# Firms and the Global Crisis : French Exports in the Turmoil

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Motivation

- Great trade collapse, unparalleled in its suddenness and cross-country synchronization.
  - 29% decline in just 4 months (September 2008 - January 2009).
  - Virtually all country in the world have been affected.
- Seemingly out of line with the decline in activity.
  - World GDP declined only by less than 3% and world IP by 9% over the same period.

Motivation

Figure 1: Total value of French exports and total number of French exporters, 2000-M1 to 2009-M4
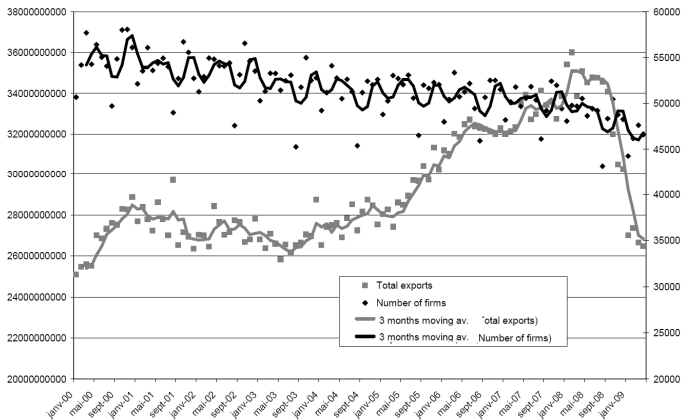
Suggested explanations

- Beyond limited resurgence of protectionism (Gamberoni and Newfarmer, 2009, Baldwin and Evenett, 2009, Bussiere et al., 2010).

- Composition effects (O'Rourke, 2009, Benassy-Quéré et al., 2009, Eaton et al., 2009, Levchenko et al., 2009).

- Global supply chains (Tanaka, 2009 ; Yi, 2009 ; Baldwin, 2009).

- Financial constraints and liquidity shortages (Aubouin, 2009 ; Chor and Manova, 2009) : evidence on past banking crises (Amiti and Weinstein, 2009 ; Iacovone and Zavacka, 2009).

What we do

Using French firm level data up to April 2009, we look at the microeconomic dimension of the trade crisis :

- We measure the contribution of the extensive vs. the intensive margin of trade to the drop in French exports, for firms of different sizes.
- We assess the sectoral, geographical and price dimension of the collapse.
- We investigate the contribution of firm-level financial constraints to the dynamic of individual firm exports during the crisis, controlling for the sectoral and geographical composition of exports.

What we find

Our main findings are the following :

- The negative intensive margin of export of the top 1% largest exporters explains much of the downsizing of French exports.
- Small and large exporters suffered quantitatively proportional trade losses, when the sectoral and geographical composition is controlled for.
- Nonetheless, large exporters mainly adjusted through the intensive margin while small exporters did so through the extensive margin (firm/destination/product).
- The impact was greatest for financially constrained firms, irrelevant of a firm's overall financial health.
- Financial constraints were particularly detrimental for firms active in sectors of high financial dependence.

Trade data

Monthly individual French exports 2000M1-2009M4 (French Customs).

- About 95,000 individual firms export in a given year.
- About 50,000 export in a given month.
- Monthly export by destination and CN8 (=HS6 + 2 digit) product category.

Firm size, defined by total exports by HS2 sector :

- Group 1 : firms in 0-80th percentile (3% of French exports).
- Group 2 : 80-95th percentile (11%).
- Group 3 : 95-99th percentile (24%).
- Group 4 : top 1% exporters (63%)

Midpoint growth rate

Monthly trade data : entry/exit especially relevant
$\Rightarrow$ **mid-point growth rate** (firm (i), country (c), product (k))

$$g_{ickt} = \frac{x_{ickt} - x_{ick(t-12)}}{0.5(x_{ickt} + x_{ick(t-12)})},$$

$$s_{ickt} = \frac{x_{ickt} + x_{ick(t-12)}}{\sum_c \sum_i \sum_k x_{ickt} + \sum_c \sum_i \sum_k x_{ick(t-12)}},$$

and $G_t = \sum_k \sum_c \sum_i s_{ickt} g_{ickt}$.

