Exports, Infrastructure and Skill Upgrading, and the Role of Management Skills in Ghanaian Manufacturing Firms

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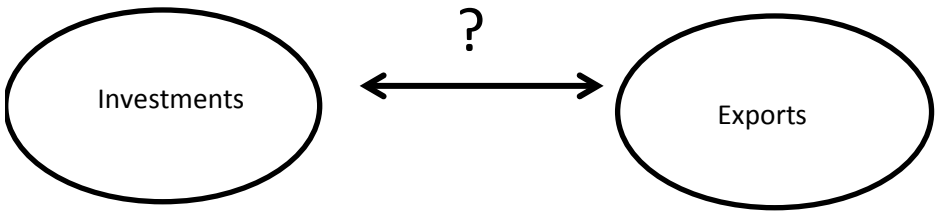
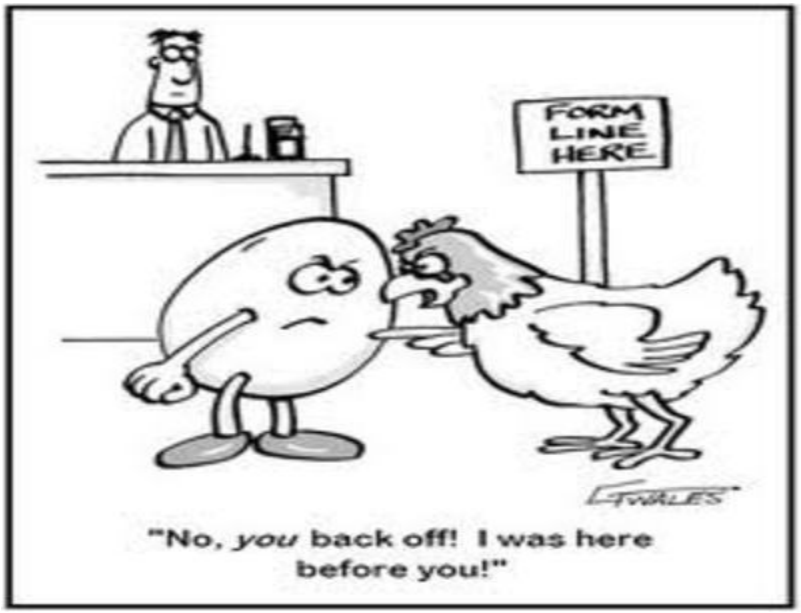
Introduction

- The causal relationship between exports (or trade liberalization) and firms' investments is still unsettled.



- On one hand, Bustos (2011), Munch and Skaksen (2008), and Attanasio, Goldberg, and Pavcnik (2004) argue that trade liberalization led firms to invest in new technologies and/or upgrade their skills set.
- On the other hand, Hantley and Moreal-Perez (2011), Girma, Greenaway, and Kneller (2002), and Kandilov and Leblebicioglu (2012) argue that firms with a track record of innovation are the ones that are more likely to export than non-innovating firms.

The causality runs in both directions



- But to gain further insights and contribute to policy debates one would benefit by analysing the numerous factors that will influence the direction of this relationship.

Further insights

- What matters is the destination of firms' exports (Brambilla, Lederman and Porto, 2012).
  - In particular, for developing countries, exporting to high-income countries requires skills but exporting per se does not.
  - This is because firms need to increase product quality, as in Verhoogen (2008), and because firms need to use skilled labour during the export process, as in Matsuyama (2007).
- Internal and external enablers are crucial in determining the nature of the relationship between exports and firms' investment in innovation (Love and Roper, 2013).

