Learning-by-Exporting under Credit Constraints[1]

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[1]The views expressed in this paper are those of the authors and do not necessarily reflect those of the Bank of Canada.

Main question

- Improved access to foreign markets increases demand and encourages firms to invest.
- Financial constraints may prevent firms to exploit these opportunities.

Contribution and findings

- Built framework to motivate firms' export and investment decisions
  - Relationship: return on exporting and firm's access to credit markets
- Firms' financial constraints are unobserved
  - Use marginal treatment framework to quantify selection effect
- Results
  - Exporters have higher productivity
  - Exporters have lower debt to asset ratios
  - **Firms that are more likely to be induced to export acquire more debt**

$\rightarrow$ positive selection is suggestive of financial constraints

Literature

- Learning from exporting
  - Clerides, Lach and Tybout, (1996), Bernard and Jensen (1999), Baldwin and Gu (2003)
  - Aw, Roberts and Winston (2007), De Loecker (2007)
  - Lileeva and Trefler (2010), Aw, Roberts and Xu (2011)
- Credit constraints and exporting
  - Greenaway et al. (2007), Manova et al. (2009), Minetti and Zhu (2011), Amiti and Weinstein (2011), Manova (2013)
  - Caggese and Cunat (2013), Brooks and Dovis (2011), Leibovici (2014), Kohn et al. (2015)
- Marginal treatment framework
  - Heckman and Vytlacil (2005), Carneiro, Heckman, Vytlacil (2010)

Theoretical framework

- Heterogeneous firms model of international trade
- Firms can invest in productivity enhancing technology and\or exporting
- Firms can borrow from investors and pledge tangible assets as collateral

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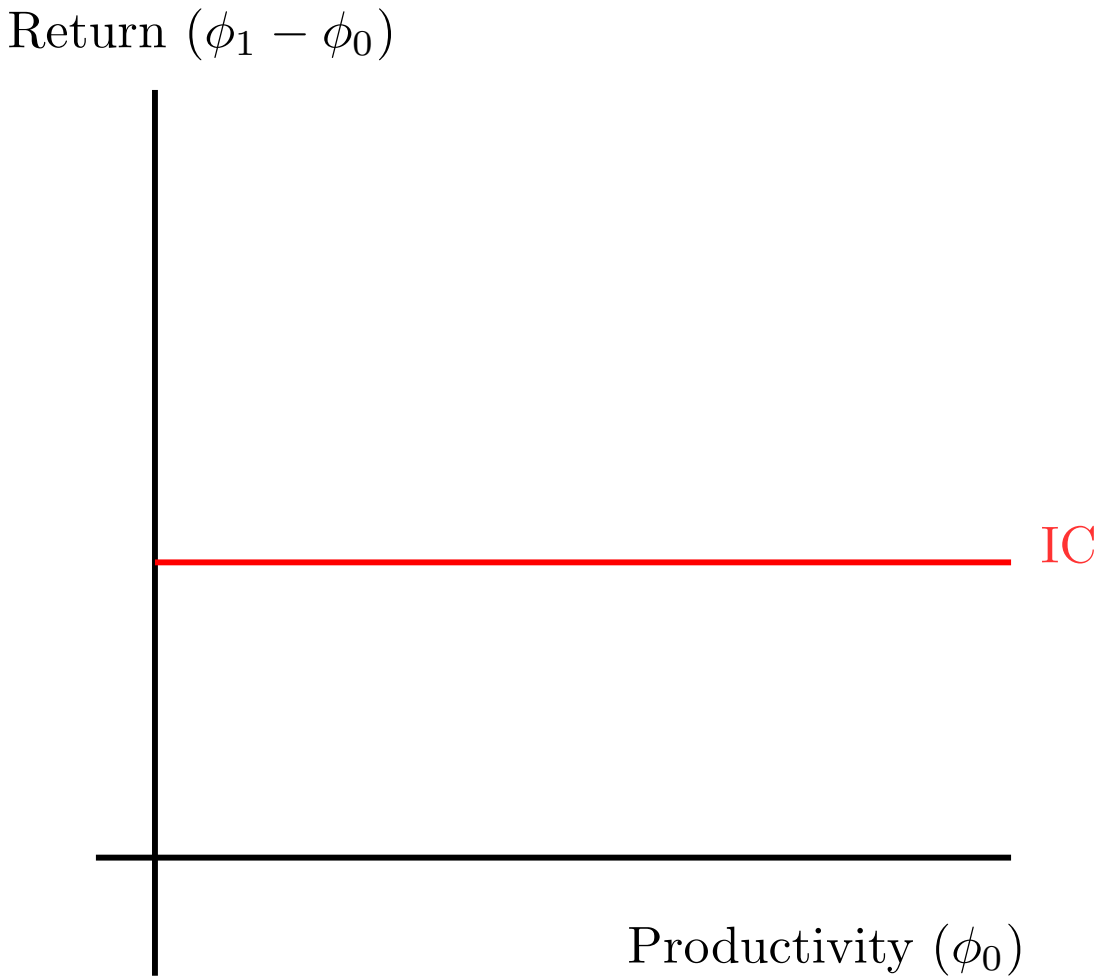
  3. Export constraint (EC) $\rightarrow$ Need to finance fixed cost to export

