How do different exporters react to exchange rate changes?

Theory, empirics and aggregate implications

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Motivation

Real exchange rate movements are large but seem to have small effects on 1) prices and 2) quantities:

1. Incomplete pass-through of ER movements into import prices
2. Exchange rate changes have little effect on aggregate quantities (exports):
   Typical macro elasticities are around 1 or just above: much lower than elasticities suggested in the trade literature (between 5 and 10).

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What we do: theory

- Imperfect competition + firm heterogeneity + distribution costs $\Longrightarrow$ firms react differently to an exchange rate depreciation:

  ▷ *High performance (productivity) firms choose to increase their producer price (increase mark-up) following a depreciation and not their exported volumes. The reverse for low performance firms* ◁

- Fixed export costs: only high performance firms can export $\Longrightarrow$ exporters are firms which, by selection, are more insensitive (in export volumes) to exchange rate movements than other firms $\Longrightarrow$ low intensive elasticity: the bulk of exports is concentrated on firms (high performers) that optimally set prices such that their sales do not react much to exchange rates

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What we do: theory (cont.)

- New firms enter the export market following a depreciation (could compensate intensive margin effect). However they are smaller and less productive than existing ones $\Longrightarrow$ low extensive elasticity too
- Aggregate implications: with sufficient heterogeneity $\Longrightarrow$ small effect of exchange rate changes on quantities (as in empirical studies)

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Main empirical findings

Firms with performance (labor productivity, TFP, export size, number of destinations...) above the median react to a depreciation of 10%:

- by increasing their producer price by around 2.0% to 3.8%. (others do not change their producer price or markup)
- but do not increase their volumes (others do increase their sales)
- entry probability increases by 1.9% after a 10% depreciation; extensive margin $\approx$ 20% of total increase in exports

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Related literature

Distribution costs and the degree of passthrough:

- Empirics: Campa and Golberg (2007): constitute a share of consumer prices between 40 and 60%; also Burstein, Neves, and Rebelo (2003);
- Theory: Corsetti and Dedola (2007); Burstein, Eichenbaum, and Rebelo (2005); Closest is Atkeson and Burstein (2008): heterogeneity in market power + trade costs generate deviations from PPP

Theory

Simple model: Home firms export to N countries, one sector (manufacturing) with monopolistic competition with standard Dixit-Stiglitz utility:

$$U_i = \left[\int_{X_i} x(\varphi)^{\frac{\sigma-1}{\sigma}} d\varphi \right]^{\frac{\sigma}{\sigma-1}},$$

- X_i: set of varieties consumed in i
- $x(\varphi)$: consumption of variety φ
- φ: productivity of the firm
- $\sigma > 1$

Transaction costs

- iceberg trade cost $\tau_i > 1$ specific to the Home-country i pair.
- fixed cost to export to i: F_i
- Consumer price (in currency i): $p_i^c(\varphi) \equiv \frac{p_i(\varphi)}{\varepsilon_i}\tau_i + \eta_i w_i$

Distribution costs $\eta_i w_i$: any additive cost paid in local currency that does not depend on firm productivity φ

ε_i: nominal exchange rate between Home and i ($\uparrow \varepsilon_i =$ depreciation vis a vis currency i) ; $p_i(\varphi)$: producer price to destination i in *Home* currency; w_i: wage rate in i currency

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Demand and profits

- Demand for a variety:

$$x_i(\varphi) = Y_i P_i \left[p_i^c(\varphi)\right]^{-\sigma} = Y_i P_i \left[\frac{p_i(\varphi)}{\varepsilon_i}\tau_i + \eta_i w_i\right]^{-\sigma}$$

  - Y_i: income
  - P_i: price index in i.