Internal and external enablers

- The role of internal enablers in determining the relationship between export and investment has scarcely been investigated.
- On the other hand, the role of external enablers has exhaustively been discussed in policy forums.
  - Export promotion agencies, special economic zones and special industrial parks (i.e. SEZs and SIPs),
  - and creating export promotion funds
- It is only recently that issues around exporting skills have emerged but have not yet produced tangible policy initiatives or outcomes.
  - But no empirical evidence regarding Africa

Research question

- Using the newly available firm data, the present paper seeks to address this gap by instrumenting exports with eligibility to the African Growth Opportunity Act (AGOA) using the case of Ghanaian manufacturing firms.
- The paper estimates the impact of exports on firms' investment and evaluates the role of firm management skills in determining the scale of this impact

Ghana manufacturing sector

- Ghana had a relatively small and underdeveloped manufacturing sector, representing approximately 10% of GDP, during the 1990s. It is estimated that approximately three quarters of manufacturing output was produced by the private sector.

Sector	Share of labour
Food processing	9.40%
Drink	4.30%
Textile	14%
Wood-processing	31.60%
Non-ferrous metal	1.70%
Chemical	13.60%
Others	25.40%

What is AGOA?

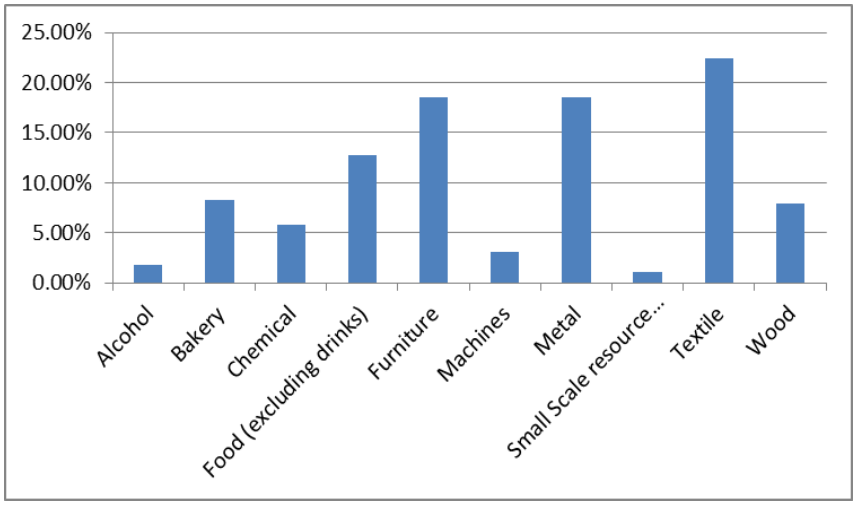
- The African Growth and Opportunity Act (AGOA) offers preferential access to selected sub-Saharan Africa (SSA) products into U.S. markets.
  - It allows duty and quota-free market access for almost all products as long as they are produced in and/or imported from approved SSA countries.
  - AGOA was initially signed by then President Bill Clinton in 2000, and renewed and expanded in 2002 and 2004 with a current expiration date of 2015.
  - The commodities included in the provision are agricultural, minerals, manufacturing, and apparels and footwear.
  - Initially there were 28 countries and now 40 countries have been given eligibility to AGOA.

Data

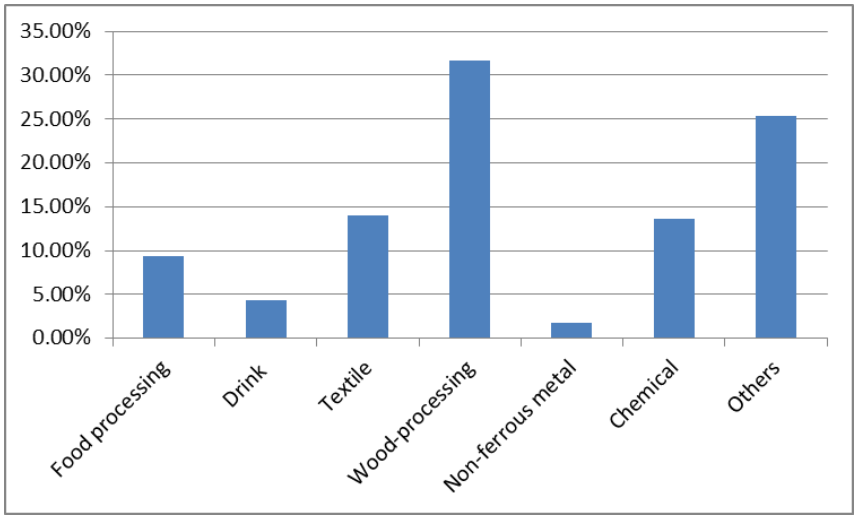
- Regional Project on Enterprise Development & Ghana Manufacturing Enterprise Survey made available by the Centre for the Study of African Economics at the University of Oxford.
- This data tracked more than 200 manufacturing firms and an average number of more than 1000 workers per round between 1991 and 2002 from four of the major cities in Ghana, namely Accra, Kumasi, Cape Coast, and Takoradi.

