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## How spillovers from foreign direct investment boost the complexity of South Africa's exports



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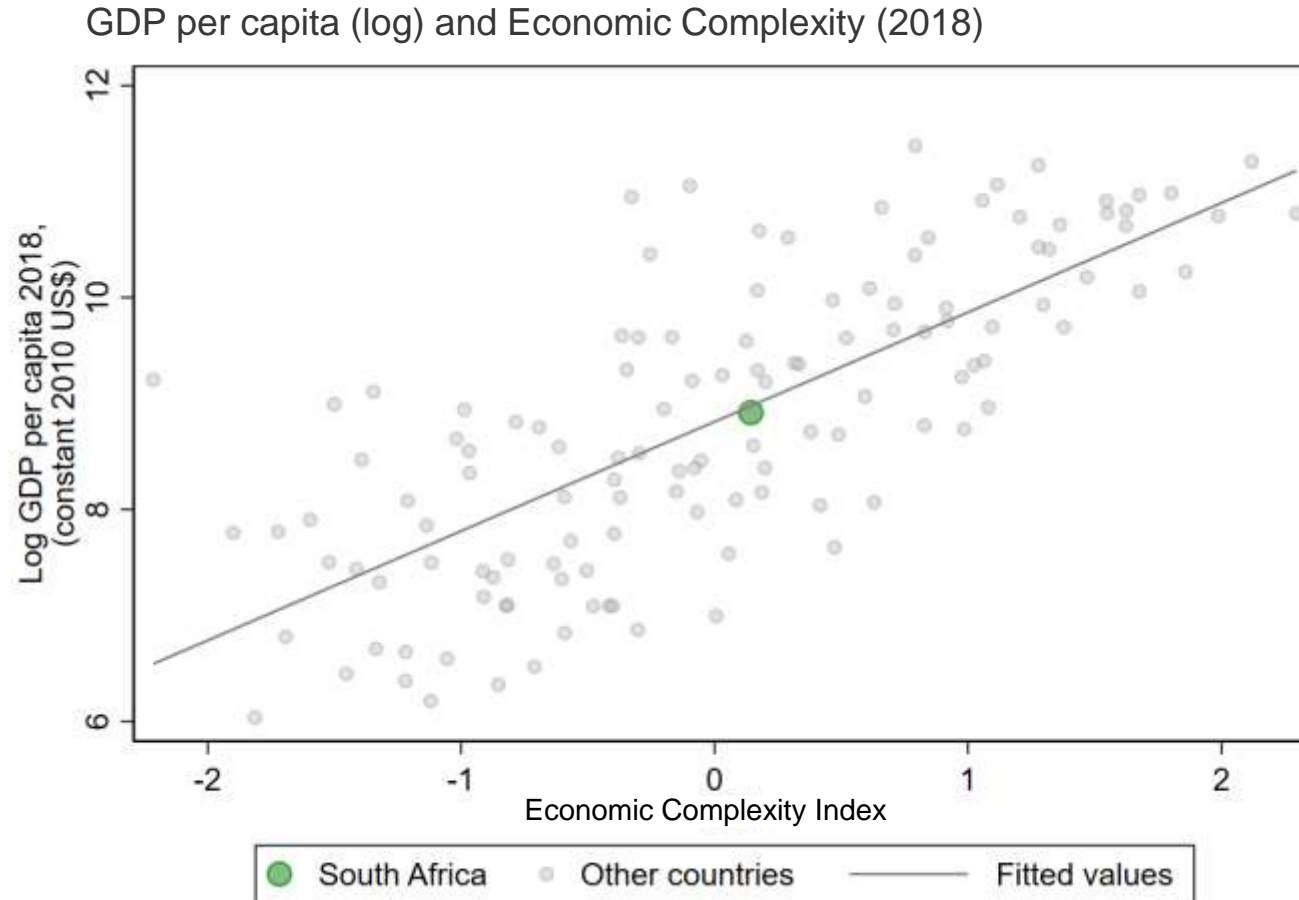




## OUTLINE

- 1 Context & Research Aim
- 2 Conceptual Framework
- 3 Data
- 4 Estimation Approach
- 5 Main Results
- 6 Conclusion & Policy Implications