- Profits:

$$\pi_i(\varphi) = [p_i(\varphi) - w/\varphi]x_i(\varphi)\tau_i - F_i(\varphi)$$

Optimal prices

Producer price $p_i(\varphi)$ in Home currency of variety φ sold in country i:

$$p_i(\varphi) = \underbrace{\frac{\sigma}{\sigma - 1}\left(1 + \frac{\eta_i q_i \varphi}{\sigma \tau_i}\right)}_{m_i(\varphi)} \frac{w}{\varphi}$$

- Real exchange rate $q_i \equiv \frac{\varepsilon_i w_i}{w}$
- Mark-up $m_i(\varphi)$ increases with depreciation and with productivity
- Intuition: A depreciation (higher q_i) increases the share of the *consumer* price which does not depend on the *producer* price $\longrightarrow$ reduces the elasticity of demand $\longrightarrow$ all firms increase their markup. High productivity firms have a lower elasticity to start with $\longrightarrow$ increase their markup more than others.

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Optimal prices (cont.)

The impact of a (real) depreciation on the producer price (in domestic currency):

$$\frac{dp_i(\varphi)}{dq_i}\frac{q_i}{p_i(\varphi)} = \frac{\eta_i \varphi q_i}{\sigma\tau_i + \eta_i \varphi q_i} > 0 :$$

Endogenous and heterogenous pricing to market

Testable Prediction 1. *The elasticity of the producer price, $p_i(\varphi)$ to an increase in q_i is positive and*
i) increases with the productivity of the firm φ (and more generally export performance)
ii) increases with local distribution costs η_i
Same result if firms differ by the quality of the good

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Quantities

The impact of a change in bilateral RER on the *volume* of exports:

$$\frac{dx_i(\varphi)}{dq_i}\frac{q_i}{x_i(\varphi)} = \frac{\sigma\tau_i}{\tau_i + \eta_i q_i \varphi} < \sigma$$

Testable Prediction 2. *The elasticity of the firm exports, $x_i(\varphi)$ to a real depreciation (an increase in q_i) is positive and*
i) decreases with the productivity of the firm
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Intuition follows from endogenous pricing to market

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Profits and the extensive margin

Profits for an exporter to i increase with depreciation:
Find threshold productivity of the "zero profit" firm φ_i^* exporting in i:

$$\frac{Y_i}{\sigma}\left(\frac{\sigma}{\sigma-1}\frac{\tau_i}{P_i}\right)^{1-\sigma}\left[\frac{1}{\varphi_i^*}+\frac{\eta_i q_i}{\tau_i}\right]^{1-\sigma}\left(\frac{q_i}{w_i}\right)^{\sigma}=f_i(\varphi^*)^{-\alpha}q_i^{1-\alpha}$$

Only high productivity firms can export: those firms price to market and are less sensitive to RER changes: *Selection effect*

Threshold productivity $\downarrow$ with depreciation: $\frac{d\varphi_i^*}{dq_i}\frac{q_i}{\varphi_i^*}=-1$

Entry of less productive and smaller firms triggered by a depreciation

Aggregate exports

- Pareto distribution for productivity: $G(\varphi) = 1 - \varphi^{-k}$, k inverse measure of productivity heterogeneity.
- Aggregate exports: all individual exports of firms with productivity $> \varphi_i^*$:

$$X_i = \int_{\varphi_i^*}^{\infty} LY_i w_i^{-\sigma} \left(\frac{\sigma}{\sigma - 1} \frac{1}{P_i} \right)^{1-\sigma} \left[\frac{\tau_i}{\varphi q_i} + \eta_i \right]^{-\sigma} dG(\varphi)$$

Aggregate exports

Elasticity of aggregate exports to RER = intensive + extensive elasticities:

$$\frac{\partial X_i}{\partial q_i}\frac{q_i}{X_i} = \underbrace{\frac{q_i}{X_i} L \int_{\varphi_i^*}^{\infty} \frac{\partial x_i(\varphi)}{\partial q_i} dG(\varphi)}_{intensive < \sigma} - \underbrace{\frac{q_i}{X_i} L x_i(\varphi_i^*) G'(\varphi_i^*) \times \frac{\partial \varphi_i^*}{\partial q_i}}_{extensive > k-\sigma} = k$$

