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DEFENSIVE AND OFFENSIVE FDI IN VALUE-CHAIN LOGISTICS
Evidence from E.U. imports from East & South East Asia

by

Evrard CLAESSENS
Ines BLOEMEN
Carlos OCAMPO Y VILAS

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DEFENSIVE and OFFENSIVE FDI in value-chain logistics;
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Evrard CLAESSENS, Ines BLOEMEN and Carlos OCAMPO Y VILAS

UNIVERSITY of ANTWERP (UFSIA) , Prinsstraat 13
B-2000 ANTWERPEN, BELGIUM, fax: 32 3 220 44 20
phone:32 3 220 41 11, e-mail : dse.ocampoyvilas.c@alpha.ufsia.ac.be

This paper addresses the influence of mixed DIA/FDI flows in East Asia upon trade diversion across the region. In spite of poor information, the evident substitution effects of Foreign Direct Investments (FDI) upon trade could activate the lack of information on product composition. Some second thoughts remain on the relation between "investment substitution" (substitution between investment and trade) and "trade diversion" (substitution between origins), but evidence proves that both effects can be separated in a statistical way. Due to data paucity, this exercise is confined to Taiwan DIA in South East Asia and the Far East in two major industries, being electric machinery and garments. This "ground research" proves ready for generalization.

1. Investments

By the end of 1997 Taiwan's outward direct investments abroad (DIA) totaled about 75 billion dollars, scattered over about 40,000 cases which average 1.9 million dollars of investment. Taking into account the interest effect, the stock estimate neatly exceeds 100 billion dollar in the 1948-1995 period at a unit rate of more than 2.5 million $ each.

Table 1 overviews the breakdown in East and South-East Asia. Most investment cases scatter around a 5 million US $ yardstick, with some occasional peaks in isolated "project" years. DIA into mainland China were recently more numerous at a lower unit value. This reduces the regional average to a 1-3 million US $ bracket since 1991. Vietnam and Cambodia seem to benefit from an initial impact with smaller investments afterwards.

Japan acts mostly as the top DIA-partner for most beneficiary FDI countries of the ASEAN region, with Taiwan ranging from second to fifth place. European partners appear with England and Germany in Thailand and England in the Philippines too.

2. DIA/FDI and Euro-trade

The European DIA flows appear either to be offensive when they aim at local markets by production facilities or distribution networks. Defensive investments are specially meant for re-exporting, thus generating dual flows, often with a strong intra-industry component. Reliable information for this type of investment is (almost) impossible to obtain on a comprehensive network basis.

Incoming European FDI from Asia are mainly offensive with the major manufacturing DIA (mainly Japanese) located in the United Kingdom. The remaining relate mainly to business services and logistics (transport, warehousing and so-called secondary production) and rather focus on the European continent.

Table 1 : Taiwan's investments in East and South-East Asia

	1959-87	1988	1989	1990	1991	1992	1993	1994	1995	1996
TH	885	860	892	782	584	290	215	478	1804	2786
#	259	308	214	144	69	44	61	88	102	66
$	3.4	2.8	4.2	5.4	8.5	6.6	3.5	5.4	17.7	42.2
MA	151	306	800	2348	1326	574	331	1123	568	310
#	175	111	191	270	182	137	86	100	123	79
$	.86	2.8	4.2	8.7	7.3	4.2	3.8	11.2	4.6	3.9
PH	17	110	149	141	12	9	5	292	13	7
#	97	86	190	158	109	27	21	42	34	22
$	.18	1.3	.78	.89	.11	.33	.24	7.0	.38	.32
IN	2400	913	157	618	1057	563	131	2488	567	534
#	22	16	19	94	58	23	21	48	89	111
$	109	57.1	8.3	6.6	18.2	24.5	6.2	51.8	6.4	4.8
SI	465	6	5	48	13	9	70	101	32	165
#	64	3	6	10	13	11	12	19	20	54
$	7.3	2.0	0.8	4.8	1.0	0.8	5.8	5.3	1.6	3.1
VI	0	0	1	228	498	538	399	496	1217	512
#	0	0	1	17	26	27	49	78	64	46
$	-	-	0	13.4	19.2	19.9	8.1	6.4	19.0	11.1
CA	0	0	0	0	0	0	0	31	20	106
#	0	0	0	0	0	0	0	3	19	33
$	-	-	-	-	-	-	-	10.3	1.1	3.2
PR	0	0	0	0	2710	5543	9965	5395	5777	5141
#	0	0	0	0	3377	6430	10948	6247	4778	3184
$	-	-	-	-	0.8	0.9	0.9	0.9	1.2	1.6
T.	3919	2195	2003	4165	6199	7528	11116	10402	9998	9562
#	617	524	621	693	3834	6699	11198	6625	5229	3595
$	6.4	4.2	3.2	6.0	1.6	1.1	1.0	1.6	1.9	2.7

