Ministry of Foreign Trade Costa Rica

Gains from **FDI and trade**: spillovers in **Costa Rica**

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FDI has Promoted Diversification and Sophistication of Goods and Services Exports

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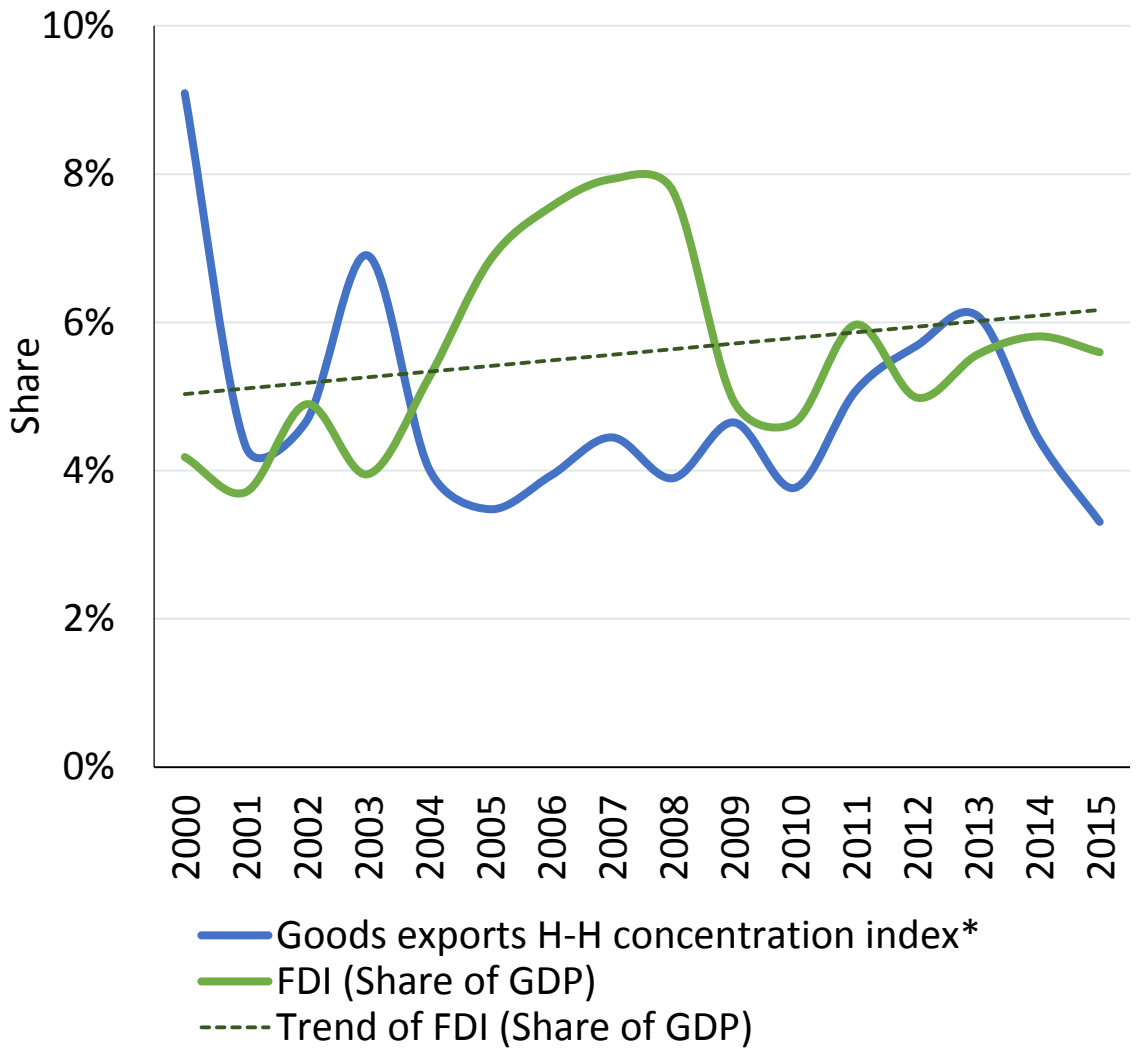
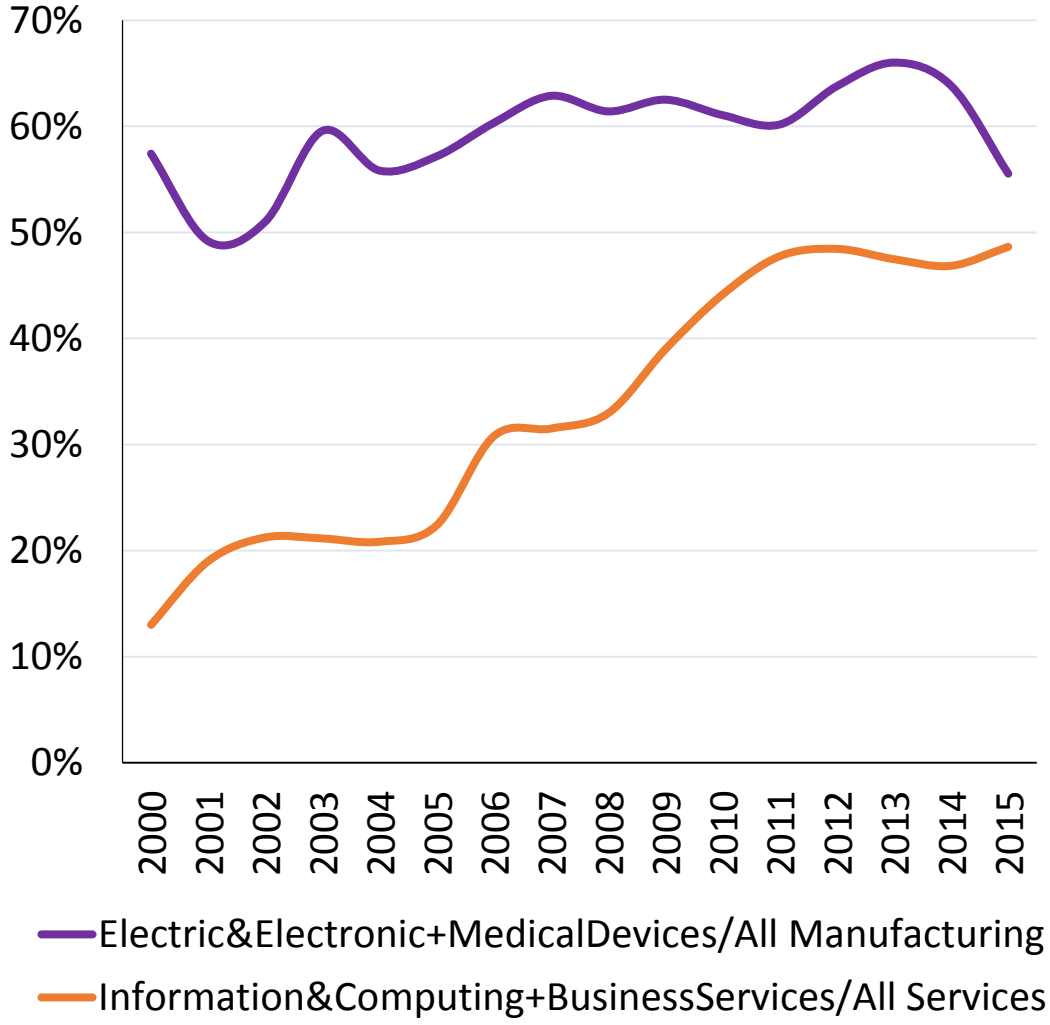
Costa Rica: FDI Inflows and Goods Exports Diversification

