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**Working Paper**

## Linking the knowledge-capital model of foreign direct investment with national knowledge systems

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**FOR ONLINE PUBLICATION**

Online Annex with supplementary material for the paper

**"Linking the knowledge-capital model of foreign direct investment with national knowledge systems"**

## DETAILED RANK CORRELATION RESULTS

**Table AIII.1 Summary results for the rank correlation between outward FDI stocks per unit of GDP (OUTST\_GDP) and intensive-margin indicators, after removing countries with tax-evasion and tax-sheltering policies from the sample %)**

Knowledge system component	Indicator name	No. of compared country observations	Rank correlation, Kendall's <i>tau-b</i>	Prob> z	Confidence code &)
(Re-)activation of existing public knowledge	AEDU_F	136	0.161	0.006	***
	AEDU_M	136	0.090	0.120	
	LQ_CONTR	112	0.076	0.236	
	FEM_RESR	32	-0.250	0.046	**
	TOT_RESR	109	0.497	0.000	***
	TOT_TECH	98	0.454	0.000	***
Creating of new public knowledge: input-related indicators	GII_MAIN	125	0.516	0.000	***
	GII_INPUT	114	0.559	0.000	***
	GERCGDP	119	0.404	0.000	***
	GERPGDP	38	0.408	0.000	***
	GERD_CAP	38	0.482	0.000	***
	GVE_XGDP	38	0.044	0.706	
	HED_XGDP	38	0.408	0.000	***
	ALLRES_LF	35	0.489	0.000	***
	RDPERS_LF	34	0.455	0.000	***
	ALLRES_EM	35	0.492	0.000	***
RDPERS_EM	34	0.480	0.000	***	
Creating of new public knowledge: output-related indicators	GII_OUTPUT	113	0.452	0.000	***
	ECONPAP	134	0.416	0.000	***
	JRN_ART	149	0.194	0.001	***
	JUDINDEP	135	0.420	0.000	***
	IMPART_C	135	0.448	0.000	***
	IMP_PUBL	134	0.389	0.000	***
	PROTPROP	135	0.415	0.000	***
	LEG_FORCE	135	0.320	0.000	***
Acquisition of foreign knowledge assets	INFDI_GDP	156	0.212	0.000	***
	BF_IMSRV	123	0.153	0.012	**
	KIBS_IMSRV	146	0.164	0.003	***
	PAT_NRES	126	0.121	0.047	**
National productivity and knowledge-throughput efficiency	INT_USER	153	0.501	0.000	***
	INTSECUR	153	0.464	0.000	***
	BBND_SUB	153	0.456	0.000	***
	ICT_CONTR	110	0.203	0.002	***
	LP_EMPL	112	0.575	0.000	***

	LP_HOUR	112	0.562	0.000	***
	FORGN_MV	135	0.224	0.000	***
	STARTABUS	135	0.321	0.000	***
Private business research and knowledge-creation efforts	BERD_GDP	38	0.386	0.001	***
	BUX_GERD	38	0.289	0.011	**
	BFIN_HERD	38	0.072	0.530	
	BRES_TOT	34	0.355	0.003	***
Absorbing of knowledge inputs by private business	HT_MFGEX	145	0.301	0.000	***
	IT_SERVEX	149	-0.080	0.148	
	ITPROD_EX	148	0.292	0.000	***
	BF_SRVEX	120	0.305	0.000	***
	KBS_SRVEX	146	0.067	0.206	
	PATP_GDP	38	0.454	0.000	***
	PATI_GDP	38	0.539	0.000	***
	PATB_GDP	38	0.539	0.000	***
	PATP_RES	120	0.105	0.092	*
	TM_DRES	122	-0.103	0.094	*
	TM_TOT	128	-0.144	0.016	**

Overall count statistics with regard to model predictions:

1. Indicators for private, firm-specific knowledge assets have a significant and positive rank correlation with outward FDI (per unit of GDP)	10 of 15 indicators (66.7%)
2. Indicators for public knowledge assets have a significant and positive rank correlation with outward FDI (per unit of GDP)	25 of 29 indicators (86.2%)
3. Indicators for national knowledge assets have a significant and positive rank correlation with outward FDI (per unit of GDP)	35 of 44 indicators (79.5%)
4. National knowledge-throughput efficiency has a positive and significant impact on a country's outward FDI.	8 of 8 indicators (100%)

Note: %) In total, we dropped 18 countries and geographical entities from the full country sample (cf. Section IV in main text for criterion and details). &) Coding of confidence levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.10.