Compute contributions of margins to French export growth :

- entry/exit (firm/country/product) : extensive margin ;
- increase/decrease in existing flows : intensive margin.

Contributions of the margins of trade

Contributions to mid-point growth rates, average September 2008-April 2009, French monthly exports, percent.

Percentiles	0-80	80-95	95-99	99-100	Total
Firm entry	1.0%	1.2%	1.2%	1.2%	4.7%
Firm exit	-1.3%	-1.5%	-1.4%	-0.6%	-4.7%
Net firm	**-0.2%**	**-0.3%**	**-0.2%**	**0.6%**	**0.0%**
Country entry	0.5%	2.0%	2.9%	5.3%	10.8%
Country exit	-0.6%	-2.4%	-3.9%	-5.6%	-12.5%
Net Country	**-0.1%**	**-0.4%**	**-1.0%**	**-0.3%**	**-1.8%**
Product entry	0.3%	1.2%	2.3%	4.8%	8.5%
Product exit	-0.3%	-1.3%	-2.7%	-5.8%	-10.1%
Net Product	**0.0%**	**-0.1%**	**-0.4%**	**-1.1%**	**-1.6%**
Net extensive margin	**-0.3%**	**-0.8%**	**-1.5%**	**-0.8%**	**-3.4%**
Intensive positive	0.3%	1.8%	4.3%	11.1%	17.5%
Intensive negative	-0.4%	-2.5%	-6.6%	-20.7%	-30.2%
Net intensive margin	**-0.1%**	**-0.7%**	**-2.3%**	**-9.6%**	**-12.7%**
Total	**-0.4%**	**-1.5%**	**-3.9%**	**-10.4%**	**-16.2%**

Source : French customs data, own calculations.

Contributions of the margins of trade

- September 2008- April 2009 : contraction in exports (-16.2% y-o-y average loss).
- 79% of the contraction contributed by the intensive margin (-12.7%).
- Downsizing of extensive margin contributed for 21% of the total (-3.4%).
  - Evenly accounted for by retrenchment in product variety and destinations.
  - Trade loss due to firms that stopped export activity altogether negligeable overall
- Negative extensive margin however important demographically, and in particular for small firms :
  - 76% of trade losses for bottom 80% exporters from the extensive margin.
  - of which 53% from firms that stopped exporting.

No conditional difference between large and small firms

Question with important policy implications is whether small firms have been affected more than proportionally.

- Need to correct unconditional growth rates by differences in geographical and sectoral specialisation.
- Shift-share analysis :
  - Regress the year-on-year midpoint growth rate on :
    - HS2 fixed effects.
    - Country fixed effects.
    - Size group fixed effects.
    - For each period.
  - Correct the mid-point growth rates for these two contributions.

No conditional difference between large and small firms

Average midpoint growth rate 2008-2009 (monthly export, %)

	Before correction				After correction			
Group	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Percentiles	(0-80)	(80-95)	(95-99)	(99-100)	(0-80)	(80-95)	(95-99)	(99-100)
2008-01	5.1	8.5	7.2	11.5	7.8	10.2	7.9	10.8
2008-02	4.7	10.2	11.4	11.6	2.4	9.3	10.5	12.2
2008-03	-4.1	3.4	5.0	4.8	-1.8	4.9	5.6	4.2
2008-04	2.9	4.8	6.2	3.8	2.3	3.7	4.5	4.6
2008-05	-2.9	-0.1	5.3	0.6	-3.3	-0.2	4.5	0.9
2008-06	-4.9	1.4	7.6	6.5	-3.3	1.7	7.2	6.5
2008-07	0.6	1.2	2.9	6.7	2.6	3.0	3.0	6.3
2008-08	-7.4	-1.4	2.0	1.6	-7.2	-1.3	1.1	1.9
2008-09	-2.6	0.7	-0.4	2.9	-3.1	-0.3	-1.4	3.4
2008-10	-7.0	-2.6	-4.5	-5.8	-9.5	-5.0	-6.0	-4.8
2008-11	-13.5	-8.8	-10.7	-5.4	-14.1	-9.3	-10.9	-5.2
2008-12	-11.1	-11.5	-17.9	-9.0	-9.9	-10.4	-14.8	-10.4
2009-01	-20.1	-20.5	-23.2	-30.2	-26.2	-25.9	-25.4	-28.1
2009-02	-21.6	-24.3	-26.1	-28.9	-22.6	-26.1	-26.8	-28.3
2009-03	-16.6	-19.8	-21.1	-26.5	-23.8	-25.7	-23.6	-24.2
2009-04	-21.3	-23.1	-26.2	-30.2	-27.1	-27.4	-26.9	-29.0