Decision to invest and export

Marginal returns



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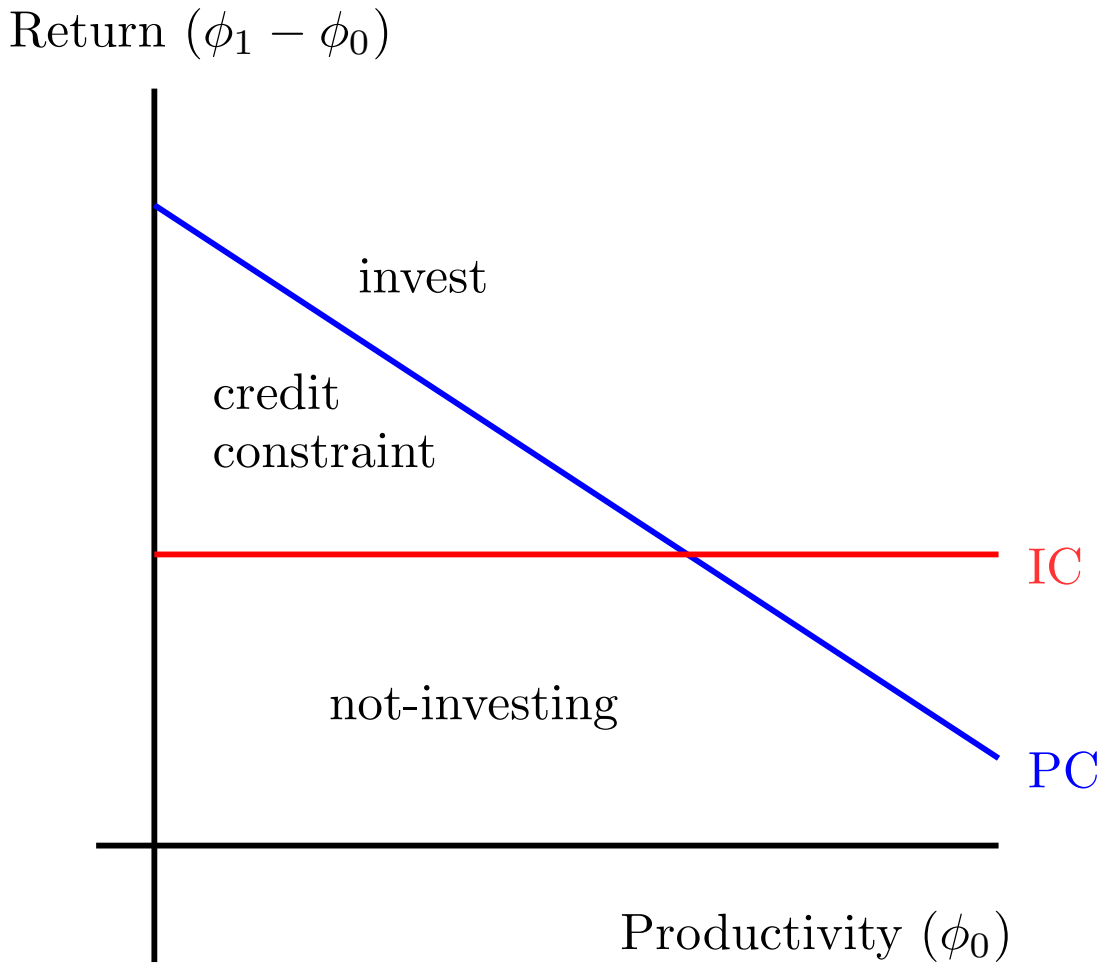