Nationally representative

Data distribution



National representation distribution



Methodology

- I use a difference-in-differences (DiD) approach to evaluate the difference in investments between firms that export outside of Africa and those that do not export before and after 2000.
- Since the data used in this analysis are non-experiment data, a matching approach is recommended to address the non-random nature of the data (Dehejia and Wahba, 2002).
- The matching method I implemented used a Mahalanobis metric matching to adjust for pre-treatment observable differences between firms that export outside of Africa and those that do not export

Model specification

$$O_t = \beta_0 + \beta_2 * Ex_t + ב * \boldsymbol{Y_t} + \beta_3 * Ex_t * Y_{00} + \beta_4 * Ex_t * Y_{01} + \beta_5 * Ex_t * Y_{02} + א * \boldsymbol{X_t} + \epsilon_t$$

O_t: Outcome of interest in year *t* (1991-2002)

Ex_t: = 1 if firm exports outside of Africa and 0 otherwise

Y_{99}: Year dummy such that Y_{99}=1 if year=1999 and 0 otherwise

Y_{00}: Year dummy such that Y_{00}=1 if year=2000 and 0 otherwise

Y_{01}: Year dummy such that Y_{01}=1 if year=2001 and 0 otherwise

Y_{02}: Year dummy such that Y_{02}=1 if year=2002 and 0 otherwise

$\boldsymbol{Y_t}$**:** Vector of year dummy to control for the year fixed effect

$\boldsymbol{X_t}$: Vector of firm characteristics

Justifying the identification strategy

- The share of Ghana's US manufacturing exports to Ghana's manufacturing exports to the rest of the world (ROW) increased twice as rapidly between 2000 and 2004 than between 1996 and 1999. The share changed from approximately 7% in 1999 to an average of 17% between 2000 and 2004.
- Between 2000 and 2004, Ghana manufacturing exports to the USA constituted about 25% of total Ghana manufacturing exports outside of Africa, a figure that increased since 2000 from an average of about 10.6% between 1996 and 1999.
- Ghana manufacture exports outside Africa grew by 34% between 2000 and 2004 but when removing US manufacture exports the growth rate changes to minus 43%.

Correcting for selection bias of treatment variable

- There are various potential sources of selection bias that may obscure the causal relation because firms' decision to export outside of Africa is likely to be non-random.
- A firm may decide to export based on their access to the port, the sector in which they are in, access to resource, and for sophisticated markets number of skilled workers.
- Used a 2SLS fixed effect model to accommodate the dynamic nature of the treatment variable while controlling for time invariant variables, and addressing the selection bias of the treatment variable.

First stage results

Dependent Variable: Exporting outside of Africa

Variables	Coefficients	P-Value
Real value of output	2.68E-11***	0.004
Real total cost of inputs	-8.66E-11***	0.000
Number of skilled workers	0.003***	0.000
Real value of capital	-6.30E-13	0.143
Location FE		Yes
Sub-sector FE		Yes
Constant	-0.031	0.560

The impact of exports on plant and equipment investments

All manufacturing firms

Variables	Coefficients	P-Value
Base year investment	0.23	0.13
Ex	-6.71	0.83
Y_{00}*Ex	-9.64*	0.07
Y_{01}*Ex	-14.60***	0.01
Y_{02}*Ex	10.38*	0.07
Number of worker	0.03*	0.09
Weekly hours of work	0.01	0.31
Replacement value of capital	0.00	0.68
Location FE		Yes
Sub-sector FE		Yes
Constant	-0.53	0.63

