Do firms learn by exporting or learn to export: evidence from Senegalese manufacturers' plants

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Introduction

- International trade benefits the trade parties through exposing countries to the knowledge stocks of their trading partners (Grossman and Helpman 1991).

- This '*learning by exporting*' effect may be important at both the country level and at the individual exporting firm level (Love and al., 2010).

- This presumption of learning by-exporting effects appears then to be one of the main justifications behind government export policies.

- Senegal, like as many African countries, abandoned its inward-looking protectionist development strategies during the 1980s, for more open trade programs as a reaction to the failure of previous import-substitution industrialization policies.

- However, there is yet no evidence of the effect of trade openness on the firm efficiency.

Introduction

- Does export experience improve firm's efficiency?

- Are the most efficient firms most likely to become exporters?

- We investigate these questions by looking the causal links between exporting and productivity.

- We use a unique firm-level panel data from Senegalese manufacturing sectors for the period 1998-2011.

- We account for endogeneity and the sample-selection bias following a approache similar to Bigsten and al. (2002) approach by jointly estimated both equation of productivity and decision, controlling for other unobserved effects.

- Our main findings indicate the evidences of both self-selection of the most efficient firms in the export market and effect of Learning in the export market.

- Skill and access to *Brevets and Licences* have a higher effect on the process of learning.

- Foreign owned firms learn more from clients

- As well small firms seem to particularly learn more from exporting.

Outline

I.   Overview of Senegalese Economy

II.   Main Episods of the Industrial Policy in Senegal

III. Methodology of Estimation of LBE Effects

IV. Results

V.   Conclusion and Next steps

I. Overview of Senegalese economy

Table : Gross Domestic Products at Current Market Prices / Produit Interieur Brut aux Current du Marche`(Million $ US)												
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1 Primary Activity	**18.77**	**18.10**	**15.18**	**17.31**	**15.68**	**16.75**	**15.63**	**16.29**	**16.29**	**16.29**	**16.29**	**16.29**
2 Secondary Activities	**22.78**	**23.98**	**24.90**	**23.94**	**24.64**	**23.67**	**22.99**	**24.03**	**24.04**	**24.04**	**24.04**	**24.04**
2.1 Mining and Quarying	1.26	1.25	1.34	1.34	1.28	0.98	0.75	0.85	0.85	0.85	0.86	0.85
2.2 Manufacturing	14.37	16.53	16.85	16.10	16.12	15.02	13.85	14.34	14.35	14.35	14.34	14.34
2.3 Energy (water, electricity & gas)	2.61	2.26	2.40	2.45	2.45	2.60	2.69	2.80	2.80	2.80	2.80	2.80
2.4 Construction	4.55	3.95	4.30	4.06	4.78	5.07	5.70	6.03	6.03	6.03	6.03	6.03
3 Tertiary Activities	**58.44**	**57.91**	**59.93**	**58.75**	**59.68**	**59.58**	**61.38**	**59.67**	**59.67**	**59.67**	**59.67**	**59.67**
3.1 Transport and Communication	7.18	8.11	8.34	8.92	9.67	10.48	10.79	10.84	10.84	10.84	10.84	10.84
3.2 Trade	19.74	18.48	18.91	17.95	17.94	18.30	17.87	16.98	16.98	16.98	16.98	16.98
3.3 Banking and Finance	2.62	2.90	2.99	3.10	3.35	3.21	3.41	3.72	3.72	3.72	3.72	3.72
3.4 Other Business Services	13.23	13.58	14.23	13.70	13.54	11.82	12.55	15.28	15.28	15.28	15.28	15.28
3.5 Non-Profit Services	15.67	14.84	15.46	15.07	15.18	15.78	16.76	12.84	12.84	12.84	12.84	12.84
Total GDP at Current Factor Cost	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

I. I. Overview of Senegalese economy

- Tertiary sector has consistently represented more than half of GDP: 61% during the period 2000-2010, against 58% in 1980-1984.

- Secondary sector contribution growths from 19.5% between 1980 and 1984 to 22.6% during the period 2000-2010.

- Primary sector share declines from 22.4% to 16.8% during the same periods.

I. I. Overview of Senegalese economy

- The main driver of growth is the tertiary sector: contribution to growth stands at 2,3% after the devaluation up to 2000 and at 2,8% in the last decade.

- The other two sectors contribute for less than half the GDP growth.