first line : total in million U.S.$
second line : # = number of cases
third line : $ = million of $ per case

source : Ministry of economic affairs, Taipei

FDI ranking in the reported countries (order as above)

Thailand : Japan, Singapore, England, USA, Germany, Taiwan
MAlaysia : Japan, Taiwan
PHilippines : Viking Islands, England, Japan, Taiwan
INdonesia : Japan, England, Hong Kong, USA, Singapore, Taiwan
SIngapore : none reported
VIetnam : Singapore, Taiwan
CAmbodja : none reported
P.R.China : Hong Kong & Macao, USA, Taiwan

The third flow is mixed with initially defensive and eventually offensive components, which are scattered across global networks. The point is whether these flows can be detected, i.e. related to concepts of logistical chain-management. These investments leave some major Asian economies as a defensive DIA to a neighboring low-salary economy. There, assembly and other labour intensive components are added up to the point of "postponement", i.e. when products cease to be anonymous "pushed" commodities and become dedicated "pulled" product. Mostly, this happens when arriving at a European "gate" (mainports, airports, etc.). These gateways may themselves be offensive FDI in "business-related services". The logistical value-chain eventually becomes a mixed (defensive & offensive) FDI, basically offensive in which some components serve defensive goals.

3. European market-shares, related to Asian FDI

A simple method consists in looking at the market share of the reported countries in the European Union for a number of typical value-chain logistical products, such as machinery or garments.

Because of the changing nomenclature from the older NIMEXE to the HS (Harmonised System) it seems wise to confine the study to the same post-1988 period, we discussed before. The 1988-1992 period allows market shares including the European partners, and thus incorparates the weight of intra-EU logistics. From 1993 the so-called INTRASTAT registers intra-EU trade, i.e. within the "unified market" in an indirect way whereas extra-EU trade continues exhaustive customs-based registrations. This paper only discusses extra-EU trade between 1988 and 1995.

Table 2: EU market-shares of some Asian nations (machinery)