# BOOSTING ECONOMIC COMPLEXITY MIGHT PROVIDE A SOLUTION TO SOUTH AFRICA'S GROWTH IMPASSE



## Definition

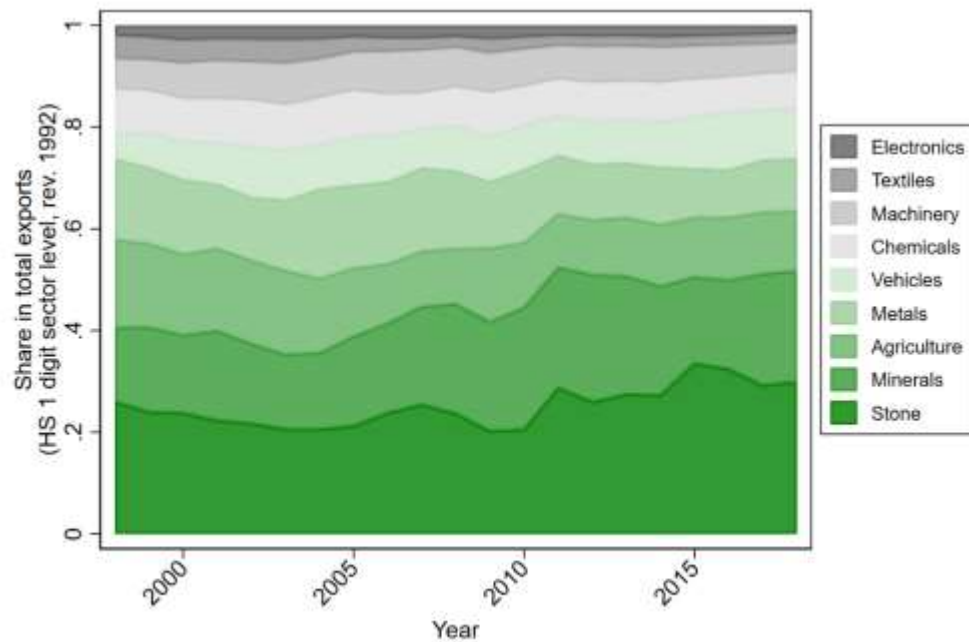
A complex economy is defined as one that can export a diverse set of sophisticated products.

Notes: economic complexity scores are calculated by applying Hidalgo and Hausmann's (2009) complexity algorithm to world trade data at the HS4 level.

Source: author's illustration based on World Development Indicators (World Bank 2018) and world trade data from The Growth Lab at Harvard University (2019).

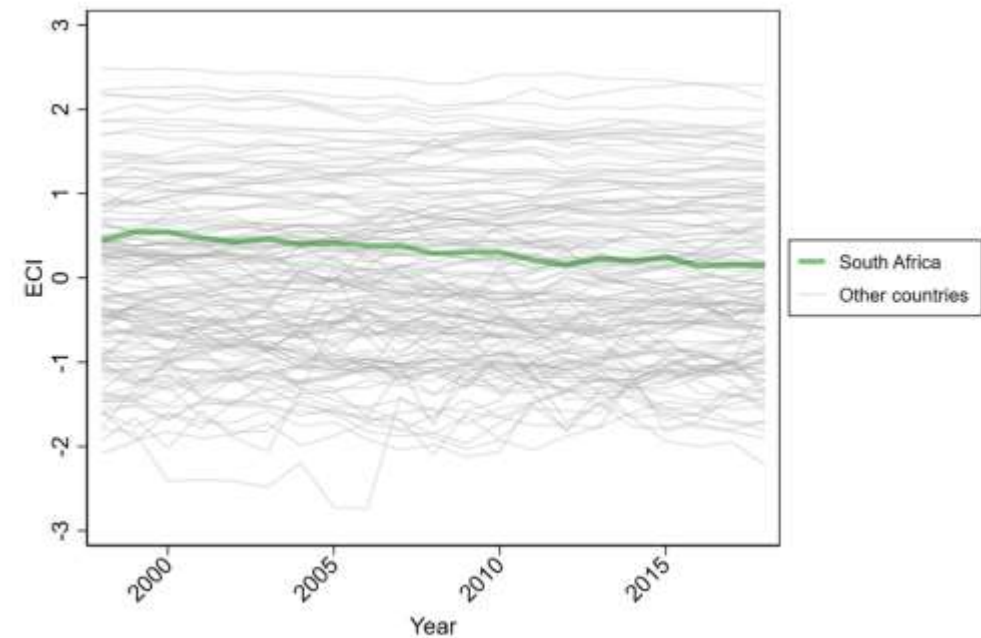
# BUT SOUTH AFRICA HAS BEEN UNABLE TO DIVERSIFY AND UPGRADE ITS EXPORT BASKET AND IMPROVE ITS ECONOMIC COMPLEXITY

Product sectors' share in total exports over time



Notes: products are grouped in accordance with the approach outlined in Harvard's online Atlas of Economic Complexity (2019). Product group 'Other' is left out of the figure. Split is calculated based on total export volume.  
Source: author's illustration based on world trade data from The Growth Lab at Harvard University (2019).