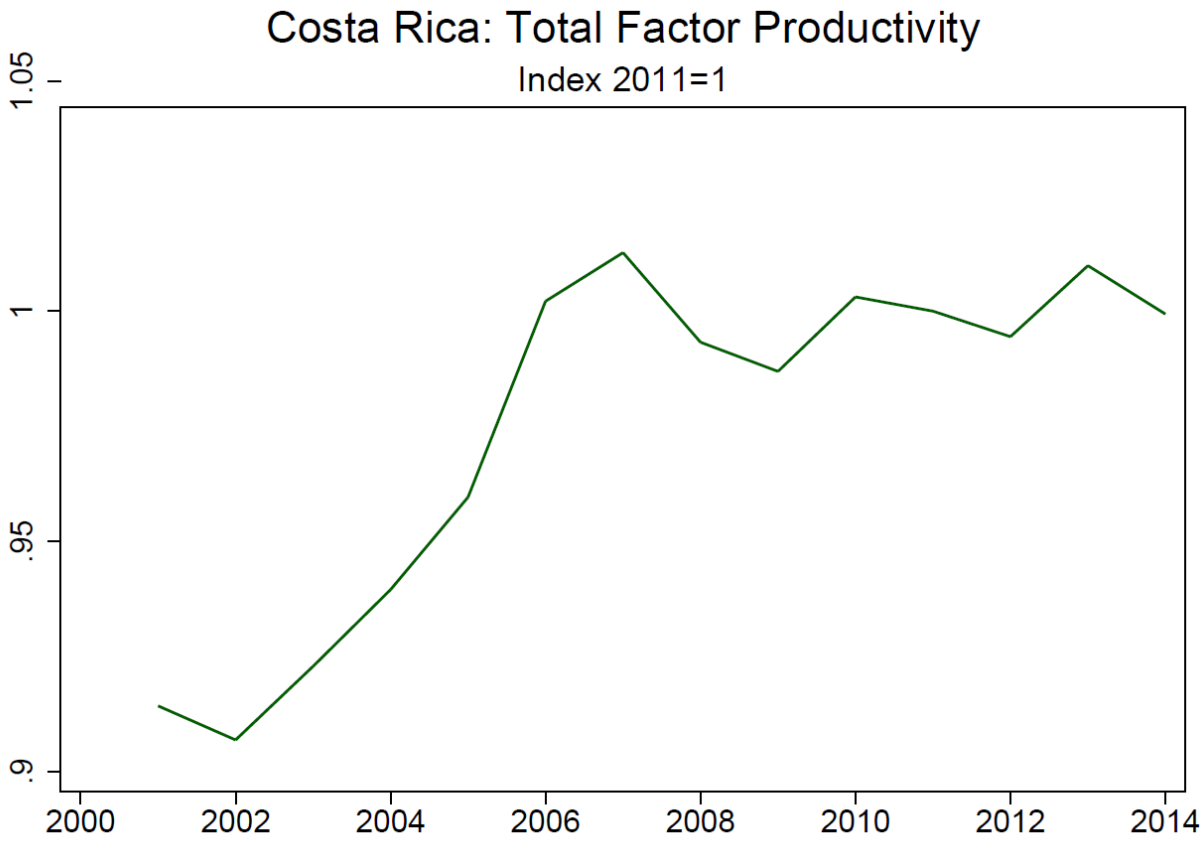


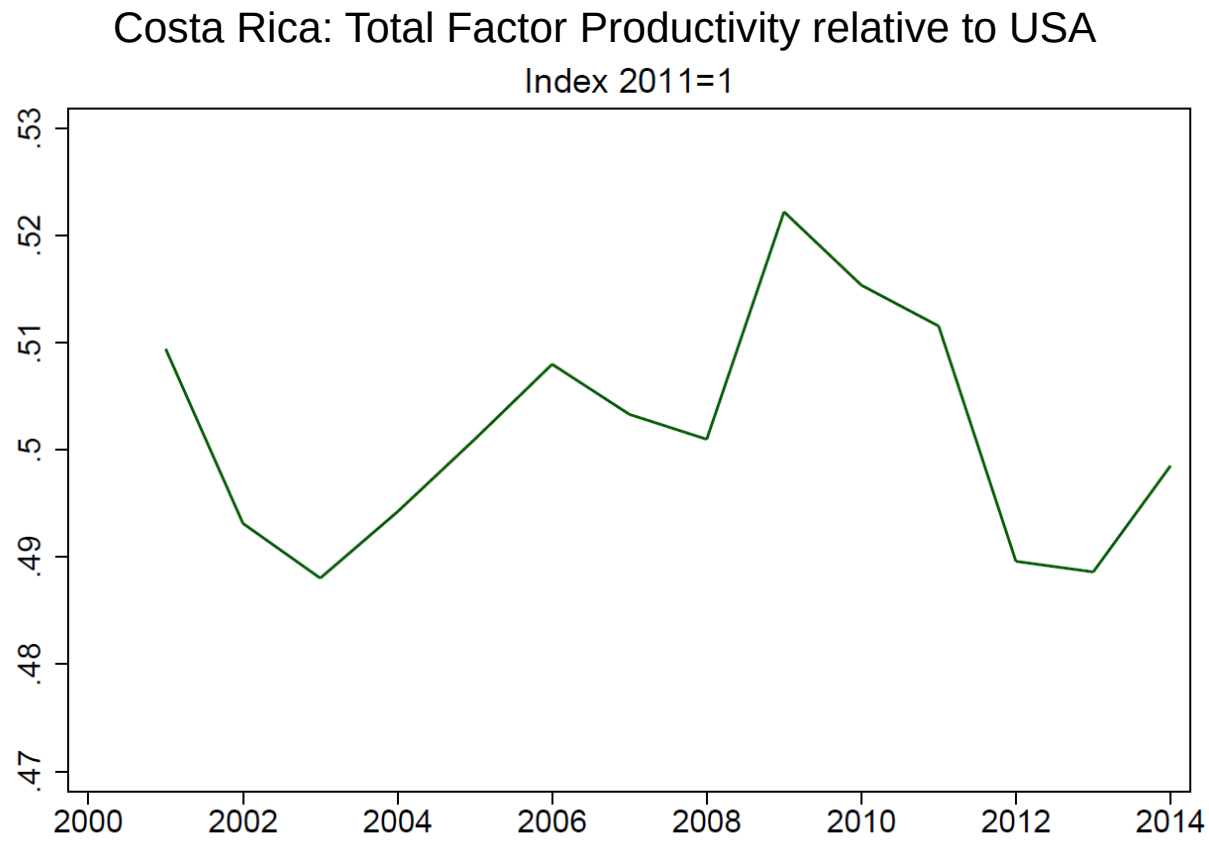
Costa Rica: Services and Goods Exports Sophistication



Sources: Authors, using data from BCCR and PROCOMER. **Note**:* 6-digit HS aggregation

Costa Rica's TFP has been Stagnating





