

# **Credit rationing and firm exports: evidence from developing countries**

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# Motivations and aim of the paper

- Exporting requires the anticipation of **upfront costs**:
  - sunk and **fixed costs** to access foreign markets (Chaney, 2016)
  - **variable costs** such as delays in cashing foreign revenues (Manova, 2013)
- The **theoretical framework** at the basis of our empirical analysis is well accepted in the literature:
  - due to upfront costs, exporting requires **more working capital** than selling at home
  - in turn, this foster the demand for **external finance**
  - if firms are at least partly credit constrained, **better access** to external finance increases their **ability to export**
- Our aim is to study the **effect of financial constraints** on both the probability that a firm **exports** (the extensive margin) and the share of exports over total sales (the intensive margin)

# Related literature

## 1. What is meant by financial conditions

- **Aggregate**, country level external characteristics such as the degree of **financial development** (Manova, 2008)
- firms' **balance sheet** characteristics (Greenaway et al., 2007)
- **self assessment** by firms on whether they are credit constrained (Minetti and Zhu, 2011; Wang, 2016)

## 2. The level of analysis

- **Single-country, firm-level** analyses (Feenstra et al., 2013; Manova et al., 2011; Bellone et al., 2010; Wagner, 2012; Minetti and Zhu, 2011; Secchi et al., 2013)
- **Cross-country, industry-level** analyses (Manova, 2008 and 2013)
- **Cross-country, firm-level** analyses (Berman and Hericourt, 2010; Fauceglia, 2015; Wang, 2016)

# Endogeneity issues

- Theoretical models show that the **finance-export** relationship can go **either way**, causing potential endogeneity problems in the empirical analysis
- Minetti and Zhu (2011) **instrument** their firm level measure of credit constraints using characteristics of the local area where the firm operates
- Wang (2016) uses country-level characteristics of the legal framework in his cross-country analysis

# Our contribution to the literature

- Our aim is to contribute to the literature in three ways:
  1. studying a **larger and more heterogeneous sample** of firms from over 68 developing countries between 2003 and 2014
  2. using a **reliable measure of credit constraints** provided by each firm's self assessment
  3. adopting an instrumental variable approach using **firm-level instruments**

# The data

- Our main source of data is the [World Bank Enterprise Survey](#):
  - small panel component of 700 firms
  - manufacturing firms
  - pooled 2003-2014 data
  - about 35% of firms in our sample exports, showing an average export share of about 15%
  - credit constrained firms represent about 23% of our sample
  - 6% of countries are higher income OECD and 56% are low and lower-middle income

# Econometric specification

$$\begin{aligned}\Pr(\text{Export}_{ikct} = 1) &= \Pr(\alpha_1 + \beta_1 CR_{ikct} + \gamma_1 Z_{ikct} + \nu_k + \lambda_c + \eta_t + \varepsilon_{ikct} > 0) \\ &= \Phi(\alpha_1 + \beta_1 CR_{ikct} + \gamma_1 Z_{ikct} + \nu_k + \lambda_c + \eta_t)\end{aligned}$$

$$\text{Share\_export}_{ikct} = \alpha_1 + \beta_1 CR_{ikct} + \gamma_1 Z_{ikct} + \nu_k + \lambda_c + \eta_t + \varepsilon_{ikct}$$

Where:

- $i$  indexes for firm,  $k$  for sector,  $c$  for country and  $t$  for year
- $\text{Export}$  equals 1 if firm  $i$  exported at time  $t$  and zero otherwise
- $\text{Share\_export}$  is the share of (direct and indirect) exports over total sales
- $CR$  equals 1 if firm  $i$  claims to be credit rationed and 0 otherwise
- $Z$  is a set of control variables (size, productivity, age, share of skilled workers, etc.)
- $\nu_k, \lambda_c, \eta_t$  are sector, country and time fixed effects
- $\varepsilon_{ikct}$  is an unobserved firm attribute

# Credit rationing and instrumental variables

- A firm is credit constrained ( $CR$  equals 1) if either:
  - it applied for a loan, but did not receive it (*bank rationing*)
  - it did not apply for a loan because of too stringent collateral, interest rate too high, or expected to be denied (*self rationing*)
- Our of instruments are based on the effect of exogenous shocks to firms' cash flows and internal funds (Gorodnichenko and Schnitzer, 2013) and on the potential role of internal capital markets:
  - *payment* for purchases of material inputs or services *after delivery*
  - establishments that are *part of a larger firm*