**Table AIII.2 Rank correlation of intensive-margin knowledge-capital indicators with (outward and inward) FDI stock and with GDP, 2000-2020 period, full country sample**

Indicator name	No. of country observations	Rank correlation with outward FDI		Rank correlation with inward FDI		PM: Kendall rank corr. (tau-b) with own GDP
		Spearman's rho	Kendall's tau-b	Spearman's rho	Kendall's tau-b	
ADEDU_F	175	0.152**	0.101**	0.157**	0.105**	0.042
ADEDU_M	175	0.157**	0.102**	0.153**	0.104**	0.106**
LQ_CONTR	128	0.322***	0.212***	0.352***	0.232***	0.213***
FEM_RESR	36	-0.540***	-0.384***	-0.441***	-0.305***	-0.232**
TOT_RESR	135	0.721***	0.517***	0.659***	0.457***	0.394***
TOT_TECH	121	0.669***	0.478***	0.603***	0.423***	0.345***
GII_MAIN	147	0.751***	0.552***	0.697***	0.504***	0.369***
GII_INPUT	131	0.794***	0.592***	0.731***	0.536***	0.404***
GERCGDP	149	0.642***	0.450***	0.621***	0.438***	0.399***
GERPGDP	42	0.514***	0.336***	0.248	0.164	0.196*
GERD_CAP	42	0.585***	0.375***	0.368**	0.231**	0.171**
GVE_XGDP	42	0.148	0.109	-0.003	0.006	0.108
HED_XGDP	42	0.368**	0.240**	0.237	0.157	0.106
ALLRES_LF	39	0.415***	0.236**	0.141	0.077	0.074
RDERS_LF	38	0.481***	0.306***	0.179	0.115	0.112
ALLRES_EM	39	0.395**	0.223**	0.120	0.058	0.072
RDERS_EM	38	0.493***	0.309***	0.194	0.118	0.115
GII_OUTPUT	130	0.749***	0.551***	0.729***	0.537***	0.399***
ECONPAP	164	0.762***	0.569***	0.822***	0.617***	0.545***
JRN_ART	195	0.464***	0.298***	0.478***	0.300***	0.279***
JUDINDEP	165	0.559***	0.390***	0.461***	0.316***	0.231***
IMPART_C	165	0.598***	0.420***	0.524***	0.365***	0.273***
IMP_PUBL	162	0.511***	0.356***	0.441***	0.307***	0.222***
PROTPROP	165	0.579***	0.407***	0.507***	0.351***	0.278***
LEG_FORCE	165	0.465***	0.329***	0.417***	0.290***	0.252***
INFDI_GDP	197	0.110	0.067	.	.	-0.138***
BF_IMSRV	157	0.296***	0.227***	0.307***	0.233***	0.200***
KIBS_IMSRV	193	0.489***	0.350***	0.539***	0.390***	0.312***
PAT_NRES	153	0.122	0.096*	0.121	0.092*	0.011
INT_USER	205	0.664***	0.472***	0.529***	0.365***	0.268***
INTSECUR	209	0.622***	0.441***	0.497***	0.348***	0.219***
BBND_SUB	204	0.633***	0.451***	0.516***	0.366***	0.248***
ICT_CONTR	126	0.255**	0.167**	0.316***	0.204***	0.115*
LP_EMPL	128	0.762***	0.566***	0.649***	0.468***	0.368***
LP_HOUR	128	0.769***	0.575***	0.658***	0.474***	0.373***
FORGN_MV	165	0.171**	0.117**	0.145*	0.102*	0.031
STARTABUS	165	0.498***	0.347***	0.450***	0.319***	0.222***
BERD_GDP	42	0.522***	0.340***	0.269*	0.182*	0.220**
BUX_GERD	42	0.434***	0.299***	0.153	0.182*	0.187*
BFIN_HERD	42	0.153	0.122	0.057	0.043	0.048
BRES_TOT	38	0.592***	0.428***	0.402**	0.300***	0.303***
HT_MFGEX	178	0.504***	0.348***	0.461***	0.323***	0.256***
IT_SERVEX	185	-0.027	-0.019	0.003	0.000	0.056
ITPROD_EX	185	0.396***	0.262***	0.370***	0.242***	0.170***
BF_SRVEX	162	0.537***	0.374***	0.474***	0.338***	0.263***
KBS_SRVEX	196	0.224***	0.149***	0.333***	0.225***	0.238***
PATP_GDP	42	0.600***	0.398***	0.385***	0.254**	0.213**
PATI_GDP	42	0.689***	0.489***	0.488***	0.354***	0.285***
PATB_GDP	42	0.626***	0.429***	0.426***	0.303***	0.201*
PATP_RES	145	0.265***	0.174***	0.297***	0.187***	0.175***
TM_DRES	150	0.115	0.064	0.169**	0.100*	0.073
TM_TOT	159	0.046	0.028	0.104	0.063	0.057