Source : French customs data, own calculations.

Sectoral dimension

ranking	Sector	HS-2	broad cat	f.e.[*]
Most harmed sectors				
1	Lead and articles thereof.	78	interm	-0.51
2	Copper and articles thereof.	74	interm	-0.41
3	Ores, slag and ash.	26	interm	-0.29
4	Vehicles o/t railw/tramw roll-stock, pts ; access.	87	autom	-0.27
5	Zinc and articles thereof.	79	interm	-0.26
6	Nickel and articles thereof.	75	interm	-0.24
7	Arms and ammun.. parts and access. thereof.	93	other eqt	-0.22
8	Ships, boats and floating structures.	89	other transp	-0.19
9	Other veget. textile fibres. paper yarn ; woven fab	53	interm	-0.19
10	Carpets and other textile floor coverings.	57	cons	-0.17
11	Iron and steel.	72	interm	-0.16
12	Raw hides and skins and leather.	41	interm	-0.16
13	Pulp of wood/of other fib. cellu. mat. waste etc	47	interm	-0.15
14	Man-made staple fibres.	55	interm	-0.15
15	Man-made filaments.	54	interm	-0.14

Source : French customs data, own calculations. [*] normalized fixed effects (weighted average equals 0).

Sectoral dimension

ranking	Sector	HS	broad cat.	f.e.*
	Least harmed sectors			
81	Prep of cereal, flour, starch/milk. etc.	19	cons	0.15
82	Prod indust. malt. starches. insulin. wheat gluten	11	interm	0.16
83	Headgear and parts thereof.	65	cons	0.16
84	Toys, games; sports requ.. parts; access thereof	95	cons	0.16
85	Cocoa and cocoa preparations.	18	cons	0.18
86	Miscellaneous edible preparations.	21	cons	0.20
87	Railw/tramw locom, rolling-stock; parts etc	86	other transp	0.20
88	Art. of leather. saddlery/harness. travel goods etc	42	cons	0.20
89	Meat and edible meat offal.	2	cons	0.21
90	Pharmaceutical products.	30	cons	0.23
91	Residues; waste from the food indust., etc.	23	interm	0.25
92	Products of animal origin, nes or included.	5	interm	0.26
93	Prepr feathers; arti flower. articles human hair	67	misc	0.29
94	Live animals.	1	interm	0.30
95	Fertilisers.	31	interm	0.34
96	Coffee, tea, mat– and spices.	9	cons	0.37

Source : French customs data, own calculations. * normalized fixed effects (weighted average equals 0).

Data : financial constraints

Financially constrained firms identified indirectly through their default on payments to their trade creditors.

- Information available to all commercial bank and credit institution, over the preceding 12 months.
- Having experienced a payment incident during the previous year reduces both the probability of contracting a new loan and the size of new loans (Aghion et al., forth JEEA).
- Payment incident database from Banque de France - Systeme Interbancaire de Telecompensation :
  - We only consider payment incidents due to the inability of clients to pay, e.g. due to insufficient funds or request for an extension of payment delay.
  - Incidents of payment due to technical reasons are excluded (missing details on bank account, issuer...).