South Africa's economic complexity ranking over time



Notes: economic complexity scores are calculated by applying Hidalgo and Hausmann's (2009) complexity algorithm to world trade data at the HS4 level.  
Source: author's illustration based on world trade data from The Growth Lab at Harvard University (2019).



## WHAT I DO

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**Aim:** Examine how the presence of FDI affect export upgrading in South African manufacturing firms

**Data:**

- i) SA tax administrative data
- ii) World trade data
- iii) SA input-output tables

**Methodology:** Regression analysis (OLS with fixed effect, Heckman selection model)

**Finding:** FDI in supplying sectors boosts domestic firms' ability to increase the sophistication of their most complex exports

# THE IDEA THAT DOMESTIC FIRMS CAN LEARN TO UPGRADE THEIR EXPORTS FROM FOREIGN FIRMS IS ALREADY ESTABLISHED IN THE LITERATURE

## 1st Generation Studies

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- The first generation of FDI-export studies has established a link between the presence of MNEs and domestic firms' **entry into export markets** and **export intensity**.
- Examples: Aitken et al. (1997); Greenaway et al. (2004); Kneller and Pisu (2007); Kokko et al. (2001), and many more...

## 2nd Generation Studies

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- A second generation of studies ask whether FDI boosts domestic firms' ability to undertake **export/product upgrading** and **diversification**
- Examples: Bajgar and Javorcik (2020); Eck and Huber (2016); Javorcik et al. (2018); Lo Turco and Maggioni (2018) and Mayneris and Poncet (2015).
- Contribution to the literature:
  - First evidence in Africa
  - New method (algorithm) to measure product complexity

# SPILOVERS FROM FDI CAN THEORETICALLY OCCUR IN MULTIPLE WAYS AND BE BOTH POSITIVE AND NEGATIVE

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## Horizontal spillovers (within industry)

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### Positive effect

- Labour mobility
- Demonstration effect
- Cost-discovery
- Competition effect

### Negative effect

- Brain drain
- Crowding-out effect

## Backward spillovers (flows upstream)

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### Positive effect

- Knowledge and technology transfer
- Quality standards
- Demand for new intermediaries

### Negative effect

- Monopsonistic foreign customers (lock-in effect)

## Forward spillovers (flows downstream)

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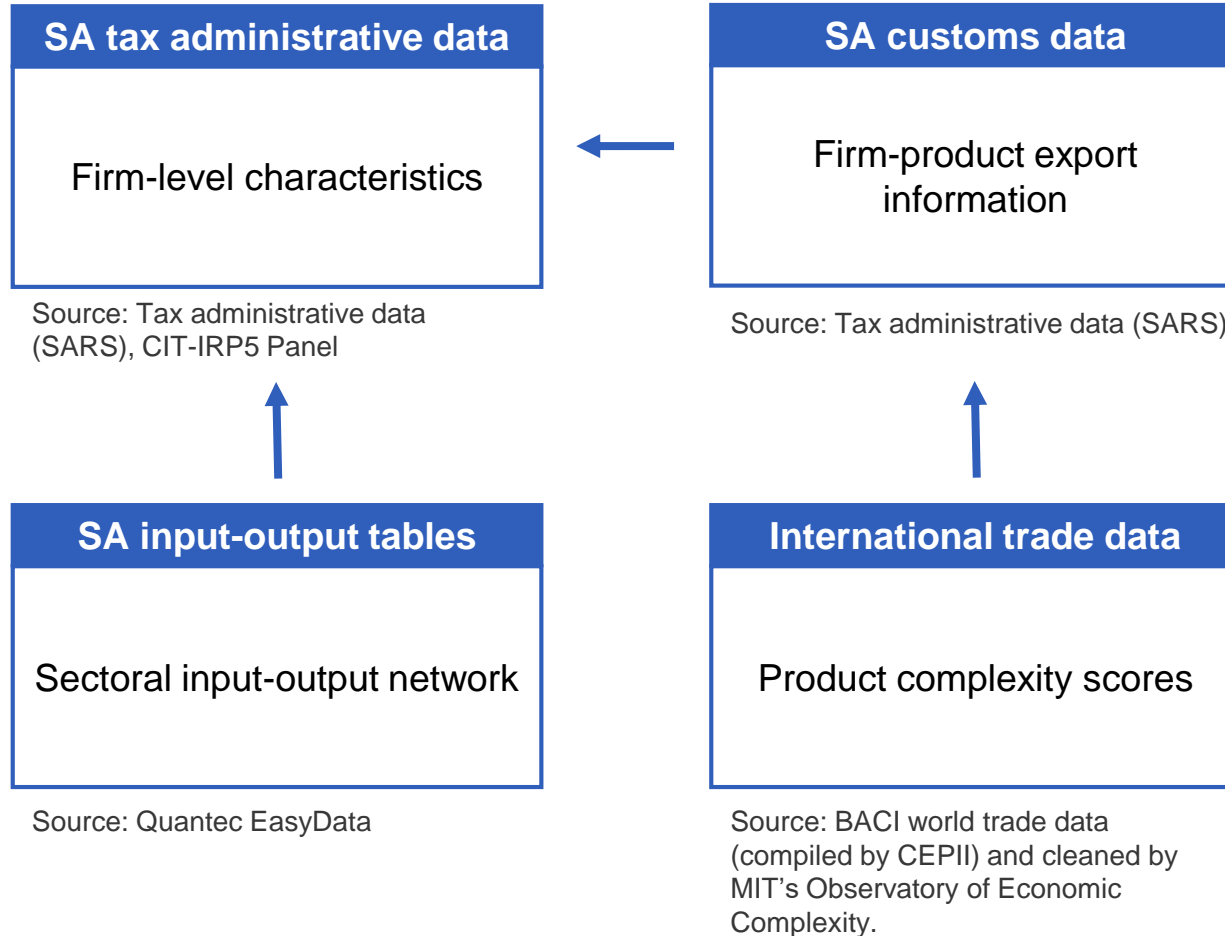
### Positive effect