**Table AIII.3 Rank correlation of extensive-margin knowledge-capital indicators with total FDI stock (outward and inward) and with GDP, 2000-2020 period, full country sample**

Indicator name	No. of country observations	Rank correlation with outward FDI		Rank correlation with inward FDI		PM: Kendall rank corr. (tau-b) with own GDP
		Spearman's rho	Kendall's tau-b	Spearman's rho	Kendall's tau-b	
HERD_S	42	0.805***	0.628***	0.792***	0.436***	0.677***
HRES_S	37	0.574***	0.402***	0.539***	0.402***	0.694***
HPER_S	40	0.697***	0.497***	0.675***	0.500***	0.779***
HFTE_S	40	0.693***	0.497***	0.661***	0.495***	0.744***
FEMRES_S	36	0.629***	0.460***	0.574***	0.438***	0.759***
GII_MAIN_S	147	0.751***	0.552***	0.698***	0.504***	0.369***
GII_INPT_S	131	0.794***	0.592***	0.730***	0.536***	0.403***
GERD_S	42	0.806***	0.624***	0.736***	0.559***	0.814***
GOVERD_S	42	0.607**	0.436***	0.570***	0.408***	0.677***
TOTRES_S	37	0.657***	0.487***	0.583***	0.438***	0.734***
GVRES_S	37	0.411**	0.282**	0.374**	0.270**	0.586***
TOTPER_S	38	0.709***	0.514***	0.647***	0.482***	0.787***
GVPER_S	39	0.440***	0.304***	0.407**	0.279**	0.606***
TOTFTE_S	39	0.730***	0.544***	0.666***	0.505***	0.776***
GVFTE_S	39	0.404**	0.282**	0.367**	0.247**	0.584***
GII_OUTP_S	130	0.749***	0.551***	0.729***	0.537***	0.399***
PAT_R_S	145	0.698***	0.514***	0.7690***	0.573***	0.639***
JRNART_S	195	0.803***	0.612***	0.866***	0.686***	0.756***
PAT_NR_S	153	0.720***	0.528***	0.765***	0.578***	0.632***
BERD_S	42	0.806***	0.619***	0.707***	0.540***	0.745***
BRES_S	38	0.748***	0.565***	0.758***	0.502***	0.727***
BPER_S	41	0.748***	0.561***	0.679***	0.510***	0.746***
BFTE_S	40	0.758***	0.569***	0.684***	0.505***	0.728***
PCTPAT_S	42	0.857***	0.677***	0.768***	0.584***	0.686***
ICTPAT_S	42	0.832***	0.642***	0.727***	0.568***	0.656***
BIOPAT_S	42	0.887***	0.728***	0.783***	0.617***	0.668***
TMDRES_S	159	0.765***	0.565***	0.844***	0.654***	0.757***
TM_TOT_S	159	0.760***	0.565***	0.841***	0.654***	0.757***