Source: Central Bank of Costa Rica. Data from PWT Version 9.0

Heterogeneous Labour Productivity across Services Activities

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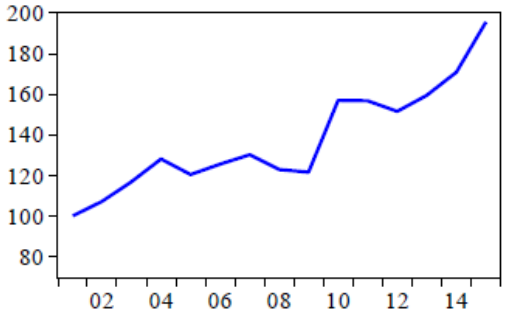
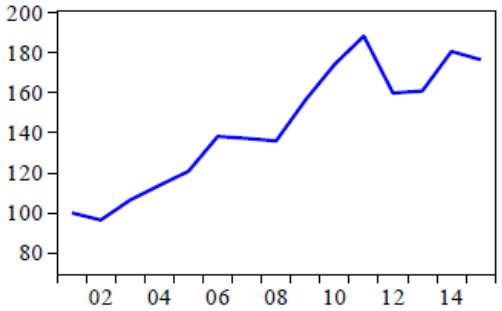
Costa Rica: Labour Productivity by Sector, 2001-15 (2001 = 100)