Light manufacturing firms

Variables	Coefficients	P-Value
Base year investment	0.29	0.12
Ex	6.43	0.12
Y_{00}*Ex	-8.39*	0.09
Y_{01}*Ex	-14.73***	0.01
Y_{02}*Ex	15.62***	0.01
Number of worker	0.02	0.23
Weekly hours of work	0.04	0.29
Replacement value of capital	0.00	0.39
Location FE		Yes
Sub-sector FE		Yes
Constant	-4.50	0.12

The impact of exports on plant and equipment investments

Medium manufacturing firms

Variables	Coefficients	P-Value
Base year investment	0.16	0.36
Ex	80.59	0.65
Number of worker	0.10***	0.00
Weekly hours of work	-0.08	0.34
Replacement value of capital	-1.27E-09	0.20
Location FE		Yes
Sub-sector FE		Yes
Constant	5.93	0.51

Heavy manufacturing firms

Variables	Coefficients	P-Value
Base year investment	-95.20	0.25
Ex	248.86	0.45
Y_{00}*Ex	-131.67	0.41
Y_{01}*Ex	-149.04	0.41
Y_{02}*Ex	-148.31	0.41
Number of worker	0.03	0.46
Weekly hours of work	-0.01	0.78
Replacement value of capital	0.00	0.45
Location FE		Yes
Sub-sector FE		Yes
Constant	-4.80	0.52

The impact of exports on skills workers accumulation

All manufacturing firms

Variables	Coefficients	P-Value
Base year number of skilled workers	0.32***	0.00
Ex	0.50***	0.00
Y_{00}*Ex	0.03	0.13
Y_{01}*Ex	0.04**	0.05
Y_{02}*Ex	0.03*	0.10
Weekly hours of work	0.00*	0.08
Replacement value of capital	0.00	0.27
Location FE		Yes
Sub-sector FE		Yes
Constant	0.15***	0.00

Light manufacturing firms

Variables	Coefficients	P-Value
Base year number of skilled workers	0.26***	0.00
Ex	0.33***	0.01
Y_{00}*Ex	-0.03	0.17
Y_{01}*Ex	-0.02	0.27
Y_{02}*Ex	-0.03	0.22
Weekly hours of work	0.00	0.51
Replacement value of capital	0.00	0.54
Location FE		Yes
Sub-sector FE		Yes
Constant	-0.13	0.22

The impact of exports on skills workers accumulation

Medium manufacturing firms

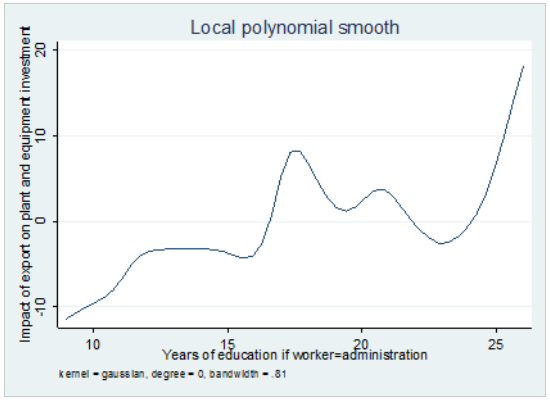
Variables	Coefficients	P-Value
Base year number of skilled workers	0.38***	0.00
Ex	1.75**	0.04
Y_{00}*Ex	-0.14	0.39
Y_{01}*Ex	0.14*	0.07
Y_{02}*Ex	-0.01	0.92
Weekly hours of work	0.00***	0.01
Replacement value of capital	0.00***	0.01
Location FE		Yes
Sub-sector FE		Yes
Constant	0.20***	0.00