# Summary statistics and correlations

Variable	CR = 1				CR = 0				ttest	
	mean	sd	min	max	mean	sd	min	max		
dummy export	0.23	0.4	0	1	0.39	0.49	0	1	23.56	***
export share	0.1	0.2	0	1	0.16	0.30	0	1	16.55	***
employees	58	176	0	3,000	132	454	0	26,000	2.33	***
labour productivity	14	64.3	0	455	13.8	85.1	0	493	-0.01	
age	19	16	1	146	22	18	1	210	12.55	***
share of temporary workers	0.12	0.2	0	1	0.10	0.20	0	1	-4.64	***
compete in national market	0.39	0.5	0	1	0.45	0.50	0	1	7.66	***
capacity utilization	0.71	0.2	0	1	0.74	0.22	0	1.05	8.06	***
share of skilled workers	0.54	0.3	0	1	0.49	0.27	0	1	-10.97	***
part establishment	0.1	0.3	0	1	0.14	0.35	0	1	8.64	***
du_1 credit purchases	0.48	0.5	0	1	0.33	0.47	0	1	-16.92	***
du_2 credit purchases	0.31	0.5	0	1	0.3	0.5	0	1	-0.49	
du_3 credit purchases	0.22	0.4	0	1	0.36	0.5	0	1	19.80	***

# Summary statistics and correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) dummy export	1													
(2) export share	0.69	1												
(3) employees	0.20	0.17	1											
(4) labour productivity	0.02	0.01	0.01	1										
(5) age	0.15	0.01	0.19	0.05	1									
(6) share of temporary workers	-0.01	-0.02	-0.04	0.01	-0.02	1								
(7) compete in national market	0.03	-0.20	0.04	0.00	0.07	-0.03	1							
(8) capacity utilization	0.06	0.06	0.07	0.00	-0.03	-0.06	0.04	1						
(9) share of skilled workers	-0.03	0.06	0.01	0.00	-0.09	-0.07	-0.02	0.08	1					
(10) credit rationing	-0.14	-0.10	-0.08	0.00	-0.08	0.03	-0.05	-0.05	0.07	1				
(11) part establishment	0.12	0.09	0.18	0.00	0.11	-0.01	0.04	0.06	-0.02	-0.05	1			
(12) du_1 credit purchases	-0.14	-0.03	-0.04	-0.01	-0.13	0.01	-0.08	0.00	0.14	0.12	-0.04	1		
(13) du_2 credit purchases	0.01	0.00	0.00	0.00	-0.01	0.01	0.05	0.01	0.01	0.00	-0.01	-0.50	1	
(14) du_3 credit purchases	0.13	0.03	0.05	0.00	0.15	-0.01	0.03	-0.01	-0.14	-0.13	0.04	-0.53	-0.46	1

# Results: extensive margin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LPM	Probit		2SLS		IV Probit		
		Coeff.	ME	Second stage	First stage	Second stage	First stage	ME
credit rationing	-0.026**	-0.099**	-0.027***	-0.795***		-2.553***		-2.553***
employees (log)	0.138***	0.464***	0.126***	0.107***	-0.038***	0.354***	-0.038***	0.354***
labour productivity (log)	0.027***	0.099***	0.027***	0.014**	-0.015***	0.059***	-0.015***	0.059***
age (log)	-0.006	-0.018	-0.005	-0.010	-0.012***	-0.030	-0.012***	-0.030
share of temporary workers	0.111**	0.429***	0.116***	0.110***	0.009	0.423***	0.009	0.423***
compete in national market	-0.047**	-0.132*	-0.036*	-0.041**	-0.001	-0.107***	-0.001	-0.107***
capacity utilization	0.012	0.037	0.010	-0.058**	-0.086***	-0.199**	-0.086***	-0.199**
share of skilled workers	-0.021**	-0.093***	-0.025***	0.030***	0.055***	0.078	0.055***	0.078
part establishment					-0.034***		-0.034***	
du_2 credit purchases					-0.008		-0.008	
du_3 credit purchases					-0.038***		-0.038***	
First stage $F$ -stat ( $p$ -value)				22.21 (0.00)				
Hansen stat ( $p$ -value)				3.58 (0.17)				
Weak identification Cragg-Donald $F$ -stat				13.45				
Observations	23,416	23,414		17,826			17,824	
$R^2$	0.3	0.26					0.17	