Quantitative results

- Can our model explain the low aggregate (intensive + extensive) elasticities of exports to RER?
- $k = 1.5$ (Mayer and Ottaviano 2008)
- $\sigma = 7$ (central estimate from trade lit.)
- Note: no need to have restriction: $k > \sigma$ as in Chaney (2008)
- Simulate model with $\tau_i = 1.2$; φ_i^* such that $P(\varphi < \varphi_i^*) = G(\varphi_i^*) = 0.8$; 20% of firms export
- Share of distribution costs in consumer prices: 0.5

Results from simulation

- We can reproduce both low observed intensive (exports from existing exporters) and extensive margins
- Standard new trade model: elasticity $= \sigma + 0 = \sigma$: too high
- Melitz/Chaney model: elasticity $= \sigma + (k - \sigma) = k$

Table 1: Calibration of aggregate export elasticities to exchange rate

	French data	Benchmark	$k = 1$	$k = 2$	$\sigma = 4$	$s_i = 0.3$
Intensive	0.88	1.16	0.84	1.41	0.80	1.43
Extensive	0.23	0.34	0.16	0.59	0.70	0.07
Total	1.11	1.5	1.0	2.0	1.5	1.5

Empirics

Large database on French firms. 2 sources:

1. French customs for firm-level trade data: export, for each firm, by destination-year, both *in value and volume*;
2. Firm-level information from INSEE: sales, employment, sector...

Merge the two: virtually all individual French exporters still present (90%)
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Export unit values

- Consider a firm j, exporting to i in year t: Producer price is now:

$$p_{jit} = \frac{\sigma}{\sigma - 1}\left(1 + \frac{\eta_{ji} q_{it} \varphi_{jt}}{\sigma \tau_i}\right)\frac{w_t}{\varphi_{jt}}$$

- Variables: 1) η_{ji}/τ_i: firm-destination fixed effects ; 2) w_t: year dummies ; 3) q_{it}: real exchange rate ; 4) φ_{jt}: firm productivity (lagged)

$$\ln(UV_{jit}) = \alpha_0 \ln(\varphi_{jt-1}) + \alpha_1 \ln(RER_{it}) + \psi_t + \mu_{ji} + \varepsilon_{jit},$$

RER_{it}:average RER between France and i during year t. We also allow for delayed effect on producer prices. φ_{jt-1}: Olley-Pakes TFP. Standard errors clustered by destination/year.

- Testable implication 1: α_1 larger for high performance firms.

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Export unit values

TABLE 3 : EXCHANGE RATE AND UNIT VALUES

Dep. Var. : Unit Value	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Performance Indicator		TFP		TFP(t-2)		Labor Productivity		Nb Destinations		Export Volume	
Sub-sample	All	High	Low	High	Low	High	Low	High	Low	High	Low
TFP(t-1)	0,006	-0,02	0.024*					0,002	0,015	0.019*	-0,005
	(0,008)	(0,013)	(0,013)					(0,011)	(0,013)	(0,011)	(0,014)
Labor Productivity(t-1)						-0,003	0,016				
						(0,013)	(0,013)				
TFP(t-2)				0,01	0,023						
				(0,020)	(0,017)						
RER	0.166***	0.212**	0,004	0.333***	0,151	0.185**	0,006	0.210***	-0,066	0.135*	0,143
	(0,056)	(0,088)	(0,083)	(0,102)	(0,096)	(0,090)	(0,080)	(0,064)	(0,127)	(0,071)	(0,096)
Observations	159659	80947	78712	55860	54815	74312	85347	103116	56543	92105	67554
R-squared	0,92	0,93	0,91	0,94	0,92	0,93	0,91	0,91	0,93	0,91	0,89

All variables in logarithms. Robust standard errors in parentheses. Panel, within estimations (firm-destination fixed effects) with year dummies. Sub-samples computed by destination-year, except for columns (8) and (9), computed by year. * significant at 10%; ** significant at 5%; *** significant at 1%