	1980-1984	1985-1993	1994-1999	2000-2010	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Contribution to GDP growth	2.4	2.3	3.8	4.1	5.4	6.5	3.7	3.2	0.2	7.2	6.2	5.7	2.3	4.9	4.4	3	4.3
Primary sector	0.4	0.5	0.6	0.4	0.19	2.62	0.4	0.1	-3.9	2.7	0.5	1.4	-1.5	-0.9	2.5	2.2	0.9
Secondary sector	0.6	0.6	0.9	0.9	1.73	0.23	1	1.3	1.2	0.9	1.4	0.9	0.3	1.6	-0.3	0.3	1.2
Tertiary sector	1.3	1.1	2.3	2.8	3.5	3.62	2.2	1.7	2.9	3.6	4.3	3.5	3.5	4.2	2.1	0.5	2.3

I. Overview of Senegalese economy

- Industry is dominated by **four main sub-sectors** in term of value added, exports, workers and factors' revenues: the food industries Chemical, Materiel of construction and the Mechanical.

- The four sub-sectors represent 48% of the firms, 60% of the workers, 55% of the exports; they realize 63% of the value added over the period 2000-2010.

Table : Contribution to total {%}						
Sector	Number of Firms	Value added	Exports	Revenues of capital of capital	Revenues of labor of Labor	workers
Oil	0.97	0.2	4.52	-1.31	5.05	5.79
Others food industries	**31.09**	**14.3**	**18.14**	11.77	18.74	35.01
Textiles	1.88	1.8	2.48	1.06	3.33	5.82
Leather	0.69	0.2	0.3	0.15	0.26	0.09
Wood	1.75	0.2	0.5	-0.01	0.52	0.25
Paper	5.89	5.4	1.57	5.81	4.76	5.79
Chimical	**6.14**	**12.8**	**17.98**	12.88	12.32	8.4
Materiel of Construction	1.9	**6.3**	**7.91**	9.54	4.29	0.42
Mecanical	**8.68**	**29.9**	**11.03**	7.53	3.7	15.84
Other industries	8.77	7.8	35.56	34.81	18.4	16.18
Construction	**32.24**	**21.2**	**0**	17.77	28.63	6.41
Total	100	100	100	100	100	100

II. Main Episods of the Industrial Policy

1960s and 1970s : imports substitutions policies

Policy objectives	sectors / activities targeted	Instruments	Results
protection of local industry	Promotion of private sector Activities of processing of local and imported products Promotion of investment Senegalese businessmen Large companies Foreign investors Small and medium enterprises Exporting companies	Tarif protections :High port duties Quantitative restrictions Quotas, licensing, Prohibition Investment Code Raising capital, including public capital Special agreements and memoranda of understanding between business companies and government Industrial areas The Dakar Industrial Free Trade Zone (ZFID) was established in 1974	Large enterprises without trade between them weakly competitive during the 1960s and 1970s

II. Main Episods of the industrial policy

1980s and 1990s : Adjustment policies and liberalization of the economy

Policy objectives	sectors / activities targeted	Instruments	Results
Improvement of the overall business environment, under the New Industrial Policy (NIP) during the years 1979-1993	All sectors Exporting companies	Macroeconomic stabilization Reducing the level of protection Liberalization of prices and marketing channels Simplification of administrative procedures Improving the efficiency of public services Subsidies / export financing Status of free points established in 1991 Business closures and job losses, particularly in the textile sector between 1988 and 1993	Fermetures d'entreprises et pertes d'emplois, notamment dans le secteur textile entre 1988 et 1993

II. Main episods of the industrial policy

2000s

Policy objectives	sectors / activities targeted	Instruments	Results
Rationalization of the support system to the private sector.	SMEs	Creation of APIX (2000), ADEPME (2001), ASN (2002), the CPI (2002) to support investment	Slow growth during the years 2006 - 2011 under the effect of exogenous shocks, and insufficient competitiveness
Recovery / promotion of industries, industrial redeployment	Sectors and SMEs	Business environment of international standard, Special Economic Zones	
Improving export competitiveness	Export businesses	Growth clusters approach (2005) Creation of ASEPEX (2005)	

III. Methodology
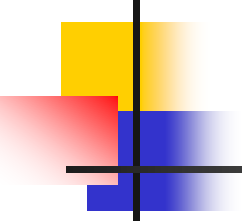
- One of the most common problems when testing the effect of exporting on productivity is endogeneity and sample-selection biases.

- The nature of these biases suggests that exporting firms might possess some unobservable characteristics that make them more productive than their domestic counterparts, thus allowing them to overcome sunk cost and enter the export markets.

- Hence, estimating the learning-by-exporting effect using conventional econometric routines would lead to biased and spurious results

III. Methodology

- We assess the link between exporting and efficiency using a production function approach.