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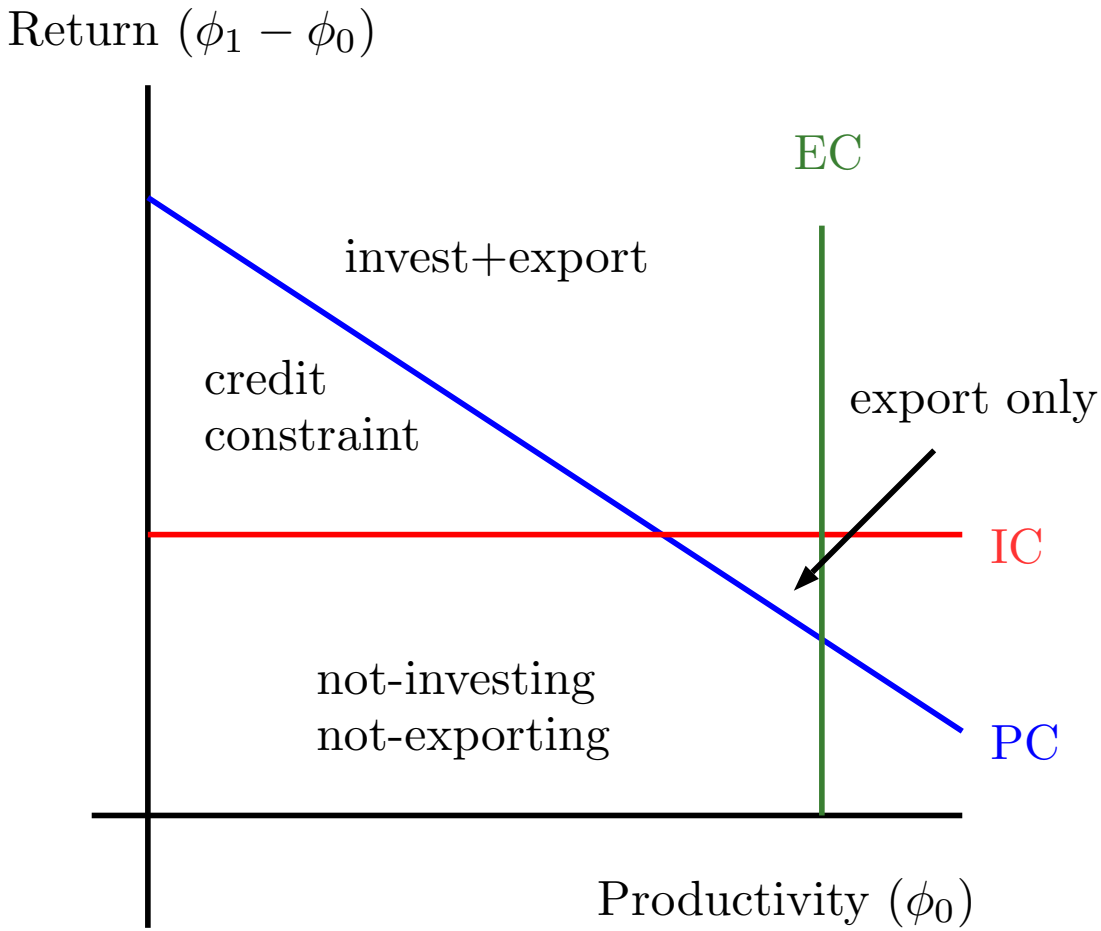

