Do financial factors affect exporting decisions?

by

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ONS Analysis of Enterprise Microdata Conference

September 8 2005

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1. Introduction

Recent developments within the trade literature have used a combination of

- sunk start-up costs and
- heterogeneity in firm productivity

to explain why not all firms are engaged in international trade. [Bernard and Jensen (2004); Bernard et al. (2003); Campa (2004); Das et al. (2004); Helpman et al. (2004); Melitz (2003); Roberts and Tybout (1997); and Tybout (2003)].

According to this line of research, only

- the most productive and
- largest firms

enter export markets, as it is only for these firms that the expected profits from exporting will be sufficiently high to cover the sunk entry costs (Melitz, 2003).

Our paper adds a completely *new* dimension of firm heterogeneity to the trade literature, namely a *financial* dimension.

In particular, we focus on whether financial constraints might

- limit firms' ability to overcome sunk costs, and consequently
- their entry into export markets,

even when other characteristics might predict profitable entry.

We build on an extensive literature that has focused on the effects of capital market imperfections on firms' activities (see Hubbard, 1998; and Bond and van Reenen, 2002, for surveys).

There are good grounds for supposing that financial constraints might limit entry into export markets:

- Campa and Shaver (2002) show that financial constraints are less binding for Spanish exporters compared to non-exporters;

- Guariglia and Mateut (2005) find that globally engaged firms in the UK face lower liquidity constraints than their purely domestic counterparts.

This offers some motivation that such constraints might also affect entry.

2. Economic background

Theoretical background

We draw upon the models of Bernard and Wagner (2001), Bugamelli and Infante (2003), and Tybout (2003).

Firm's static problem of export participation with no sunk costs of entry:

EXP_{it} : dummy variable equal to 1 if firm i exports in year t, and 0 otherwise.

The firm will

$$\underset{EXPit \in \{0,1\}}{Max} \{\pi it(et, cit, y_t) + vit\} EXPit \qquad (1)$$

where π_{it} denotes profits made by exporting, in excess of those made on the domestic market.

π_{it} depends on

- the exchange rate (e_t),
- marginal production costs (c_{it}),
- a foreign demand shifter (y_t),
- a serially uncorrelated error term (v_{it}).

Firm *i* will decide to export at time *t* (EXP_{it}=1) if

$\pi(e_t, c_{it,} y_t) + v_{it} > 0$,

otherwise it will only serve the domestic market.

Two ways of including sunk costs in this set-up:

First: Ad hoc way

$$EXP_{it} = 1 \text{ if } \beta X_{it} + \gamma f_{it} + u_i + u_t + v_{it} > 0 \qquad (2)$$
$$= 0 \text{ otherwise.}$$

- X_{it}: productivity, and other firm-level characteristics which determine the expected profits that the firm is likely to generate by exporting.
- f_{it}: those financial variables likely to affect the ability of the firm to finance the export market entry costs.
- u_i: firm-specific error term, which encompasses those time-invariant firm characteristics that determine profits.
- u_t: time-specific effect, which takes into account business effects, which are not firm-specific.

Second: Dynamic setting [Bernard and Wagner (2001), Bugamelli and Infante (2003), and Tybout (2003)].

The decision to enter export markets is made by a rational firm with the objective of maximising expected profits over the expected period of participation in export markets, net of fixed costs.

F : sunk costs.

The firm's payoffs from exporting take the following form:

- $\pi(e_t, c_{it,} y_t) + v_{it}$ if EXP_{it}=1 and $EXP_{i(t-1)}$=1
- $\pi(e_t, c_{it,} y_t) - F + v_{it}$ if EXP_{it}=1 and $EXP_{i(t-1)}$=0 (3)
- 0 if EXP_{it}=0 and $EXP_{i(t-1)}$=0.

The optimal pattern of the firm's export market participation over time should satisfy the following Bellman equation:

$$V(e_t, c_{it,} y_{t,} v_{it}, EXP_{i(t-1)}) = \underset{EXP_{it}}{Max} \{\pi(e_t, c_{it,} y_t) - (1-EXP_{i(t-1)})F + \delta E_t V(e_{t+1}, c_{i(t+1),} y_{t+1,} v_{i(t+1)}, EXP_{it}) \} \quad (4)$$

Firms will find it optimal to export when:

$$\pi(e_t, c_{it,} y_t) + \delta \{E_t V(e_{t+1}, c_{i(t+1),} y_{t+1,} v_{i(t+1)}, EXP_{it}/EXP_{it}=1) - E_t V(e_{t+1}, c_{i(t+1),} y_{t+1,} v_{i(t+1)}, EXP_{it}/EXP_{it}=0)\} + v_{it} > (1-EXP_{i(t-1)})F, \quad (5)$$

Using a reduced-form approximation:

$$EXP_{it} = 1 \text{ if } \beta X_{it} + \eta\, EXP_{i(t-1)} + u_i + u_t + v_{it} > 0 \quad (6)$$
$$= 0 \text{ otherwise.}$$

A positive and significant $\eta \Rightarrow$ sunk costs are present.