- The approach involves jointly estimation of a dynamic productivity function and a dynamic discrete choice model for the decision to export, where we allow for causality running both from efficiency to exporting and from exporting to efficiency.

- This strategy enables us to control for unobserved heterogeneity in the form of firm specific effects that are correlated across the two equations.

- We consider the total factor productivity (TFP) and compute it in an initial step from the production function and then use it as the outcome variable in the econometric test for learning effects.

$$y_{it} = \alpha_0 + \alpha_k k_{it} + \alpha_l l_{it} + \omega_{it} + \varepsilon_{it}$$

(1)

$$\text{Firm efficiency TFP} : \hat{A}_{it} = y_{it} - \hat{\alpha}_k k_{it} - \hat{\alpha}_l l_{it}.$$ (2)

We use the firm-level TFP estimation as the outcome variable to study the effect of exporting on productivity

$$A_{it} = \beta_1 A_{it-1} + \beta_2 \text{Export}_{it-1} + \beta_3 X_{it} + \beta_4 \text{Sector}_{it} + \mu_i + \epsilon_{it}$$ (3)

<u>Firms charcteristics</u> X_{it}: age, size, proportion of skillworkers, foreigncapital, capitallabour, Access to Innovation, access to Licences, Brevets.

III. Methodology of estimation of LBE effects

- **How do we account for endogeneity and self selection ?**

$$\text{Prob}(\text{Export}_{it} = 1) = \phi(\alpha_1 A_{it-1} + \alpha_2 \text{Export}_{it-1} + \alpha_3 X_t + \alpha_4 \text{Sector}_t + d_i + \Psi_{it} \qquad (4)$$

- We jointly estimated both equation of productivity (3) and probability to export (4) by GMM in a one step procedure using the *xtabond2* command in stata.

- We use unbalanced panel data to account for firms' movement of entry into and exit from the export market.

III. Methodology of estimation of LBE effects

Step 1: $\hat{A}_{it} = y_{it} - \hat{\alpha}_k k_{it} - \hat{\alpha}_l l_{it}.$ (1)

- We deflate the value of the output and inputs.

- Due to the limitations of data, we use index to deflate firm input and output.

- We construct a sectoral indice for capital using the data on the Gross fixed capital formation panel data and a national consumer price index (CPI). Then we deflate physical capital using the sectoral capital indice.

- The value added and employment are deflated using the consumer price index. The estimated form of the total productivity factor is:

III. Methodology of estimation of LBE effects

Step 2: Estimation of self selection and Learning by exporting effects

$$A_{it} = \beta_1 A_{it-1} + \beta_2 \text{Export}_{it-1} + \beta_3 X_{it} + \beta_4 \text{Sector}_{it} + \mu_i + \epsilon_{it} \qquad (3)$$

$$\text{Prob}(\text{Export}_{it} = 1) = \phi(\alpha_1 A_{it-1} + \alpha_2 \text{Export}_{it-1} + \alpha_3 X_t + \alpha_4 \text{Sector}_t + d_i + \Psi_{it} \qquad (4)$$

We jointly estimated both equation of productivity (3) and probability to export (4) by GMM in a one step procedure using the *xtabond2* command in stata.

- We use the fourteen panel data from Senegalese manufacturing sectors for the period 1998-2011.

- After cleaning : unbalanced panel has of 1177 manufacturing firms (11063 observations) including exporters and non exporters.

III. Methodology of estimation of LBE effects

Table : Senegal, Distribution of the firm by sector, 1998-2011

Year	Textiles	Agro-industries	Others industries	Total firms
1998	18	91	314	423
1999	20	102	346	468
2000	21	114	374	509
2001	22	125	428	575
2002	23	145	465	633
2003	22	154	503	679
2004	26	191	600	817
2005	27	205	641	873
2006	27	225	698	950
2007	27	239	732	998
2008	27	259	764	1050
2009	30	253	766	1049
2010	36	254	769	1059
2011	21	242	717	980

III. Methodology of estimation of LBE effects

Table : Senegal, Distribution of the firm by status and by sector, 1998-2011

Export status	Proportion
Never export	0,8143
Permanent exporters	0,0012
Single entry	0,0199
Single exit	0,0195
Switchers	0,1448