**Table AIII.4 Rank correlation of intensive-margin knowledge-capital indicators with total FDI stock (outward and inward) and with GDP, 2000-2020 period, full country sample, but without tax-sheltering countries**

Indicator name	No. of country observations	Rank correlation with outward FDI		Rank correlation with inward FDI		PM: Kendall rank corr. (tau-b) with own GDP
		Spearman's rho	Kendall's tau-b	Spearman's rho	Kendall's tau-b	
ADEDU_F	163	0.116	0.076	0.123	0.084	0.042
ADEDU_M	163	0.139*	0.090*	0.149*	0.101*	0.129**
LQ_CONTR	121	0.313***	0.209***	0.359***	0.240***	0.243***
FEM_RESR	32	-0.493***	-0.343***	-0.373***	-0.250**	-0.234*
TOT_RESR	125	0.716***	0.515***	0.661***	0.459***	0.415***
TOT_TECH	112	0.658***	0.467***	0.609***	0.423***	0.386***
GII_MAIN	138	0.741***	0.540***	0.704***	0.506***	0.400***
GII_INPUT	123	0.783***	0.581***	0.735***	0.536***	0.433***
GERCGDP	137	0.637***	0.449***	0.625***	0.443***	0.414***
GERPGDP	38	0.525***	0.346***	0.235	0.158	0.218*
GERD_CAP	38	0.599***	0.380***	0.358**	0.226**	0.218*
GVE_XGDP	38	0.212	0.158	0.015	0.021	0.155
HED_XGDP	38	0.386**	0.243**	0.250	0.164	0.110
ALLRES_LF	35	0.457***	0.261**	0.163	0.089	0.103
RDPERS_LF	34	0.500***	0.312***	0.169	0.102	0.159
ALLRES_EM	35	0.446***	0.250**	0.148	0.072	0.099
RDPERS_EM	34	0.518***	0.323***	0.194	0.112	0.169
GII_OUTPUT	122	0.729***	0.533***	0.727***	0.534***	0.433***
ECONPAP	157	0.752***	0.560***	0.818***	0.613***	0.548***
JRN_ART	183	0.471***	0.300***	0.486***	0.305***	0.281***
JUDINDEP	154	0.532***	0.369***	0.445***	0.305***	0.250***
IMPART_C	154	0.580***	0.420***	0.513***	0.354***	0.288***
IMP_PUBL	152	0.480***	0.333***	0.413***	0.289***	0.221***
PROTPROP	154	0.556***	0.389***	0.495***	0.342***	0.287***
LEG_FORCE	154	0.448***	0.320***	0.401***	0.280***	0.251***
INFDI_GDP	181	0.027	0.015	0.108	0.071	-0.136*
BF_IMSRV	141	0.307***	0.231***	0.333***	0.247***	0.238***
KIBS_IMSRV	176	0.486***	0.347***	0.567***	0.409***	0.366***
PAT_NRES	143	0.168**	0.124**	0.174**	0.127**	0.049
INT_USER	189	0.657***	0.466***	0.522***	0.360***	0.288***
INTSECUR	192	0.610***	0.431***	0.489***	0.342***	0.251***
BBND_SUB	188	0.619***	0.441***	0.506***	0.360***	0.282***
ICT_CONTR	119	0.231**	0.151**	0.287***	0.185***	0.107*
LP_EMPL	121	0.748***	0.555***	0.645***	0.463***	0.408***
LP_HOUR	121	0.756***	0.564***	0.658***	0.471***	0.413***
FORGN_MV	154	0.167**	0.114**	0.149*	0.105*	0.045
STARTABUS	154	0.476***	0.331***	0.451***	0.320***	0.251***
BERD_GDP	38	0.542***	0.357***	0.267	0.181*	0.240**
BUX_GERD	38	0.439***	0.306***	0.243	0.181	0.212*
BFIN_HERD	38	0.045	0.061	-0.089	-0.041	-0.056
BRES_TOT	34	0.571***	0.405***	0.368**	0.266**	0.330***
HT_MFGEX	167	0.486***	0.337***	0.455***	0.320***	0.272***
IT_SERVEX	173	-0.034	-0.024	-0.016	-0.013	0.027
ITPROD_EX	174	0.367***	0.242***	0.346***	0.226***	0.173***
BF_SRVEX	145	0.535***	0.374***	0.491***	0.342***	0.290***
KBS_SRVEX	179	0.243***	0.164***	0.324***	0.219***	0.196***
PATP_GDP	38	0.373**	0.403***	0.669***	0.243**	0.240**
PATI_GDP	38	0.668***	0.471***	0.435***	0.317***	0.275***
PATB_GDP	38	0.614***	0.414***	0.393***	0.272**	0.206*
PATP_RES	136	0.278***	0.183***	0.309***	0.194***	0.169***
TM_DRES	142	0.138	0.079	0.192**	0.113**	0.07
TM_TOT	151	0.061	0.038	0.119	0.073	0.063