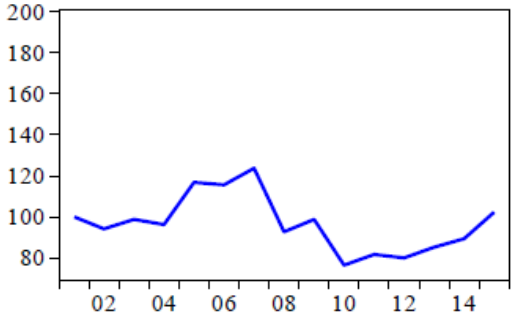
Transportation, IT and communications



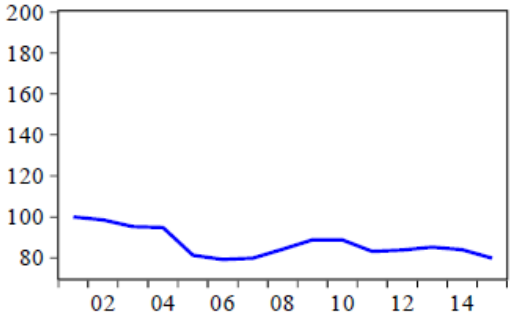
Business services



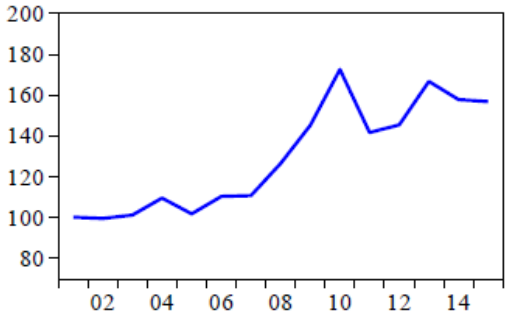
Electricity, gas and water



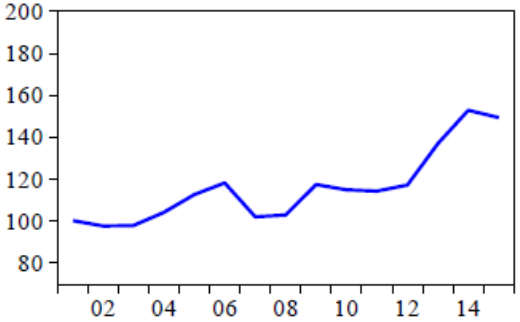
Public administration services



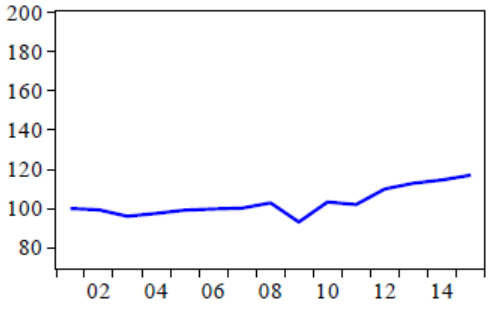
Construction



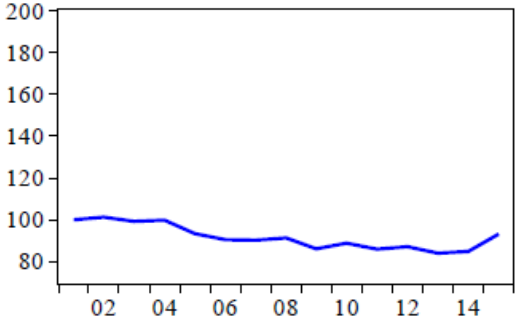
Financial services and insurance



Trade, restaurants and hotels

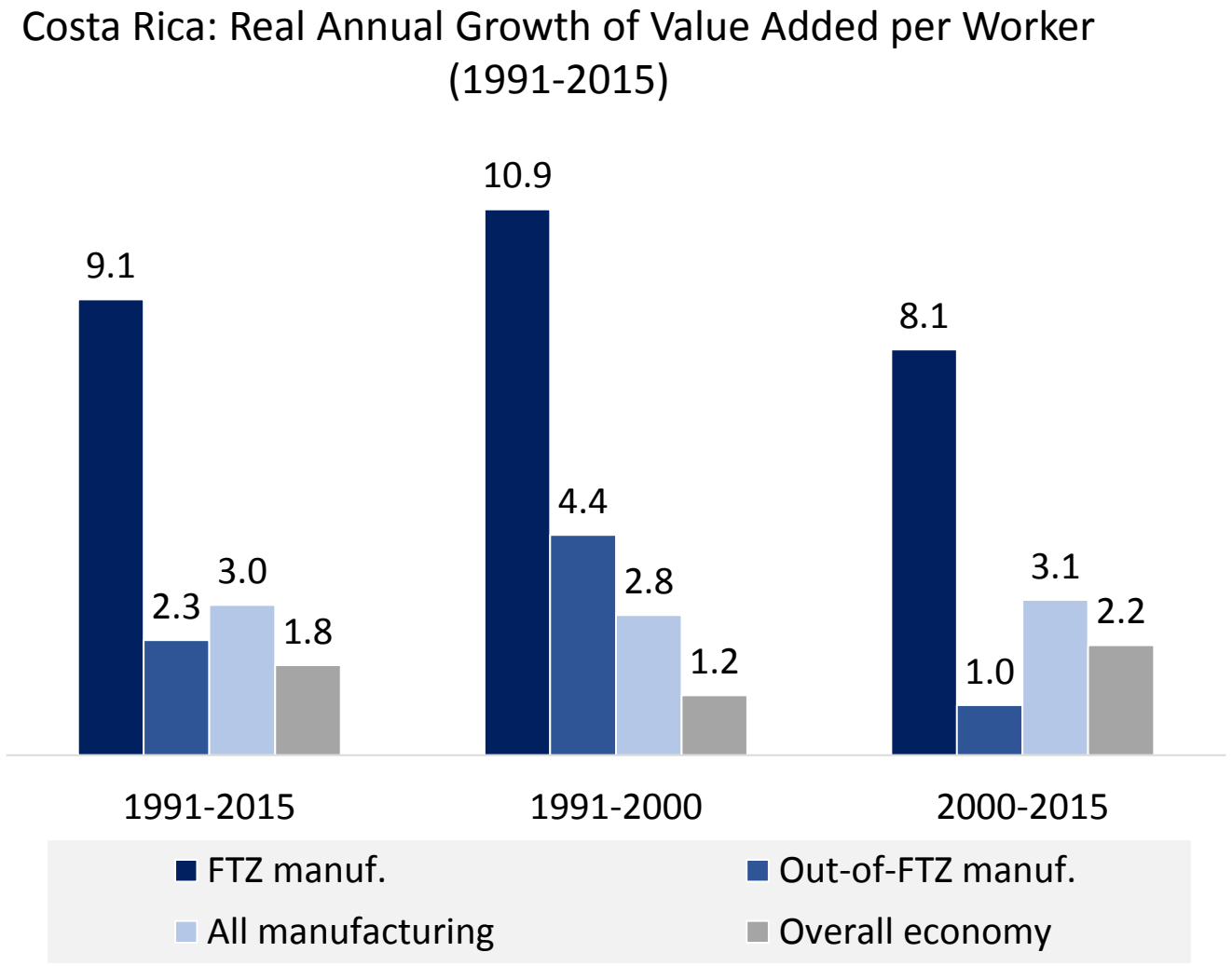


Communal, social and personal services



Source: Mulder et. al. 2016. Análisis del Crecimiento de la Productividad en Costa Rica, 2001-2015

Dual Performance: Labour Productivity Growth Differs Significantly between FTZ Firms and Local Firms



Source: Medaglia, 2015. Balance de Zonas Francas: beneficio neto del régimen para Costa Rica, 2011-2015

- Question: Is there evidence of FDI spilling over domestic firms' productivity?
- Hypothesis: Backward linkages and foreign presence positively affects domestic firms' productivity
- Methodology: Fixed effects (FE) and random effects (RE) panel data equation
- Data
    - Firm-level data for period 2008-15, formal sector
    - Source: Central Bank of Costa Rica's data set constructed using administrative records from several official primary sources
    - Variables: revenues, total net assets, employment, imports, exports, foreign capital share, sectoral classification (4-digit ISIC v.4), transactions between firms, location
    - Building also on results by Alfaro, Manelici and Vásquez (2017) for data on transactions between FDI and local firms and for tracking FDI firms in CR.

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Ruan & Ugur (2005)'s model for manufacturing