Econometrics : firm-level financial constraints

Baseline specification estimated on 2008M1 to 2009M4 by OLS :

$$g_{ickt} = \alpha * d \ln(import)_{ckt} + \beta * PI_{it} + \gamma * PI_{it} * crisis + u_{ct} + v_{kt} + \varepsilon$$

- Crisis : dummy equal to 1 from 2008M9 onwards.
- Import : demand as net imports in each destination*HS2 market (i.e. total less imports from France).
- Country and time fixed effects (control for exchange rate, etc.).
- HS2 and time fixed effects (specific sector shocks, etc.).
- Financial constraints : payment incidents.

Baseline econometric estimation

| | (1) | (2) | (3) | (4) |
			RZ<med.	RZ>med.
dln(import)	0.065***	0.065***	0.072***	0.051***
	0.004	0.004	0.006	0.006
Incident of payment	-0.269***	-0.259***	-0.260***	-0.254***
	0.004	0.005	0.007	0.009
Crisis*Incident of payment		-0.020***	0.007	-0.073***
		0.007	0.009	0.013
Obs.	6135735	6135735	4175151	1960584
Nbr. Firms	105212	105212	79524	49215

Source : French customs data, own calculations.

Econometric estimation : robustness

	(5)	(6)	(7) weighted	(8) Groups
dln(import)	0.061***	0.058***	0.286***	0.066***
Incident of payment	-0.076***	-0.083***	-0.097***	-0.271***
Crisis*Incident of payment	-0.041***	-0.017***	-0.079***	-0.019***
ln(net assets)	-0.002***	-0.004		
Crisis * ln(net assets)	0.001	0.003***		
ln(VA/nbr employees)	0.023***	0.025***		
Crisis * ln(VA/nbr employees)	0.003	-0.001		
Internal financing / investment		0.000		
Crisis * Int.financing / inv.		0.000		
Financial charges / VA		-0.023**		
Crisis * Financial charges / VA		0.052***		
Leverage ratio		-0.001		
Crisis * Leverage ratio		-0.003***		
Obs.	4576938	4140150	6135735	5724816
Nbr. Firms	45776	38849	105212	

Quantification : financially constrained firms during the crisis

Conclusion and research agenda
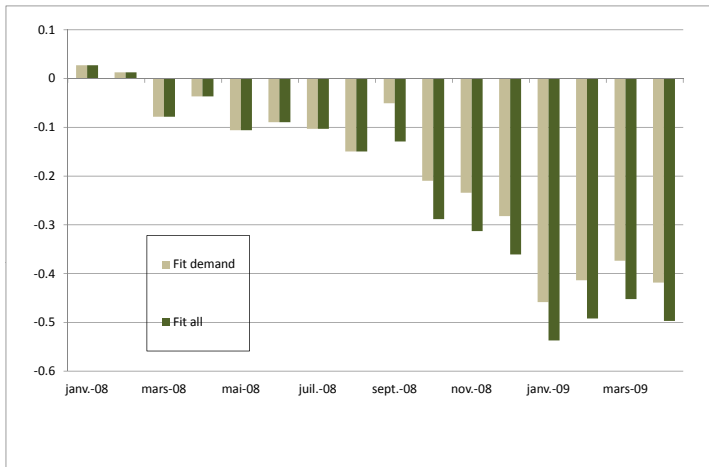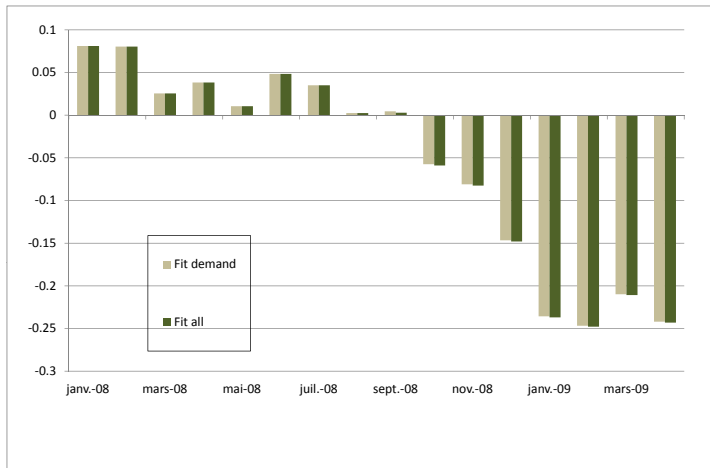
- **Intensive margin** accounts for the bulk of the export collapse :
  - But additional firm selection concentrated on small firms ;
  - Long term impact on exports ?
- **Firm heterogeneity** :
  - Large and small firms evenly impacted when controlled for sector and destination ;
  - Financially constrained firms more affected in period of crisis ;
  - But small aggregate impact of financial constraints.
- **Trade frictions** :
  - No information on domestic sales : would be a natural benchmark (Eaton, Kortum, Neiman & Romalis, 2009 on aggregated data) ;
  - No information on intra-firm trade : role of global value chains.