- Embodied technologies
- Accompanying services
- Supply of new, better, and/or cheaper intermediaries

### Negative effect

- Monopolistic foreign suppliers (higher prices, lower quality)

# THE STUDY USES DATA ON THE UNIVERSE OF SOUTH AFRICAN EXPORTING MANUFACTURING FIRMS (NEARLY 5,500) FROM 2013-2016



**Definition**

➤ A complex product is only produced by a few, highly complex countries. An unsophisticated product can be produced by many, non-complex countries.



# ESTIMATION APPROACH

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$$EC_{it} = \beta_0 + \beta_1 Horizontal_{jpt} + \beta_2 Backward_{jpt} + \beta_3 Forward_{jpt} + \beta' Controls_{it-1} + \alpha_j + \delta_p + \mu_t + \theta_{jt} + \tau_{pt} + \varepsilon_{it}$$

## Dependent variable

- $EC_{it}$ : export complexity of firm  $i$  in year  $t$ . Three variations of  $EC_{it}$ :
  - i) Average complexity of entire export basket of firm  $i$  at time  $t$
  - ii) Average complexity of new export products of firm  $i$  at time  $t$
  - iii) Complexity of the most sophisticated export product of firm  $i$  at time  $t$  (**top-line complexity**)

## Spillover proxies

- $Horizontal_{jpt}$ : share of output accounted for by foreign firms in industry  $j$  in province  $p$  in year  $t$
- $Backward_{jpt}$ : weighted share of foreign firms in all sectors sourcing inputs from industry  $j$  in province  $p$  at time  $t$ . Weights are given by the share of industry  $j$ 's output sold to each sourcing sector.
- $Forward_{jpt}$ : weighted share of foreign firms in all sectors supplying inputs to industry  $j$  in province  $p$  at time  $t$ . Weights are given by the share of industry  $j$ 's input sourced from each supplying sector.

## Controls

- $Controls_{it-1}$ : vector including controls for size, productivity, R&D intensity, wage, past export complexity, import complexity, and export diversification (number of products sold and number of export markets).

## Fixed effects

- $\alpha_j + \delta_p + \mu_t + \theta_{jt} + \tau_{pt}$ : industry, province, and year dummies; industry-year and province-year dummies

## t-test of mean differences between key variables for domestic exporters and foreign firms

	Mean Domestic Exporters	Mean Foreign Firms	Difference
<b>Dependent variables</b>			
$EC_{it}^{new}$	-0.7084	-0.6503	-0.0581**
$EC_{it}^{all}$	-0.9036	-0.8363	-0.0673***
$EC_{it}^{topline}$	-0.0804	0.0150	-0.0954***
<b>Spillover proxies</b>			
$Horizontal_{jpt-1}$	0.3094	0.3301	-0.0207***
$Backward_{jpt-1}$	0.0340	0.0339	0.0001
$Forward_{jpt-1}$	0.0319	0.0319	-0.0000
<b>Controls</b>			
$Size_{it-1}$	3.6491	2.9164	0.7327***
$LabourProductivity_{it-1}$	12.4729	12.2747	0.1983***
$R\&DIntensity_{it-1}$	0.5150	0.1517	0.3634***
$Wage_{it-1}$	11.5693	11.4232	0.1461***
$CountryDiversification_{it-1}$	5.1369	7.0807	-1.9439***
$ProductDiversification_{it-1}$	8.2338	10.7941	-2.5603***
$EC_{it-1}^{all}$	-0.9141	-0.8355	-0.0786***
$IC_{it-1}^{all}$	0.8590	0.8800	-0.0210