$$\left(\frac{Y}{L}\right)_{ijt} = \beta_0 + \beta_1 FP_{jt} + \beta_2 \left(\frac{K}{L}\right)_{ijt} + \beta_3 \left(\frac{L_s}{L_u}\right)_{ijt} + \alpha_j + \alpha_t + e_{ijt}$$

Where,

- $\left(\frac{Y}{L}\right)_{ijt}$: labour productivity of firm i in sector j in year t. Ratio of revenues (Y) to total employment (L)
- FP_{jt}: foreign presence. Share of employment accounted by all foreign-owned plants in the relevant sector
- $\left(\frac{K}{L}\right)_{ijt}$: capital intensity. Ratio of total net assets by total employment in the firms
- $\left(\frac{L_s}{L_u}\right)_{ijt}$: labour quality. Ratio by skilled workers (Ls) to unskilled workers (Lu)
- Sector, province and time dummies are included

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Haller (2014)'s model for services

$$\left(\frac{Y}{L}\right)_{ijt} = \beta_0 + \beta_1 FP_{jt-1} + \beta_2 exp_{it-1} + \beta_3 \left(exp_{it-1} * FP_{jt-1}\right) + \beta_4 impcom_{jt-1} + \beta_5 HHI_{jt} + \beta_6 \Delta igr_{jt-1} + \alpha_j + \alpha_t + e_{it}$$

Where,

- $\left(\frac{Y}{L}\right)_{ijt}$: labour productivity of firm i in sector j in year t
- FP_{jt-1}: foreign presence. Lagged share of employment accounted by all foreign-owned plants in the relevant sector j
- exp_{ijt-1}: lagged export status of firm i. Dummy variable assumes value 1 if firm registered exports that year
- $impcom_{jt-1}$: import competition from abroad. Lagged imports share in domestic consumption by 2-digit ISIC code
- HHI_{jt}: Herfindahl-Hirschman index to control for product market concentration in sector j (3-digit ISIC code)
- Δigr_{jt-1}: lagged revenue growth in sector j, to control for firms' willingness to join fast growing industries
- Sector, province and time dummies are included