MACHINERY	1988	1989	1990	1991	1992	1993	1994	1995
Thai pr.	1.08	0.76	0.76	0.66	0.60	0.67	0.71	0.80
ECU %	0.41	0.65	0.89	1.15	1.31	1.52	1.46	1.54
ton %	0.38	0.86	1.17	1.74	2.17	2.26	2.05	1.92
Mal pr.	1.34	1.22	1.27	1.30	1.21	1.56	1.60	1.60
ECU %	1.65	2.08	2.56	3.31	3.57	4.97	5.59	6.83
ton %	1.24	1.71	2.02	2.56	2.96	3.25	3.58	4.37
Phil pr.	4.47	(0.67)	3.320	2.96	2.78	2.75	2.62	2.95
ECU %	0.39	(0.46)	0.46	0.52	0.63	0.74	0.90	1.15
ton %	0.09	(0.68)	0.14	0.17	0.23	0.27	0.34	0.39
Indo pr.	0.50	0.12	046	0.30	0.32	0.41	0.43	0.40
ECU %	0.03	0.04	0.09	0.13	0.28	0.56	0.58	0.55
ton %	0.05	0.34	0.18	0.41	0.86	1.35	1.34	1.39
PRChina	0.47	0.45	0.41	0.41	0.41	0.41	0.36	0.33
ECU %	1.45	2.33	3.26	3.75	4.67	5.60	5.83	6.51
ton %	3.07	5.05	7.66	8.76	10.74	12.72	14.54	17.45
Taiwan	0.73	0.75	0.79	0.67	0.75	0.86	0.87	0.90
ECU %	4.90	4.85	4.53	4.54	4.05	3.76	3.59	3.97
ton %	6.60	6.39	5.64	6.68	5.35	4.34	4.11	4.42
GARMENTS	1988	1989	1990	1991	1992	1993	1994	1995
Thai pr.	0.85	0.92	0.88	0.93	0.98	1.01	0.99	0.99
ECU %	3.04	3.13	2.98	3.06	2.78	2.46	2.21	1.89
ton %	3.57	3.40	3.36	3.29	2.84	2.42	2.23	1.90
Mal pr.	0.85	0.88	0.85	0.86	0.85	0.90	0.91	0.91
ECU %	0.98	1.27	1.52	1.71	1.70	1.59	1.52	1.21
ton %	1.15	1.43	1.78	1.99	1.98	1.77	1.67	1.33
Phil pr.	0.73	0.78	0.73	0.81	0.79	0.86	0.79	0.75
ECU %	1.64	1.62	1.39	1.47	1.29	1.19	1.07	0.92
ton %	2.22	2.05	1.89	1.82	1.91	1.38	1.35	1.21
Indo pr.	0.67	0.71	0.74	0.80	0.79	0.85	0.87	0.83
ECU %	1.40	1.98	2.39	3.14	3.67	3.62	3.56	3.26
ton %	2.09	2.76	3.19	3.89	4.58	4.22	4.08	3.88
PRChina	0.61	0.69	0.75	0.87	0.86	0.91	0.87	0.86
ECU %	6.99	7.52	9.88	13.25	12.82	13.45	13.43	11.61
ton %	10.95	10.53	12.74	14.96	14.56	14.64	15.17	13.28
Taiwan	1.02	1.06	1.01	1.071	1.12	1.18	1.10	1.07
ECU %	3.37	2.86	2.08	2.38	1.86	1.26	1.13	0.93
ton %	3.32	2.70	2.05	2.24	1.66	1.08	1.02	0.87

first line: price relative to competitive price
second line: market share in ECU %
thirth line: in volume %
source : EUROSTAT data processed by CLAESSENS (1997)

The simplified "ground-research" model is:

$MSEU_{i,k} = f[FDIT_i, MSTW_k]$

with $MSEU_{i,k}$: EU market share of external partner "i" for product "k" (i.e. either machinery or garments)
$FDIT_i$: foreign direct investment from Taiwan in "i"
$MSTW_k$: EU market share of Taiwan product class "k".

The market share data are given in Table 2. Note that only the market share data in value (ECU) terms are used in the statistical exercise. Nevertheless, comparison with tonnage shows that the Philippines tend to low volume, high priced items, whereas mainland China focuses on the lower price brackets. The other nations are in between with quite stable trends.

4. results

The data are first pooled and tested for cross-correlation and regression performance.

Both for machinery and garments, the correlation results are satisfactory:

table 3 : correlation matrix

Correlation	ln FDIT	ln MSTW	ln MSEU	ln FDIT	ln MSTW	ln MSEU
ln FDIT	1.00	-0.06	0.35	1.00	-0.05	0.66
ln MSTW		1.00	-0.47		1.00	-0.15
ln MSUE	*MACHINERY*		1.00	*GARMENTS*		1.00

Technically, the relation between the two explanatory variable is very small (-0.06 and -0.05); it expresses the "disinvesting" effect of outward DIA and their immediate direct effect on lowering Taiwan market share in Europe for related products. This means both effects can be discussed as separate items.

The correlation between the investments (FDIT) and the EU market share (MSEU) is 0.35 for machinery, and even 0.66 for textiles. The substitution between dropping Taiwan shares and rising shares of FDI beneficiary countries shows a realistically negative correlation; it is fairly high for machinery (-0.47) and lower (-0.15) for garments. The overall picture appears to be realistic.