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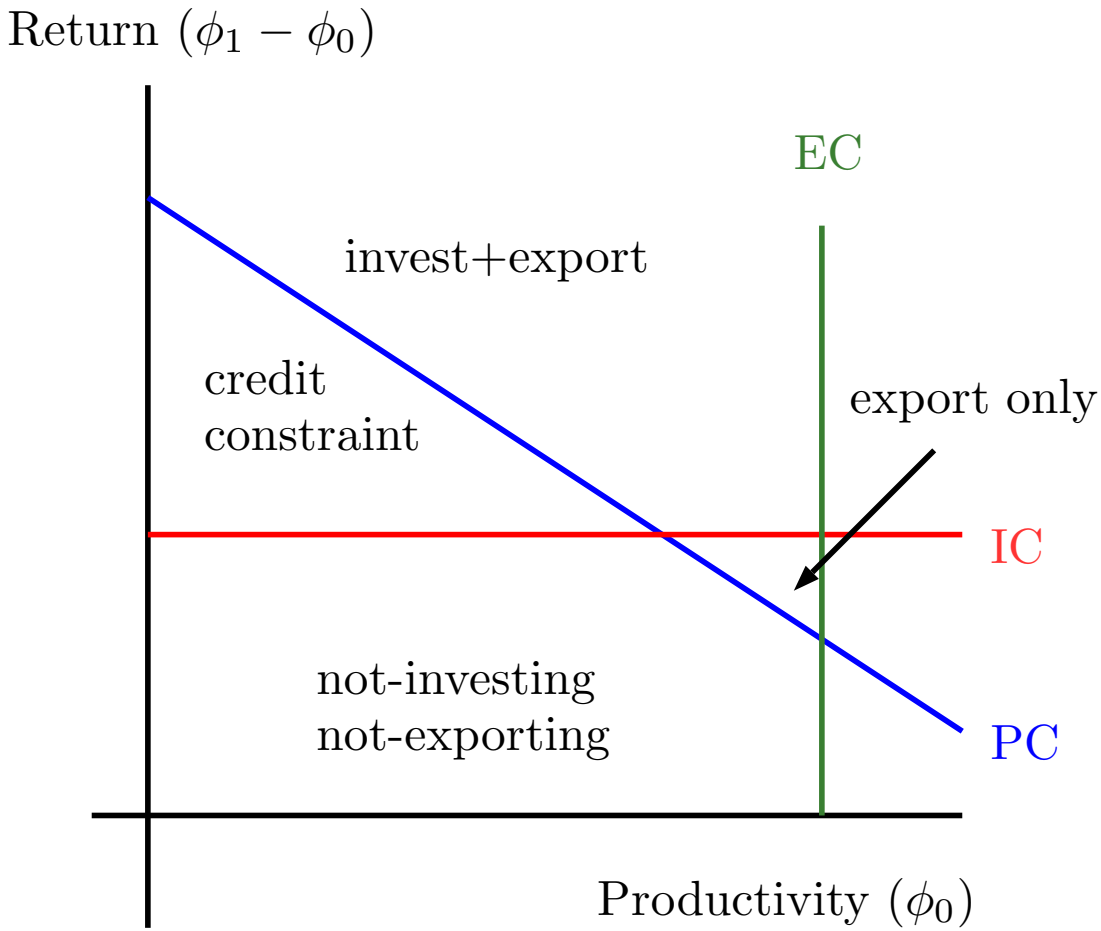

- **Firms with higher returns will choose to export and invest.**
  - Conditional on initial productivity and financial conditions.

Going to empirics

- Main identification issues:
  - credit constraints are not observable

- Our solution:
  - Estimate marginal returns to exporting
  - Firms with higher returns will choose to export and acquire more debt

  $\rightarrow$ **positive selection**

Data - ASM/T2

Two Sources linked:

- ASM - Annual Survey of Manufacturers
- T2 corporate tax records

ASM-T2: ASM (Plant Level) linked with T2 (Firm Level)

- Annual Data: 2000-2010
- Manufacturers
- **Firm-level variables are common to all plants of the firm.**

Data - ASM/T2

- ASM production/export variables:
  - Value Added, Employment (production and non-production), Salary and Wages,
  - Sales, Material and Supplies Costs, Fuel and Electricity Costs, Value of Shipments,
  - Value of Shipments Exported, NAICS classification, Plant Age
- T2 corporate balance sheet variables
  - Assets, Tangible Assets, Sales, Profits, Equity,
  - Total Debt, Total Long-term Liabilities, Working Capital, Corporation Type,
  - Firm corporate start year