Foreign Presence in Manufacturing and Services

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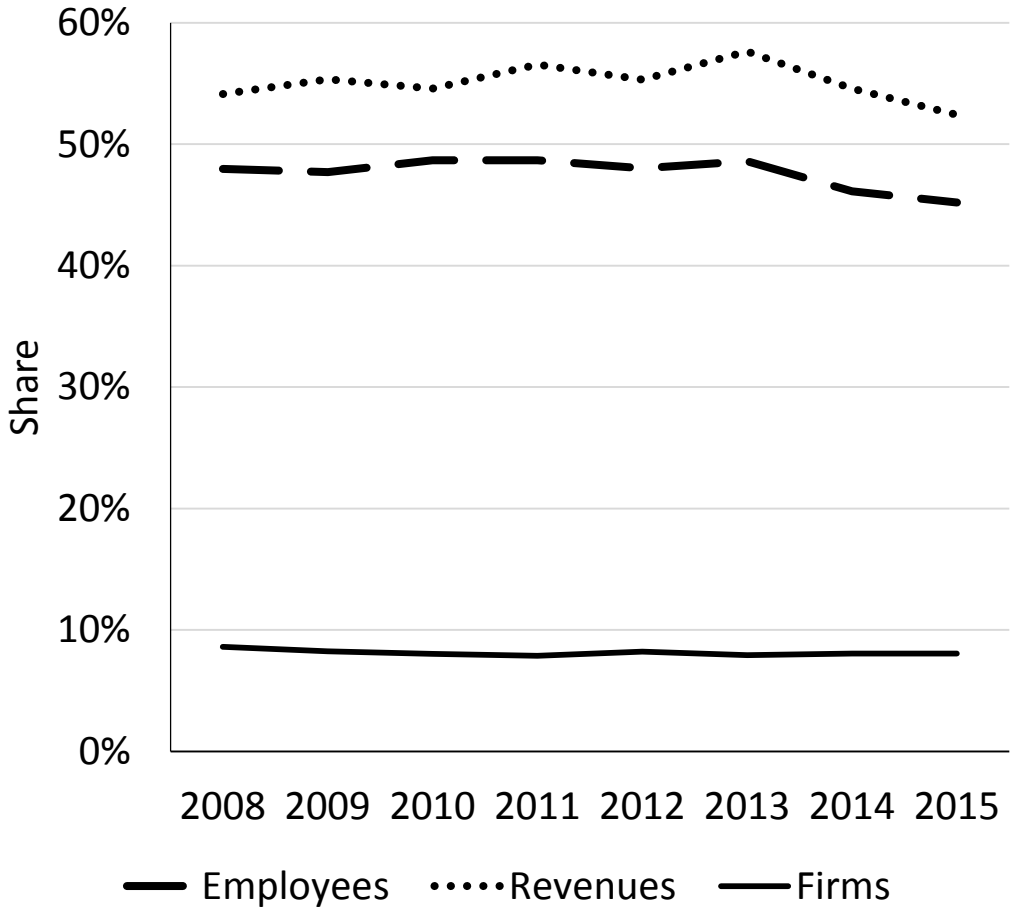
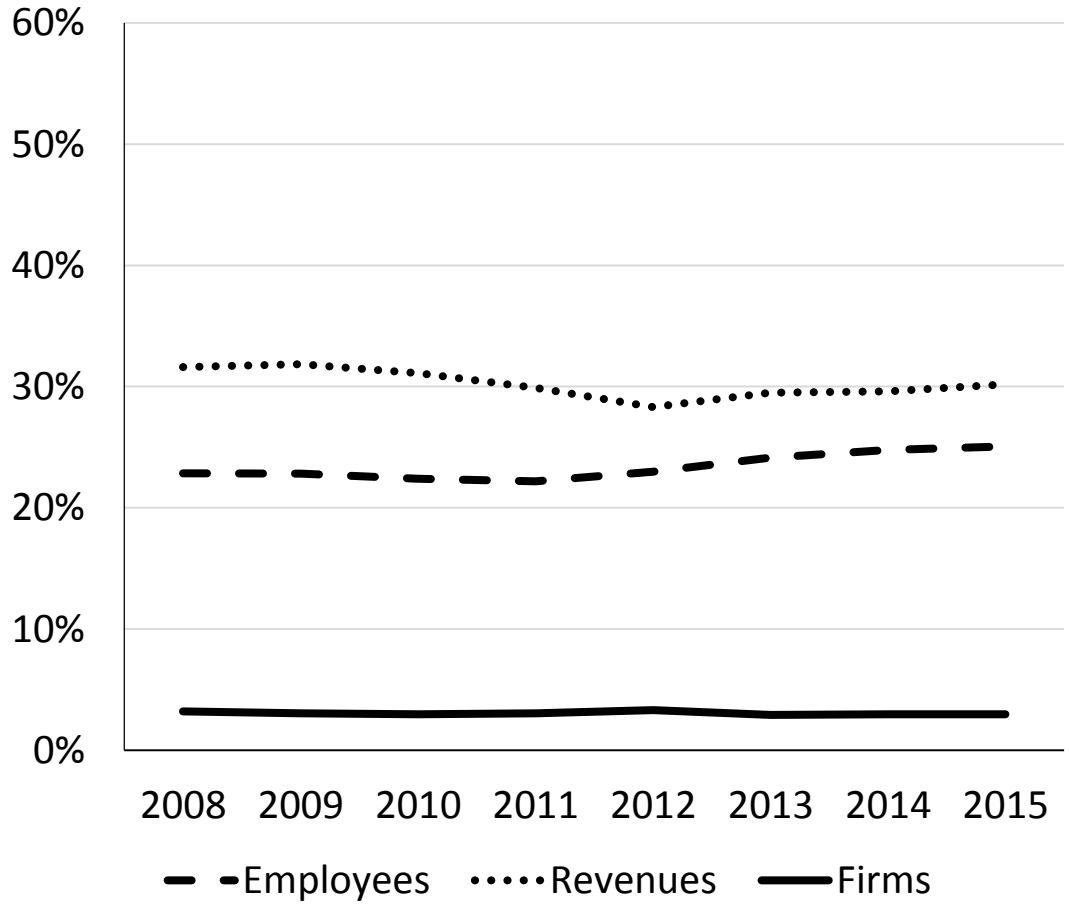
Foreign Firms Share in **Manufacturing**, 2008-15