Annexes

Annex : Number of exporters reporting an incident of payment

year	month											
	1	2	3	4	5	6	7	8	9	10	11	12
2007	2839	3016	3219	3111	3165	3164	2998	2727	2884	3010	3020	2889
2008	2493	2753	2785	2878	2778	2869	2911	2662	2780	3046	3033	2952
2009	2673	2853	2980	3231								

Source : Banque de France, own calculations.

Annex : FiBEn Descriptive statistics

Variable	Obs.	Mean	S.D.	Q1	Median	Q3
Incident of payment	6135735	0.03	0.18	0.00	0.00	0.00
dln(import)	6135735	-0.06	0.23	-0.16	-0.04	0.06
ln(net assets)	5183686	9.70	1.99	8.24	9.46	10.94
ln(VA/nbr employees)	4576938	4.32	0.69	3.93	4.26	4.62
Internal financing / investment	4501875	2.57	16.50	0.00	1.10	3.50
Financial charges / VA	4501875	0.08	0.14	0.01	0.04	0.08
Leverage ratio	4387091	0.75	1.73	0.04	0.24	0.82

Source : FIBEn, own calculations.

Contributions to exports, percent.

Percentiles	0-80	80-95	95-99	99-100	Total
Firm entry	1.2%	1.4%	1.6%	1.8%	6.0%
Firm exit	-1.1%	-1.3%	-1.2%	-2.3%	-5.9%
Net firm	**0.0%**	**0.1%**	**0.4%**	**-0.4%**	**0.1%**
Country entry	0.6%	2.2%	3.4%	5.2%	11.4%
Country exit	-0.6%	-2.0%	-3.1%	-4.8%	-10.5%
Net Country	**0.0%**	**0.2%**	**0.3%**	**0.4%**	**0.9%**
Product entry	0.4%	1.8%	4.3%	11.7%	18.1%
Product exit	-0.3%	-1.7%	-3.9%	-10.8%	-16.7%
Net Product	**0.0%**	**0.1%**	**0.3%**	**0.9%**	**1.3%**
Net extensive margin	**0.1%**	**0.4%**	**1.0%**	**0.9%**	**2.3%**
Intensive positive	0.3%	2.0%	4.8%	12.9%	20.1%
Intensive negative	-0.3%	-1.7%	-3.9%	-10.3%	-16.2%
Net intensive margin	**0.0%**	**0.3%**	**1.0%**	**2.6%**	**3.9%**
Total	**0.1%**	**0.7%**	**1.9%**	**3.5%**	**6.2%**

Source : French customs data, own calculations.

Percentile	0-80	80-95	95-99	99-100	Total
Firm entry	0.2%	0.3%	0.6%	1.0%	2.0%
Firm exit	-0.2%	-0.3%	-0.3%	-0.4%	-1.2%
Net firm	**0.0%**	**0.1%**	**0.3%**	**0.6%**	**0.9%**
Country entry	0.4%	0.9%	1.2%	2.1%	4.6%
Country exit	-0.4%	-0.9%	-1.3%	-2.2%	-4.7%
Net Country	**0.0%**	**0.0%**	**0.0%**	**-0.1%**	**-0.1%**
Product entry	0.1%	0.8%	1.9%	7.6%	10.4%
Product exit	-0.1%	-0.8%	-1.8%	-6.8%	-9.6%
Net Product	**0.0%**	**0.0%**	**0.0%**	**0.7%**	**0.7%**
Net extensive margin	**0.0%**	**0.1%**	**0.3%**	**1.2%**	**1.5%**
Intensive positive	0.1%	1.2%	3.8%	15.2%	20.4%
Intensive negative	-0.2%	-1.2%	-3.5%	-14.2%	-19.0%
Net intensive margin	**0.0%**	**0.0%**	**0.3%**	**1.0%**	**1.4%**
Total	**0.0%**	**0.1%**	**0.6%**	**2.3%**	**2.9%**