Export volumes

- Export Volumes: $x_{jit} = Y_{it} P_{it}^{\sigma-1} \left[\frac{\tau_i}{\varphi_{jt} q_{it}} + \eta_{ji} \right]^{-\sigma} w_{it}^{-\sigma} \left(\frac{\sigma-1}{\sigma} \right)$
- Variables: Z_{it} = set of destination-year specific variables [Y_{it} (GDP), w_{it}(GDP per capita) and P_{it} (effective RER)]

$$\ln x_{jit} = \beta_0 \ln(\varphi_{jt-1}) + \beta_1 \ln(RER_{it}) + \gamma Z_{it} + \psi_t + \mu_{ji} + \upsilon_{jit},$$

- Firm-destination fixed effects μ_{ji} and year dummies ψ_t.
- Testable implication 2: β_1 lower for high performance firms

Export volumes

TABLE 4 : EXCHANGE RATE AND EXPORT VOLUMES

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Performance Indicator		TFP		TFP(t-2)		Labor Productivity		Nb Destinations		Export Volume	
Sub-sample	All	High	Low	High	Low	High	Low	High	Low	High	Low
TFP(t-1)	0.070***	0.076**	0.044					0,039	0.080***	0.094***	0,033
	(0.020)	(0.031)	(0.033)					(0,030)	(0,028)	(0.028)	(0.030)
Labor Productivity(t-1)						0.067**	0.063*				
						0,032	0,032				
TFP(t-2)				0,01	-0,033						
				0,048	0,047						
RER	0.333**	0.127	0.630***	-0,093	0.450**	0.341*	0.566***	-0,183	0.405***	0.330*	0.531**
	(0,130)	(0,204)	(0.207)	(0,258)	(0.229)	(0,206)	(0,204)	(0,269)	(0,155)	(0,176)	(0,209)
Effective RER	-0.227***	-0,196	-0.279**	-0.276*	-0.329**	-0,023	-0.363***	-0,097	-0.193*	-0.218**	-0,14
	(0.081)	(0,124)	(0.136)	(0,151)	(0.149)	(0,126)	(0,131)	(0,154)	(0.101)	(0.110)	(0,131)
GDP	0.810*	0,768	0.816	0,905	2.585***	1,084	0,548	1.889*	0,308	0,381	2.132***
	(0,442)	(0,666)	(0.748)	(0,918)	(0,910)	(0,666)	(0,722)	(1,042)	(0,531)	(0,589)	(0,748)
GDP per capita	0,145	0,335	0.142	-0,125	-1.956**	0,005	0,391	1.925*	0,814	0,594	-1,204
	0,450	(0,677)	(0.768)	(0,984)	(0,955)	(0,676)	(0,742)	(1,132)	(0,524)	(0,599)	(0,763)
Observations	134958	68434	66524	45985	45154	62968	71990	52413	82545	77851	57107
R-squared	0,86	0,87	0,85	0,88	0,86	0,88	0,85	0,87	0,86	0,84	0,76

All variables in logarithms. Robust standard errors in parentheses. Panel, within estimations (firm-destination fixed effects) with year dummies. Sub-samples computed by destination-year, except for columns (8) and (9), computed by year. * significant at 10%; ** significant at 5%; *** significant at 1%

The role of distribution costs

TABLE 5 : DISTRIBUTION COSTS AND NON LINEAR EFFECT OF EXCHANGE RATE VARIATIONS

	(1)	(2)
Dep. Var.	Unit Value	Export vol.
Sub-sample	All	All
TFP(t-1)	0,004	0.121***
	(0,013)	(0,033)
RER	-0,307	0.847*
	(0,211)	(0,472)
RER*Distribution	1.910**	-3.726**
	(0,748)	(1,625)
…		
Observations	46222	39941
R-squared	0,91	0,87