Foreign Firms Share in **Services**, 2008-15



Sources: Authors, using data from BCCR

Firm and Sector-level Descriptive Statistics

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Firm-level variables

	Foreign firms		Local firms					
			All		*Manufacturing*		*Services*	
Variable	Mean	Stand. Deviation	Mean	Stand. Deviation	Mean	Stand. Deviation	Mean	Stand. Deviation
ln(Y/L)	17.71	1.20	17.15	1.05	17.05	0.90	17.17	1.07
ln(K/L)	17.36	1.59	16.39	1.60	16.15	1.37	16.42	1.63
Ls/Lu	40.82	121.81	3.14	15.95	2.19	12.11	3.27	16.38
Share of sales to FO firms	0.15	0.23	0.10	0.22	0.13	0.23	0.09	0.21
Exporter	0.46	0.50	0.05	0.22	0.15	0.36	0.04	0.20
No. of observations	6,025[a]		180,811*		20,920*		159,891*	

Sector-level variables

Variable		2-digit aggreg.	Foreign presence		Import competition		3-digit aggreg.	HHI		Revenues growth rate	
	Year	No. of sectors	Mean	Stand. Dev.	Mean	Stand. Dev.	No. of sectors	Mean	Stand. Dev.	Mean	Stand. Dev.
Manufacturing	**2008**	19	0.48	0.28	0.43	0.22	35	0.33	0.24	0.004	0.02
	2015	20	0.45	0.30	0.34	0.17	37	0.28	0.24	0.0004	0.01
Services	**2008**	41	0.23	0.21	0.12	0.12	81	0.17	0.16	0.003	0.016
	2015	41	0.25	0.12	0.12	0.12	87	0.13	0.16	0.004	0.018

Source: Authors, using data from BCCR. Notes: a) Minimum number of observations available.*Regression sample.

Results: Specification No.1 (Ruan & Ugur) Applied to Domestic Manufacturing Firms

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Productivity Spillovers in Manufacturing at 2-Digit Level

Model	(1) FE	(2) RE	(3) FE	(4) RE	(5) FE	(6) RE
Foreign presence	0.070	0.065			0.070	0.065
	[0.132]	[0.131]			[0.132]	[0.131]
Share of sales to FO firms			0.016	0.056	0.016	0.056
			[0.045]	[0.039]	[0.045]	[0.039]
ln(K/L)	0.215***	0.238***	0.215***	0.238***	0.215***	0.238***
	[0.013]	[0.011]	[0.013]	[0.011]	[0.013]	[0.011]
Ls/Lu	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	-	Yes	-	Yes	-	Yes
Province dummies	-	Yes	-	Yes	-	Yes
No. of observations	20,920	20,920	20,920	20,920	20,920	20,920
Number of firms	4,059	4,059	4,059	4,059	4,059	4,059
Prob > F	0,0		0,0		0,0	
Prob > chi2		0,0		0,0		0,0

Source: Authors, using data from BCCR. **Notes:** Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Results: Specification No.1 (Ruan & Ugur) Applied to Domestic Services Firms

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Productivity Spillovers in Services at 2-Digit Level

Model	(1) FE	(2) RE	(3) FE	(4) RE	(5) FE	(6) RE
Foreign presence	0.430***	0.488***			0.433***	0.488***
	[0.099]	[0.097]			[0.099]	[0.097]
Share of sales to FO firms			-0.079***	0.004	-0.079***	0.004
			[0.021]	[0.017]	[0.021]	[0.017]
ln(K/L)	0.209***	0.226***	0.209***	0.226***	0.208***	0.226***
	[0.005]	[0.004]	[0.005]	[0.004]	[0.005]	[0.004]
Ls/Lu	0.000	0.000***	0.000	0.000***	0.000	0.000***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	-	Yes	-	Yes	-	Yes
Province dummies	-	Yes	-	Yes	-	Yes
No. of observations	159,891	159,891	159,891	159,891	159,891	159,891
Number of firms	37,523	37,523	37,523	37,523	37,523	37,523
Prob > F	0,0		0,0		0,0	
Prob > chi2		0,0		0,0		0,0

Source: Authors, using data from BCCR. **Notes:** Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Results: Specification No.2 (Haller) Applied to Domestic Manufacturing Firms

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Productivity Spillovers in Manufacturing at 3-Digit Level

Model	(1) FE	(2) RE	(3) FE	(4) RE
Foreign presence (lag): Non-Exp	-0.017	-0.035		
	[0.115]	[0.115]		
Foreign presence (lag): Exp	-0.004	-0.027		
	[-0.033]	[-0.213]		
Share of sales to FO firms: Non-Exp			0.024	0.081*
			[0.051]	[0.045]
Share of sales to FO firms: Exp			-0.065	-0.046
			[0.070]	[0.066]
Impcomp (lag)	0.148	0.146	0.144	0.122
	[0.105]	[0.105]	[0.105]	[0.104]
HHI	-0.410***	-0.417***	-0.416***	-0.423***
	[0.135]	[0.138]	[0.129]	[0.132]
Revenues growth rate (lag)	0.072	0.054	-0.269	-0.288*
	[0.322]	[0.314]	[0.177]	[0.172]
Year dummies	Yes	Yes	Yes	Yes
Sector dummies	-	Yes	-	Yes
Province dummies	-	Yes	-	Yes
No. of observations	19,242	19,242	19,343	19,343
Number of firms	3,728	3,728	3,728	3,728
Prob > F	0,0		0,0	
Prob > chi2		0,0		0,0

