
OPEN _t	.076 (.053)	.076 (.078)	.011 [*] (.005)	.057 [*] (.027)	.057 (.041)	.018 [*] (.002)
FDI _t	.039 [*] (.009)	.039 [*] (.018)	-.002 [*] (.001)	-.006 (.005)	-.006 (.010)	-.0005 (.0004)
GDP CAP _t	.013 [*] (.001)	.013 [*] (.004)	.005 [*] (.0001)	-.0006 (.0007)	-.0006 (.0007)	-.001 [*] (.0001)
GDP GR _t	-.087 (.231)	-.087 (.160)	-.035 ^{**} (.020)	-.086 (.117)	-.086 (.078)	.003 (.010)
R _i squared	.97	.98	...	.99	.99	...
No: of obs:	373	373	373	369	369	369

Note: Country-specific and time-specific fixed effects estimate. *, ** respectively denote significance at the 5 percent and 10 percent levels.

Table 5.b. Reverse Causality{All Countries

Dependent Variable: Cumulative Per Capita Exports

	(1)	(2)	(3)	(4)	(5)	(6)
PLC_{t-1}	.033 ^a (.005)	.033 ^a (.011)	.002 ^a (.0004)	-.0002 (.003)	-.0002 (.003)	.0001

(0) Tj ET 482.25 428.25 0.65Tj 4.5 0Tc (-) Tj