The regression was tested in a logarithmic OLS model:

a/ machinery (pooled data)

$\ln MSEU_{i,k} = 6.48 + 0.25 \ln FDIT_i - 5.58 \ln MSTW_k$
(t-stat.) (2.45) (2.31) (- 3.18)

These results indicate a positive influence from FDI on the export capacity of the beneficiary economies in European markets for the machinery sector. Moreover there is an elastic substitution effect between Taiwanese machinery exports to Europe and those originating from the FDI beneficiary nations.

b/ garments (pooled data)

$\ln MSEU_{i,k} = -0.71 + 0.28 \ln FDIT_i - 0.19 \ln MSTW_k$
(t-stat.) (-1.85) (5.1) (-0.8)

The above equation proves a similar investment effect (0.28 against 0.25) for the garment sector but, unlike the machinery sector, shows an inelastic substitution effect. This corresponds to reality since on the one hand there are FDI in textile machinery and on the other hand there exists an export flow in textiles; in case of machinery both flows relate to the same product.

c/ country data

The individual regression results for each of the beneficiary countries are given in annex. The results for machinery are similar to the ones we found for the pooled-regression data. For each of the national economies we have a postive investment (trade generating) effect and a sensitive substitution effect (negative sign for MSTW). For the garment sector the record is fairly uneven, and clearly needs further study. Note that these individual regressions include lagged investment data.

5. Conclusion

The method of separating the trade effects of FDI in a multi-country value-chain logistical setting proves effective in distinguishing between a trade generating investment effect and a trade-diverting substitution effect. The pooled data give satisfactory results, but the individual country studies need further data in order to test leads and lags in a more elaborate model. In most cases investment data are aggregated by country, however a surplus value is obtained when these investment data are complemented by detailed trade data (classified by product and country). Therefore, this procedure appears realistic in tracing the trade effects of FDI, and adds to the understanding of global logistical value-chains.

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Abbreviations

D.I.A. : Direct Investments Abroad (mostly outbound)
E.U. : European Union
F.D.I.. : Foreign Direct Investments (mostly inbound, although this term is also used in general)
M.S. : Market Share

Annex

Regression results for country data (OLS)
Ground research model :

$$\ln MSEU(i,k) = c + \alpha \ln FDIT_{i(-1)} + \beta \ln MSTW_k$$

with MSEU $_{i,k}$: EU market share of external partner "i" for product "k"
FDIT $_{i(-1)}$: foreign direct investment from Taiwan in country "i" with one lag
MSTW : EU market share of Taiwan product class "k"

i = Malaysia
Indonesia
Philippines
Thailand
k = machinery
garments

Machinery	**Malaysia**	**Indonesia**	**Philippines**	**Thailand**
c	5.47	10.65	4.94	1.12
(t-statistic)	(4.02)	(7.02)	(5.64)	(5.17)
α (ln FDIT.$_1$)	0.14	0.20	0.15	0.50
(t-statistic)	(1.08)	(1.87)	(3.20)	(1.48)
β (ln MSTW)	-3.53	-9.43	-4.16	-4.96
(t-statistic)	(-4.15)	(-9.24)	(-5.98)	(-2.94)
R-squared	0.81	0.96	0.90	0.86
Adjusted R-sq.	0.72	0.93	0.86	0.79
S.E. of regr.	0.23	0.27	0.13	0.15
Durbin-Watson	1.40	1.93	2.24	2.92
Prob (F-stat.)	0.035	0.002	0.009	0.02
Garments	**Malaysia**	**Indonesia**	**Philippines**	**Thailand**
c	-0.13	1.29	0.04	1.08
(t-statistic)	(-0.24)	(2.33)	(1.14)	(3.02)
α (ln FDIT.$_1$)	0.07	0.002	-0.01	-0.06
(t-statistic)	(0.93)	(0.02)	(-1.46)	(-0.97)
β (ln MSTW)	0.06	-0.38	0.47	0.50
(t-statistic)	(0.43)	(-1.84)	(12.56)	(6.09)
R-squared	0.22	0.46	0.98	0.95
Adjusted R-sq.	0.17	0.19	0.96	0.93
S.E. of regr.	0.15	0.21	0.037	0.05
Durbin-Watson	1.33	0.93	3.01	2.01
Prob (F-stat.)	0.61	0.29	0.001	0.002