# Results: intensive margin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	Tobit		2SLS		IV Tobit		
		Coeff.	ME	Second stage	First stage	Second stage	First stage	ME
credit rationing	-0.010*	-0.049**	-0.049**	-0.234**		-0.969***		-0.969***
employees (log)	0.075***	0.215***	0.215***	0.063***	-0.038***	0.171***	-0.038***	0.171***
labour productivity (log)	0.009***	0.042***	0.042***	0.006	-0.016***	0.027***	-0.016***	0.027***
age (log)	-0.032***	-0.059***	-0.059***	-0.031***	-0.012***	-0.058***	-0.012***	-0.058***
share of temporary workers	0.054*	0.200**	0.200**	0.054*	0.009	0.199***	0.009	0.199***
compete in national market	-0.148***	-0.248***	-0.248***	-0.133***	0.000	-0.223***	0.000	-0.223***
capacity utilization	0.007	0.010	0.010	-0.020	-0.086***	-0.090**	-0.086***	-0.090**
share of skilled workers	0.017**	-0.010	-0.010	0.036***	0.055***	0.060**	0.055***	0.060**
part establishment					-0.034***		-0.034***	
du_2 credit purchases					-0.008		-0.008	
du_3 credit purchases					-0.038***		-0.038***	
First stage $F$ -stat ( $p$ -value)				22.36 (0.00)				
Hansen stat ( $p$ -value)				0.7 (0.70)				
Weak identification Cragg-Donald $F$ -stat				13.32				
Observations	23,404	23,404		17,819			17,819	
$R^2$	0.31	0.24					0.17	

# Sample split: firm size

	Extensive margin				Intensive margin			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	small-medium firms		large firms		small-medium firms		large firms	
	2SLS		2SLS		2SLS		2SLS	
	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage
credit rationing	-1.028***		-0.130		-0.352***		0.129	
employees (log)	0.098***	-0.031***	0.130***	-0.042***	0.060***	-0.031***	0.068***	-0.042***
labour productivity (log)	0.009	-0.013***	0.048***	-0.012***	0.002	-0.014***	0.019***	-0.012***
age (log)	-0.018*	-0.015**	0.001	-0.006	-0.027***	-0.015**	-0.031***	-0.006
share of temporary workers	0.114**	0.005	0.092***	0.014	0.064**	0.005	0.033	0.015
compete in national market	-0.044**	-0.003	-0.039*	-0.002	-0.108***	-0.003	-0.163***	-0.002
capacity utilization	-0.081**	-0.086***	-0.004	-0.085***	-0.026	-0.087***	-0.006	-0.085***
share of skilled workers	0.027	0.039	-0.011	0.072***	0.036**	0.040	0.020	0.072***
part establishment		-0.046***		-0.015		-0.045***		-0.015
du_2 credit purchases		0.002		-0.028**		0.003		-0.028**
du_3 credit purchases		-0.029***		-0.053***		-0.029***		-0.053***
First stage <i>F</i> -stat ( <i>p</i> -value)	30.17 (0.00)		9.60 (0.00)		29.83 (0.00)		9.61 (0.00)	
Hansen stat ( <i>p</i> -value)	3.90 (0.14)		3.66 (0.16)		1.65 (0.44)		3.00 (0.22)	
Weak identification Cragg-Donald <i>F</i> -stat	7.87		6.51		7.82		6.48	
Observations	10,866		6,960		10,861		6,958	

# Sample split: credit rationing reasons

	Extensive margin				Intensive margin			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	bank rationing		self rationing		bank rationing		self rationing	
	2SLS		2SLS		2SLS		2SLS	
	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage
credit rationing	-1.583**		-1.107***		-0.787*		-0.289**	
employees (log)	0.132***	-0.004***	0.100***	-0.034***	0.068***	-0.004***	0.062***	-0.033***
labour productivity (log)	0.028***	0.001	0.009	-0.016***	0.010***	0.001	0.005	-0.016***
age (log)	-0.011	-0.006**	-0.007	-0.005	-0.033***	-0.006**	-0.030***	-0.005
share of temporary workers	0.151***	0.031***	0.079**	-0.022***	0.076***	0.031***	0.045*	-0.022***
compete in national market	-0.033**	0.005	-0.047**	-0.005	-0.130***	0.005	-0.135***	-0.005
capacity utilization	-0.037	-0.030**	-0.052*	-0.056***	-0.024	-0.030**	-0.016	-0.056***
share of skilled workers	-0.018	-0.002	0.050***	0.057***	0.022**	-0.002	0.040***	0.057***
part establishment		-0.012***		-0.022***		-0.012**		-0.022***
du_2 credit purchases		0.003		-0.012		0.004		-0.012
du_3 credit purchases		-0.004		-0.034***		-0.004		-0.034***
First stage F-stat ( <i>p</i> -value)	12.12 (0.00)		11.97 (0.00)		12.01 (0.00)		12.13 (0.00)	
Hansen stat ( <i>p</i> -value)	5.97 (0.05)		2.67 (0.26)		0.713 (0.70)		1.83 (0.40)	
Weak identification Cragg-Donald <i>F</i> -stat	2.39		10.83		2.4		10.69	
Observations	17,826		17,826		17,819		17,819	

# Conclusions

- We find robust evidence of a negative, statistically and economically significant effect of financial constraints on:
  - the probability that a firm exports (the extensive margin of exports)
  - the share of exports over total sales (the intensive margin of exports)