Estimation equation

- Reg.: exporters (treated $j = 1$) and non-exporters (untreated $j = 0$)

$$Y_{[j],it} = \beta_{[j]} X_{[j],it} + K_{[j]}(p) + \epsilon_{it} \tag{1}$$

  - Y: leverage ratio of firm i in year t (proxy for access to credit)
  - X: initial leverage ratio, value added labor productivity, sales, age, industry dummies
  - K control function: 3rd order polynomial

- Andresen (2018) Stata Journal - MTEFE module
- Instruments:
  - Industry-specific US-CA Real Exchange Rate in year t
  - Changes in US tariffs after China's entry to the WTO

Results

Dep. variable	**Leverage ratio**	
	untreated	treated vs. untreated
Init. leverage ratio	0.8367***	0.0922***
	(0.0131)	(0.0302)
Init. labor prod	-0.1960***	0.1900***
	(0.0276)	(0.0610)
Age	-0.0274	0.0756***
	(0.0151)	(0.0329)
Age squared	-0.0241***	0.0444***
	(0.0046)	(0.0099)
Number of obs	415,773	415,773
Replications	100	100

- Initial financial conditions are important
- Initially less productive firms have higher leverage ratio

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- Initial financial conditions are important
- Initially less productive firms have higher leverage ratio
- **Exporters: higher leverage ratios, more productive and older.**

Treatment effects

	(1)
ATE	0.850***
	(0.061)
ATT	1.424***
	(0.105)
ATUT	0.512***
	(0.111)
LATE	0.649***
	(0.043)
Test of observable heterogeneity, p-value	0.0000
Test of essential heterogeneity, p-value	0.0000

- Exporting increases the leverage ratio.
- ATT>ATE>ATUT $\Rightarrow$ positive selection
  - firms with higher expected returns acquire more debt

$\rightarrow$ **consistent with presence of financial constraints**

Thanks/Merci

Appendix

Summary statistics

	Non-exporters		Exporters		Difference
	Mean	Std. dev.	Mean	Std. dev.	t-stat
Assets (*thous.*)	7006.3	26274.1	18535.6	40003.3	-123.0
Debt (*thous.*)	3822.5	13715.4	9867.4	20665.1	-124.3
Sales (*thous.*)	7302.0	24274.7	19276.7	37024.3	-138.1
Employment	15.31	24.15	38.3	44.7	-235.1
Profit (*thous.*)	1633.4	4888.1	3923.5	7134.9	-134.7
Value added labor prod (*thous.*)	77.2	42.1	89.3	47.8	-94.0
Debt to asset ratio	0.794	0.556	0.704	0.451	60.4
Age	9.83	5.526	10.19	5.71	-22.4
Observations	298890		201369		

- Exporters are larger, older and have higher productivity
  - Lower debt to asset ratio

Results

Dep. variable	**Labour productivity**	
	untreated	treated vs. untreated
Init. leverage ratio	-0.0024***	-0.0003
	(0.002)	(0.001)
Init. labor prod	0.108***	0.421***
	(0.0138)	(0.0201)
Age	0.193	-0.335***
	(0.0132)	(0.021)
Age squared	-0.002***	0.0004***
	(0.00003)	(0.00005)
Number of obs	415,773	415,773
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- More productive firms have lower initial debt to asset ratio
- Initially more productive firms remain more productive

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	(0.00003)	(0.00005)
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- More productive firms have lower initial debt to asset ratio
- Initially more productive firms remain more productive
- **Exporters: more productive and younger.**

Treatment effects

	(1)
ATE	0.23*
	(0.135)
ATT	2.203***
	(0.329)
ATUT	-1.003***
	(0.205)
LATE	1.443***
	(0.246)
Test of observable heterogeneity, p-value	0.0000
Test of essential heterogeneity, p-value	0.0000

- Exporting increases productivity.
- ATT>ATE>ATUT $\Rightarrow$ positive selection
  - Firms that are more likely to choose to export become more productive.

$\rightarrow$ **firms with higher expected returns expand productivity more.**