Empirical background

Vast literature, which introduced financial variables in models of

- fixed investment,
- inventory investment, and
- R&D investment

A high sensitivity of investment to cash flow has typically been interpreted as an indicator of the presence of financial constraints.

Evidence in favor of this hypothesis (the financing constraints hypothesis) has been found for various countries.

3. Data sample and summary statistics

The dataset

- Profit and loss and balance sheet data from the *Financial Analysis Made Easy* (FAME) database.

- The dataset includes a majority of firms which are not traded on the stock market.

- The firms in our dataset operate in the manufacturing sector.

- Our panel includes a total of 52594 annual observations on 9352 companies, covering the years 1993-2003.

- It has an unbalanced structure, with an average of 7 observations per firm.

Summary statistics

Table 1

Table 2

Table 1: Summary statistics of the key variables

	Total sample	Obs. such that EXP_{it}=0	Obs. such that EXP_{it}=1
$Size_{it}$	2396.28	15764.63	27151.8
$Number\ of\ employees_{it}$	285.58	209.86	312.55
$Real\ sales_{it}$	309.37	202.88	350.86
Age_{it}	27.67	21.76	28.98
$Labor\ productivity_{it}$	1.34	1.315	1.35
$Wage_{it}$	22.0	21.76	22.09
$Foreign_i$	0.46	0.33	0.50
$Subsidiaries_i$	0.32	0.25	0.34
$Liquidity_{it}$	1.60	1.49	1.64
$Coverage\ ratio_{it}$	30.70	30.73	30.70
$(Short\text{-}term\ debt/total\ assets)_{it}$	0.24	0.24	0.24
$(Total\ debt/\ total\ assets)_{it}$	0.38	0.37	0.39
$(Short\text{-}term\ debt/current\ assets)_{it}$	0.39	0.42	0.38
$(Short\text{-}term\ debt/current\ liabilities)_{it}$	0.38	0.37	0.39
$(Cash\ flow/total\ assets)_{it}$	0.087	0.10	0.08
$Quiscore_{it}$	54.94	54.11	55.25
Number of observations	52546	37828	14718

Table 2: Percentages of exporters by industry and financial characteristics

	Entire sample	Low liquid.	High liquid.	Low quiscore	High quiscore
Metals and metal goods	77.4	76.1	80.9	77.2	78.6
Other minerals & mineral products	67.0	67.2	66.8	66.5	67.1
Chemicals and man-made fibres	84.6	83.6	88.0	83.7	87.1
Mechanical engineering	85.6	84.9	87.8	86.3	85.4
Electrical engineering.	84.4	83.1	88.3	83.7	87.3
Motor vehicles, parts, other transport equipment	77.0	76.1	80.2	75.4	80.5
Food, drink, tobacco	50.5	49.0	55.2	50.9	52.2
Clothing, leather, footwear	79.4	78.0	84.6	78.4	82.0
Other	54.9	53.0	61.6	54.2	55.8
All	71.9	70.6	76.3	71.4	73.5

4. Econometric specifications and estimation technology

Econometric specifications

We initially estimate the following reduced form model:

$$EXP_{it} = a_0 + a_1\, size_{i(t-1)} + a_2\, size^2_{i(t-1)} + a_3\, wage_{i(t-1)} + a_4\, laborprod_{i(t-1)} + a_5\, subsidiaries_i + a_6 foreign_i + a_7 financial_{i(t-1)} + u_i + u_t + e_{it}, \quad (7)$$

$Financial_{it}$:

- liquidity or
- short-term debt to current assets ratio

We then estimate the following Equation:

$$EXP_{it} = a_0 + a_1\, size_{i(t-1)} + a_2\, size^2_{i(t-1)} + a_3\, wage_{i(t-1)} + a_4\, laborprod_{i(t-1)} + a_5\, subsidiaries_i + a_6 foreign_i +$$
$$+ a_{71} financial_{i(t-1)} * FINDUM_{it} +$$
$$+ a_{72} financial_{i(t-1)} * (1-FINDUM)_{it} +$$
$$+ u_i + u_t + e_{it}, \qquad (8)$$

$FINDUM_{it}$ is a dummy variable equal to

- 1 if firm *i* is classified as financially constrained (low liquidity or low quiscore value) in year *t*,
- and 0 otherwise.