Theory predicts that:

Firms that export in high distribution costs countries and sectors react to a depreciation by:

- increasing more their producer price (in euro), more pricing to market

- increasing less their export quantities

We use Campa and Golderg (2008) data on 10 (non euro) OECD countries and 28 sectors

On this reduced sample test:

Interaction term: RER * distribution costs is

- positive on unit values
- negative on export volumes

Robust standard errors in parentheses. Panel, within estimations (firm-destination fixed effects) with year dummies. Destination-specific controls not reported. Subsamples computed by destination. * significant at 10%; ** significant at 5%; *** significant at 1%

Robustness: product level and extreme deciles

TABLE 11 : ROBUSTNESS: PRODUCT LEVEL AND DECILE DECOMPOSITION

	(1)		(2)	(3)		(4)	(5)	(6)	(7)	(8)
	PRODUCT LEVEL						DECILE DECOMPOSITION			
Dependent Variable	Unit Value			Export Volume			Unit Value		Export Volume	
Performance Indicator: TFP Sub-sample	All	High	Low	All	High	Low	10% High	10% Low	10% High	10% Low
TFP(t-1)	0.016*** (0,004)	0.024*** (0,004)	0.008** 0,004	0.062*** (0,009)	0.038*** (0,011)	0.132*** (0,011)	0,009 (0,015)	0,012 (0,018)	-0,009 (0,037)	-0,016 (0,043)
RER	0.157*** (0,025)	0.205*** (0,026)	0.110*** 0,027	0.272*** (0,059)	0.312*** (0,067)	0.489*** (0,069)	0.227* (0,125)	-0,227 (0,183)	0,121 (0,304)	0.893** (0,442)
…										
Observations	1046447	525545	520902	891184	447378	443806	23779	15073	19851	13239
R-squared	0,78	0,94	0,92	0,58	0,88	0,85	0,95	0,92	0,9	0,86

All variables in logarithms. Robust standard errors in parentheses. Panel, within estimations (firm-destination fixed effects) with year dummies. Destination specific controls not reported. Sub-samples computed by destination-year. * significant at 10%; ** significant at 5%; *** significant at 1%

Alternative stories

- imported inputs whose price increase with depreciation: control for each firm's imports from same country
- decreasing returns $\longrightarrow$ higher MCs with higher sales after depreciation: control for total sales of the firm
- high market power firms price to market: control for share of firm's exports in the country/sector
- competition intensity: when we split between high and low productivity firms, we may be splitting between high and low competition sectors: split firms according to the median level of productivity *inside each sector*

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Alternatives (1)

TABLE 12 : ROBUSTNESS: ALTERNATIVES (1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ALTERNATIVE	IMPORTED INPUTS				DECREASING RETURNS			
Dependent Variable	Unit Value		Export Volume		Unit Value		Export Volume	
Performance Indicator: TFP Sub-sample	High	Low	High	Low	High	Low	High	Low
TFP(t-1)	-0,019 (0,012)	0.024* (0,013)	0.067* (0,030)	0,05 (0,034)	-0.027** (0,013)	0.024* (0,013)	0,034 (0,031)	0,027 (0,033)
RER	0.225** (0,088)	0,004 (0,083)	0,107 (0,204)	0.631*** (0,208)	0.211** (0,088)	0,004 (0,083)	0,12 (0,204)	0.628*** (0,207)
Imports / Total Sales	-0,016 (0,054)	0,058 (0,044)	0,038 (0,105)	-0,093 (0,102)				
Total Sales					0.054*** (0,018)	-0,002 (0,011)	0.334*** (0,040)	0.230*** (0,029)
Observations	80400	78032	68017	66018	80947	78712	68434	66524
R-squared	0,92	0,91	0,87	0,85	0,93	0,91	0,87	0,85

All variables but Imports/Total Sales in logarithms. Robust standard errors in parentheses. Panel, within estimations (firm-destination fixed with year dummies. Sub-samples computed by destination-year. * significant at 10%; ** significant at 5%; *** significant at 1%