Source: Authors, using data from BCCR. **Notes:** Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Results: Specification No.2 (Haller) Applied to Domestic Services Firms

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Productivity Spillovers in Services at 3-Digit Level

Model	(1) FE	(2) RE	(3) FE	(4) RE
Foreign presence (lag): Non-Exp	0.133*	0.169**		
	[0.074]	[0.073]		
Foreign presence (lag): Exp	-0.002	0.011		
	-0.0160	0.0958		
Share of sales to FO firms: Non-Exp			-0.096***	-0.021
			[0.023]	[0.019]
Share of sales to FO firms: Exp			-0.170	-0.131
			[0.057]	[0.055]
Impcomp (lag)	-0.190**	-0.197**	-0.188**	-0.195**
	[0.093]	[0.091]	[0.091]	[0.089]
HHI	-0.158**	-0.176***	-0.122*	-0.136**
	[0.068]	[0.067]	[0.066]	[0.066]
Revenues growth rate (lag)	-0.220	-0.226	0.081	0.078
	[0.158]	[0.155]	[0.119]	[0.117]
Year dummies	Yes	Yes	Yes	Yes
Sector dummies	-	Yes	-	Yes
Province dummies	-	Yes	-	Yes
No. of observations	139,703	139,703	140,601	140,601
Number of firms	32,367	32,367	32,452	32,452
Prob > F	0,0		0,0	
Prob > chi2		0,0		0,0

Source: Authors, using data from BCCR. **Notes:** Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Results: Mixed Specification combining Ruan & Ugur + Haller, Applied to Domestic Manufacturing and Services Firms

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Productivity Spillovers in Manufacturing and Services at 2-Digit Level

Model	Manufacturing		Services	
	(1)	(2)	(3)	(4)
	FE	RE	FE	RE
Foreign presence (Non- exp)	0.102	0.056	0.428***	0.480***
	[0.137]	[0.135]	[0.098]	[0.096]
Foreign presence (Exp)	0.171	0.0861	0.563***	0.645***
	[0.168]	[0.161]	[0.171]	[0.158]
Share of sales to FO firms	0.008	0.043	-0.091***	-0.004
	[0.044]	[0.039]	[0.022]	[0.018]
Impcomp (lag)	0.152	0.089	-0.172**	-0.190**
	[0.095]	[0.093]	[0.084]	[0.082]
IHH	-0.310**	0.042	-0.060	0.031
	[0.124]	[0.079]	[0.062]	[0.056]
Revenues growth rate (lag)	0.094	0.056	-0.143	-0.153
	[0.283]	[0.277]	[0.131]	[0.130]
ln(K/L)	0.213***	0.234***	0.203***	0.223***
	[0.014]	[0.012]	[0.005]	[0.004]
Ls/Lu	0.001***	0.001***	0.000**	0.000***
	[0.000]	[0.000]	[0.000]	[0.000]
Year dummies	Yes	Yes	Yes	Yes
Sector dummies	-	Yes	-	Yes
Province dummies	-	Yes	-	Yes
No. of observations	19,344	19,344	140,601	140,601
Number of firms	3,736	3,736	32,452	32,452

Source: Authors, using data from BCCR. **Notes:** Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

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Findings of Productivity Spillovers in Manufacturing and Services througth the Specifications

Specification	Variable	Manufacturing		Services	
		(1) FE	(2) RE	(3) FE	(2) RE
Ruan&Ugur	Foreign presence	0.070	0.065	0.433***	0.488***
		[0.132]	[0.131]	[0.099]	[0.097]
	Share of sales to FO firms	0.016	0.056	-0.079***	0.004
		[0.045]	[0.039]	[0.021]	[0.017]
Haller	Foreign presence (lag) Non-Exp	-0.017	-0.035	0.133*	0.169**
		[0.115]	[0.115]	[0.074]	[0.073]
	Foreign presence (lag) Exp	-0.004	-0.027	-0.002	0.011
		[-0.033]	[-0.213]	-0.0160	0.0958
Combination	Foreign presence (Non- exp)	0.102	0.056	0.428***	0.480***
		[0.137]	[0.135]	[0.098]	[0.096]
	Foreign presence (Exp)	0.171	0.0861	0.563***	0.645***
		[0.168]	[0.161]	[0.171]	[0.158]
	Share of sales to FO firms	0.008	0.043	-0.091***	-0.004
		[0.044]	[0.039]	[0.022]	[0.018]

Source: Authors, using data from BCCR. **Notes:** Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

- Run estimations at sub-sector level (i.e. plastics, metal mechanic works, business services, IT services, etc.)

- Identify comparable samples of domestic firms to control for differences when estimating the effect from linkages with FDI

Conclusions and Policy Implications

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Conclusions

- So far, no evidence of FDI spillovers on domestic manufacturing firms' productivity at the aggregate level
- So far, evidence of FDI spillovers on domestic services firms' productivity at the aggregate level
- More research is needed with a higher level of disaggregation, for example by applying the model to specific sub-sectors, particularly in services

Policy Implications

- Need to deploy a public policy agenda for domestic firms' capacity building oriented to boost their absorptive capacity and linking with FDI

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