Finally, we estimate dynamic versions of (7) and (8)

Estimation methodology

Cross-sectional, pooled, and random-effects Probit models

5. Empirical results

Main results

Table 3

Differentiating the effects of the financial variables across financially constrained and financially healthy firm-years

Table 4

Dynamic specifications

Table 5

Table 3: Static Probit model of export participation

	Pooled Probit	Random-effects Probit	Pooled Probit	Random-effects Probit
$Size_{i(t-1)}$	1.306 (10.10)***	2.101 (8.31)***	1.246 (9.39)***	1.840 (5.31)***
$Size^2_{i(t-1)}$	-0.059 (8.74)***	-0.074 (5.74)***	-0.056 (8.07)***	-0.064 (3.62)***
$Wage_{i(t-1)}$	-0.007 (2.51)**	-0.010 (2.58)***	-0.007 (2.43)**	-0.014 (1.98)**
$Productivity_{i(t-1)}$	-0.014 (1.11)	-0.006 (0.30)	-0.018 (1.42)	-0.035 (1.97)**
$Subsidiaries_i$	0.129 (2.74)***	0.244 (3.02)***	0.122 (2.56)**	0.353 (2.99)***
$Foreign_i$	0.210 (5.05)***	0.185 (2.77)***	0.241 (5.70)***	0.171 (1.48)
$Liquidity_{i(t-1)}$	0.065 (3.73)***	0.059 (2.33)**		
$(Short\text{-}term\ debt / current\ assets)_{i(t-1)}$			-0.217 (6.24)***	-0.475 (7.74)***
Obs.	31010	31010	29651	29651

Table 4: Static Probit model of export participation: distinguishing firm-years on the basis of the degree of financial constraints that they face

	Pooled Probit *FINDUM* based on liquidity	Random-effects Probit *FINDUM* based on liquidity	Pooled Probit *FINDUM* based on liquidity	Random-effects Probit *FINDUM* based on liquidity
$Size_{i(t-1)}$	1.304 (10.07)***	3.270 (14.43)***	1.246 (9.38)***	1.487 (5.99)***
$Size^2_{i(t-1)}$	-0.059 (8.71)***	-0.142 (12.28)***	-0.056 (8.06)***	-0.041 (3.17)***
$Liquidity_{i(t-1)} * FINDUM_{it}$	0.099 (4.03)***	0.077 (1.85)*		
$Liquidity_{i(t-1)} * (1-FINDUM_{it})$	0.071 (4.02)***	0.068 (2.78)***		
$(Short\text{-}term\ debt / current\ assets)_{i(t-1)} * FINDUM_{it}$			-0.217 (6.25)***	-0.425 (7.40)***
$(Short\text{-}term\ debt / current\ assets)_{i(t-1)} * (1-FINDUM_{it})$			-0.081 (0.81)	-0.303 (1.83)*
Observations	30947	30947	29591	29591

Table 5: Dynamic Probit model of export participation

	FINDUM based on liquidity	*FINDUM* based on liquidity	*FINDUM* based on liquidity	*FINDUM* based on liquidity
$EXP_{i(t-1)}$	3.539 (109.65)***	3.540 (109.49)***	3.521 (107.00)***	3.523 (106.80)***
$Size_{i(t-1)}$	0.475 (4.42)***	0.475 (4.42)***	0.429 (3.86)***	0.429 (3.86)***
$Size^2_{i(t-1)}$	-0.023 (4.01)***	-0.023 (4.51)***	-0.020 (3.51)***	-0.021 (3.52)***
$Liquidity_{i(t-1)}$	-0.023 (1.71)*			
$Liquidity_{i(t-1)} * FINDUM_{it}$		-0.043 (1.60)		
$Liquidity_{i(t-1)} * (1-FINDUM_{it})$		-0.017 (1.22)		
$(S.t.\ debt / curr.\ assets)_{i(t-1)}$			-0.040 (1.19)	
$(S.t.\ debt / curr.\ assets)_{i(t-1)} * FINDUM_{it}$				-0.043 (1.27)
$(S.t.\ debt / curr.\ assets)_{i(t-1)} * (1-FINDUM_{it})$				-0.118 (0.92)
Observations	31010	30947	29651	29591

6. Conclusions

- We have introduced a completely new dimension of firm heterogeneity to understand why some firms engage in international trade while others do not, namely a financial dimension.

- We found that those firms more likely to face financial constraints are less likely to export.

- Moreover, balance sheet variables are important determinants of export market participation decisions.

- This happens essentially because healthier balance sheets make it easier for firms to meet the sunk export markets entry costs.

- Policy implications:

efficient intermediation of funds to small, financially constrained firms

$\Rightarrow$ small business community can thrive not only domestically, but also internationally

$\Rightarrow$ higher growth.