**Table AIII.5 Rank correlation of extensive-margin knowledge-capital indicators with total FDI stock (outward and inward) and with GDP, 2000-2020 period, full country sample, but without tax-sheltering countries**

Indicator name	Number of country observations	Rank correlation with outward FDI		Rank correlation with inward FDI		PM: Kendall rank corr. (tau-b) with own GDP
		Spearman's rho	Kendall's tau-b	Spearman's rho	Kendall's tau-b	
HERD_S	38	0.830***	0.690***	0.809***	0.650***	0.824***
HRES_S	33	0.636***	0.458***	0.594***	0.443***	0.705***
HPER_S	36	0.723***	0.527***	0.689***	0.518***	0.762***
HFTE_S	36	0.726***	0.533***	0.682***	0.518***	0.724***
FEMRES_S	32	0.678***	0.516***	0.606***	0.472***	0.770***
GII_MAIN_S	138	0.741***	0.541***	0.704***	0.507***	0.400***
GII_INPT_S	123	0.783***	0.581***	0.735***	0.536***	0.433***
GERD_S	38	0.834***	0.662***	0.760***	0.576***	0.795***
GOVERD_S	38	0.688***	0.508***	0.633***	0.457***	0.698***
TOTRES_S	33	0.698***	0.538***	0.603***	0.462***	0.754***
GVRES_S	33	0.471***	0.341***	0.420**	0.303**	0.595***
TOTPER_S	34	0.735***	0.551***	0.657***	0.497***	0.775***
GVPER_S	35	0.524***	0.375***	0.469***	0.324***	0.620***
TOTFTE_S	35	0.771***	0.593***	0.687***	0.529***	0.771***
GVFTE_S	35	0.485***	0.351***	0.425**	0.287***	0.597***
GII_OUTP_S	122	0.729***	0.533***	0.727***	0.534***	0.433***
PAT_R_S	136	0.732***	0.545***	0.799***	0.600***	0.635***
JRNART_S	183	0.835***	0.644***	0.881***	0.705***	0.755***
PAT_NR_S	143	0.757***	0.562***	0.799***	0.609***	0.634***
BERD_S	38	0.821***	0.642***	0.706***	0.539***	0.724***
BRES_S	34	0.782***	0.608***	0.681***	0.523***	0.718***
BPER_S	37	0.765***	0.592***	0.683***	0.523***	0.730***
BFTE_S	36	0.786***	0.606***	0.695***	0.521***	0.718***
PCTPAT_S	38	0.861***	0.684***	0.749***	0.570***	0.664***
ICTPAT_S	38	0.846***	0.556***	0.713***	0.747***	0.718***
BIOPAT_S	38	0.902***	0.747***	0.771***	0.610***	0.642***
TMDRES_S	142	0.800***	0.606***	0.875***	0.689***	0.744***
TM_TOT_S	151	0.786***	0.589***	0.861***	0.675***	0.757***