Total exporters : 164 ; 19 per cent of the total firms

Table A4: Senegal, Distribution of the firm by status and by sector, 1998-2011

Industry	Number of firms	% in the total firms	Observations	Exports status during the period 1998-2011				
				Entry single	Single exit	switcher	Permanent	Never
ENERGIE	41	3.48	315	1		3		37
FABRITION D'AUTRES PRODUITS MINERAUX								
NON	14	1.19	162	1		3		10
INDUSTRIES CHIMIQUES	58	4.93	642	2	3	19	1	33
BOULANGERIE, PATISSERIE ET PATES ALIMENT	163	13.85	1342	2		4		157
INDUSTRIES DES BOISSONS	14	1.19	119	1		2		11
INDUSTRIES DES OLEAGINEUX	5	0.42	54			2		3
INDUSTRIES LAITIERES	14	1.19	148		1	2		11
INDUSTRIES DIVERSES	29	2.46	273			7		22
INDUSTRIES DU BOIS	18	1.53	185			1		17
INDUSTRIES DU CAOUTCHOUC ET PLASTIQUES	38	3.23	420	3	1	10		24
INDUSTRIES DU CUIR ET DE LA CHAUSSURES	13	1.10	157		2	2		9
INDUSTRIES DU PAPIER ET CARTONS, DE L'ED	90	7.65	887	4	1	9		76
INDUSTRIES TEXTILES ET HABILLEMENT	29	2.46	333		1	9		19
METALLURGIE ET TRAVAIL DES METAUX	63	5.35	636			8		55
PREPARATION DE SITES ET CONSTRUCTION D'O	337	**28.63**	2878			8		329

IV. Estimations results

Table: Self-selection and Learning by exporting effects, Senegal 1998-2011

Variables	Self Selection	Learning by Exporting
		0.1362903***
	0.0792868**	
A_{it-1}	0.0339634	0.0121778
	1.840304***	0.1572953***
E_{it-1}	0.0741146	0.0339953
Lnage	-0.0265948	0.0009513
	0.0407716	0.012817
lnsize	0.2074637***	-0.5207598***
	0.0315404	0.0149113
Skillworkers	0.4176225***	0.2791582***
	0.104516	0.0345007
Lncapital-labour	0.1893683***	-0.755737***
	0.0373625	0.0146822
Foreignownership	0.0618314	0.4325706***
	0.0858136	-0.048
Research & developmemt	-0.0144678	0.0718185
	0.1598724	0.0667902
Brevets and Licenses	0.1277417***	0.113433***
	0.075107	0.0318201

IV. Estimations results

Self selection effect

- $A_{it-1} > 0$: Strong persistence of the previous exporters firms in the export decision : firm's current involvement in exporting activity may well lower the fixed costs of engaging in exporting in the next period.

- $E_{it-1} > 0$: The estimated coefficient on lagged export status variable is positive and highly significant (at the one per cent level) indicating a strong persistence of the previous exporters firms in the export decision

- *Skillworker*s > 0 : Skill have a positive effect on the probability to export

- *Brevets and Licenses* >0 Access to Brevets Licenses increase the likelihood to export.

- *Lnsize* > 0 Firm's age have no effect on the decision to export

Learning by exporting effect

- A_{it-1} >:   **Strong evidence of Learning by exporting effect**

- Exporting firms acquire external knowledge through various channels:

- *Foreignownership* > 0: Foreign owned firms learn more from clients.

- *Skillworkers* > 0 : Our results suggest also that firms with skilled workers are more able to reap the benefits of exposure to export markets than are others manufacturing firms.

- *Brevets and Licenses >0 :* Firms with intangibles assets as *Brevets and Licences* have higher gains of efficiency in exporting.

- *Lnsize* < 0 : Finally small firms seem to particularly learn more from exporting.

V. Policy Implications

- Senegal manufacturing firms has much to gain from promoting its manufacturing sector towards exporting.

- By increasing the ability of domestic firms to overcome foreign market barriers as well as assimilate further benefits arising from exporting.

- Government could help developing curricula into colleagues and senior secondary schools or other training programs enable companies to have the skills they need.

- Special public strategies to promote firms' access to Brevets and Licences and Innovation must be implemented.

- Finally, supports favour to small and medium enterprises programs could strengthen their productivity gains on the external market. The initiatives already undertaken favour to the small plants might be continued and reinforced.
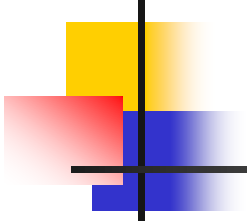
V. Conclusion and Next steps

Next steps

1. **Revisite the TFP estimation with other approach**
2. **Using sectorial deflators**
3. **Others : others approach to test the LBE (propensity matching score !)**

V. Conclusion and Next steps

Thank for your attention