Notes: Author's own calculations. All variables except spillover proxies,  $CountryDiversification_{it-1}$  and  $ProductDiversification_{it-1}$  are reported in logs.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Author's calculations based on SARS data.

Context &  
Research Aim

Conceptual Framework

Data

Estimation Approach

Main Results

Conclusion &  
Policy Implications

## Descriptive statistics

Compared to South African exporters, foreign exporters:

- export more complex products
- have a more diverse export basket (in terms of countries and products)

## Regression Results

FDI inflows to upstream industries boosts South African firms' **top-line complexity**.

A **1 percentage point** increase in the share of foreign firms in supplying sectors is associated with a **5.4 per cent** increase in top-line complexity.

However, the evidence does not suggest that FDI boosts the *average* complexity of domestic firms':

- i) **entire export basket** \*
- ii) **new export products** \*

\*Results not shown here.

Dependent variable: top-line complexity (OLS)

	$EC^{topline}_{it}$			
	(1)	(2)	(3)	(4)
$Horizontal_{jpt-1}$	-0.067 (0.076)			-0.065 (0.073)
$Backward_{jpt-1}$		1.561 (2.100)		0.366 (2.183)
$Forward_{jpt-1}$			5.439*** (1.446)	5.434*** (1.420)
$Size_{it-1}$	0.049*** (0.011)	0.051*** (0.011)	0.050*** (0.011)	0.049*** (0.011)
$LabourProductivity_{it-1}$	0.021* (0.012)	0.022* (0.011)	0.022* (0.011)	0.020* (0.011)
$R\&DIntensity_{it-1}$	0.008 (0.005)	0.009* (0.005)	0.009* (0.005)	0.008 (0.005)
$Wage_{it-1}$	0.022** (0.010)	0.022** (0.010)	0.022** (0.010)	0.022** (0.010)
$CountryDiversification_{it-1}$	0.019*** (0.003)	0.019*** (0.003)	0.019*** (0.003)	0.019*** (0.003)
$ProductDiversification_{it-1}$	0.017*** (0.002)	0.017*** (0.002)	0.017*** (0.002)	0.017*** (0.002)
$EC^{all}_{it-1}$	0.378*** (0.020)	0.378*** (0.020)	0.379*** (0.020)	0.379*** (0.020)
$IC^{all}_{it-1}$	0.073*** (0.026)	0.075*** (0.026)	0.076*** (0.026)	0.073*** (0.026)
All fixed effects	YES	YES	YES	YES
Observations	5,442	5,487	5,487	5,442
R-squared	0.417	0.415	0.416	0.418

Notes: Robust standard errors, clustered at the province-industry level, in parenthesis. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Source: Author's calculations based on SARS data.

# MAIN TAKEWAYS

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## Effect

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The effect of FDI on export upgrading is positive, significant, and robust in South African, but arguably modest:

- Foreign suppliers help domestic firms increase the complexity of their most sophisticated export products (top-line complexity).
- No evidence that FDI boosts the average complexity of domestic firms' i) entire export basket or ii) new export products.

## Spillover channel

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FDI-induced export upgrading occurs through forward spillovers (foreign suppliers linking-up with domestic buyers):

- In general, academics and policy makers focus on backward spillovers, but no evidence of this in South Africa.
- In line with the idea that access to better inputs matter for firm performance (Goldberg et al. 2013; Newman et al. 2016).

# POLICY IMPLICATIONS

## In general

Attracting FDI is a viable policy tool to foster export upgrading in South Africa's manufacturing sector and boost economic complexity.

## A dual approach

Policy makers should take a dual approach to FDI:

1. Focus on attracting FDI to upstream, supplying sectors.
2. Cultivate backward spillovers
  - how to incentives links between foreign firms and domestic suppliers?

## ...but keep in mind

This study has a limited focus. Policymakers should take a holistic view on FDI considering things such as:

- Employment effects
- Productivity spillovers
- Transfer mispricing and profit shifting (Wier and Reynolds, 2018; Wier 2020).



**Thank you!**



Discussant

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