Geographic dimension

	Most harmed destinations		
ranking	Country	Share in French exports	f.e.*
1	Taiwan	0.46%	-0.27
2	Chile	0.15%	-0.21
3	Ukraine	0.23%	-0.16
4	Spain	9.32%	-0.16
5	Argentina	0.23%	-0.12
6	China	2.30%	-0.09
7	Portugal	1.23%	-0.09
8	United Kingdom	8.08%	-0.07
9	Slovenia	0.31%	-0.06
10	United States of America	6.78%	-0.06
11	Poland	1.61%	-0.06
12	Turkey	1.40%	-0.05
13	Denmark	0.72%	-0.04
14	Romania	0.63%	-0.04
15	Czech Republic	0.85%	-0.03

Source : French customs data, own calculations. * normalized fixed effects (weighted

average equals 0).

Geographic dimension

	Least harmed destinations		
ranking	Country	Share in French exports	f.e.*
35	Thailand	0.25%	0.05
36	Finland	0.52%	0.07
37	Tunisia	0.81%	0.07
38	Brazil	0.78%	0.07
39	Côte d'Ivoire	0.18%	0.07
40	Canada	0.86%	0.08
41	Russian Federation	1.44%	0.08
42	Malaysia	0.36%	0.08
43	Israel	0.30%	0.09
44	Mexico	0.47%	0.09
45	Switzerland	2.81%	0.14
46	Australia	0.7%	0.16
47	Egypt	0.3%	0.16
48	Morocco	0.9%	0.16
49	Nigeria	0.3%	0.18
50	Algeria	1.1%	0.36

Source : French customs data, own calculations. * normalized fixed effects (weighted

average equals 0).

Annex : Decomposition of changes into volumes and prices

- We decompose each elementary flow *i* as follows :

$$dln(value)_{i,t/t-12} = dln(quantity)_{i,t/t-12} + dln(\tfrac{value}{quantity})_{i,t/t-12}$$

- and then aggregate elementary price changes as one would do for a Tornqvist price index, using the following formula :

$$\sum_i w_{it} \, dln(value)_{i,t/t-12} =$$
$$\sum_i w_{it} \, dln(quantity)_{i,t/t-12}] + \sum_i w_{it} \, dln(\tfrac{value}{quantity})_{i,t/t-12}$$

where the weight w_{it} is given by :

$$w_{it} = \tfrac{1}{2} \left(\tfrac{value_{i,t}}{\sum_i value_{i,t}} + \tfrac{value_{i,t-12}}{\sum_i value_{i,t-12}} \right)$$

- We use this method to decompose both changes in total exports and changes in exports directed to specific destinations.

Annex : Decomposition of changes into volumes and prices

$\Rightarrow$ nearly all the exports' contraction due to changes in volumes.

	dln(value)	dln(quantity)	dln($\frac{v}{q}$)
All destinations	-0.31	-0.32	0.01
euro area	-0.38	-0.37	0
extra-euro area	-0.22	-0.26	0.04
UK	-0.40	-0.37	-0.03
US	-0.15	-0.28	0.13
Japan	-0.14	-0.31	0.16
China	-0.14	-0.36	0.22

Note : Important caveats to our analysis are the following : Our analysis is based exclusively on the intensive margin as we can only apply the above method to continuous flows. In addition we exclude from the analysis all elementary flows without quantity reported. Hence we exclude all intra-EU trade flows for firms exporting overall less than 460,000 euro per year to the other 26 members of the Union.

Source : French customs data, own calculations