Heavy manufacturing firms

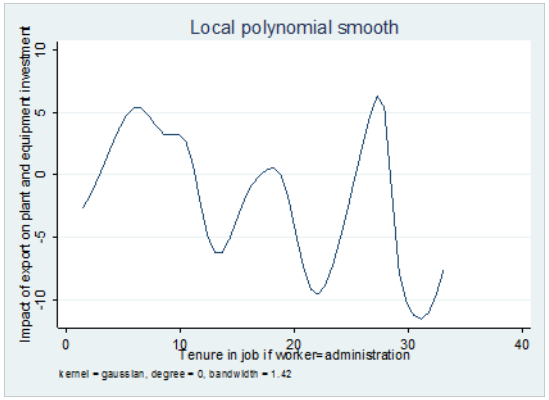
Variables	Coefficients	P-Value
Base year number of skilled workers	0.37*	0.06
Ex	5.24	0.25
Y_{00}*Ex	7.39***	0.00
Y_{01}*Ex	6.28***	0.01
Y_{02}*Ex	5.00**	0.02
Weekly hours of work	-0.00**	0.03
Replacement value of capital	-5.11E-11***	0.01
Location FE		Yes
Sub-sector FE		Yes
Constant	0.19	0.11

Role of firm management skills in determining firms' response to trade on investment in plant and machinery

Management education

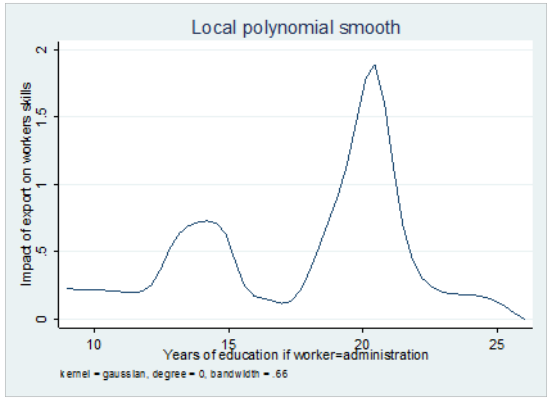


Management job tenure

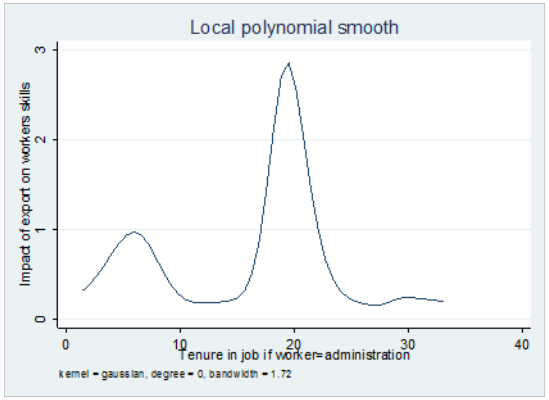


Role of firm management skills in determining firms' response to trade on investment in workers skills

Management education



Management job tenure



Conclusion

- The impact of exports on firms' skilled workers accumulation and firms' real investments in plant and equipment is positive.
- However this impact varies by manufacturing intensity such that investments in plant and equipment were mostly made by firms in light manufacturing sectors while accumulation of skilled workers was made by firms in both medium and heavy manufacturing sectors.
- While level of management education is positively correlated with the impact of trade on plant and machinery investment, tenure is negatively related to it.
- But, for the case of the impact of export on skill upgrading, I found substantial impact only in firms managed by highly skilled administrators.

Policy recommendations

- A set of initiative has been implemented in Ghana, notably the Export Development Investment Fund and the Ghana Industrial Skill Development Center just to name a few.
- These models can be replicated in other African countries as well. For the fund, governments should insure the credibility of their custom collection agencies where the fund can be sourced. The recent introduction of “one-stop shops” in many African customs ports is a good step forward.
- Regarding setting up a skill development centre a government might select a small number of its technical or polytechnic institutes, take them out of the regular educational system, and form partnerships with the private sector to run them on a new governance system that is more conducive to innovation and engaging with industry.
  - By focusing on a small number, the government could also afford to contribute its share of resources to upgrade the institutions to much higher standards than the current general situation where most of the technical institutions are seriously under-equipped with obsolete industrial machinery.