Alternatives (2)

TABLE 13 : ROBUSTNESS: ALTERNATIVES (2)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ALTERNATIVE	MARKET POWER				COMPETITION INTENSITY			
Dependent Variable	Unit Value		Export Volume		Unit Value		Export Volume	
Performance Indicator: TFP Sub-sample	High	Low	High	Low	High	Low	High	Low
TFP(t-1)	-0,02 (0,013)	0.024* (0,013)	0.066** (0,030)	0,044 (0,033)	-0,011 (0,013)	0,02 (0,013)	0.078** (0,032)	0,036 (0,033)
RER	0.215** (0,088)	0,004 (0,083)	0,328 (0,201)	0.651*** (0,205)	0.192** (0,092)	0,047 (0,085)	0,207 (0,210)	0.634*** (0,213)
Share of French Exports	0,248 (0,288)	-0,081 (0,414)	21.100*** (2,407)	27.365*** (6,303)				
Observations	81568	78091	68970	65988	80947	78712	68434	66524
R-squared	0,93	0,91	0,88	0,85	0,93	0,91	0,87	0,85

All variables but "Share of french exports" in logarithms. Robust standard errors in parentheses. Panel, within estimations (firm-destination with year dummies. Sub-samples computed sector-destination-year for columns (5) to (8) * significant at 10%; ** 5%; *** 1%

Exporting decisions and new exporters

- Depreciation should increase probability of exporting: entry + not exiting
- Exporters entering due to exchange rate depreciation should be smaller

Exporting decisions and new exporters

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Exchange rates and the export decision

TABLE 6 : EXCHANGE RATE AND EXPORTING DECISIONS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. Var.	P(X>0)	P(X>0)	P(X>0)	P(X>0)	P(X>0)	P(X>0)	P(X>0)	P(X>0)	P(X>0)
Condition	All	X(T-1)=0	X(T-1)=1	All	X(T-1)=0	X(T-1)=1	All	X(T-1)=0	X(T-1)=1
Labor Productivity(t-1)	0.228***	0.076***	0.324***	0.053***	0.012***	0.062***	0.183***	0.132***	0.266***
	(0.002)	(0.003)	(0.004)	(0.001)	(0.003)	(0.001)	(0,005)	(0,007)	(0,011)
RER	0.898***	1.258***	1.154***	0.199***	0.180***	0.244***	1.582***	1.186***	2.009***
	(0.033)	(0.052)	(0.060)	(0.007)	(0.007)	(0.011)	(0,045)	(0,061)	(0,094)
GDP	-0.489***	-0.073	1.224***	-0.123***	-0.015	0.240***	-1.146***	-0.960***	1.501***
	(0.113)	(0.178)	(0.197)	(0.026)	(0.026)	(0.040)	(0,157)	(0,215)	(0,403)
GDP per capita	1.648***	1.234***	-0.450**	0.382***	0.188***	0.070*	3.072***	2.878***	0,33
	(0.112)	(0.175)	(0.194)	(0.025)	(0.026)	(0.040)	(0,154)	(0,211)	(0,401)
Effective RER	0.012	-0.110***	0.045	0.004	0.016	0.029	-0,021	0.097**	0.465***
	(0.021)	(0.034)	(0.178)	(0.005)	(0.030)	(0.035)	(0,029)	(0,039)	(0,064)
Marginal effects (1)									
Labor productivity(t-1)	0.054***	0.012***	0.065***				0.036***	0.021***	0.064***
RER	0.214***	0.193***	0.231***				0.331***	0.266***	0.509***
Observations	2430544	1482033	948511	2430544	1482033	948511	1418476	825367	322999
Estimation		Probit			OLS			FE Logit	

Robust standard errors in parentheses.All estimations include destination fixed effects and year dummies. (1) Marginal effects computed at means. Linear estimations for FE Logit estimations.* significant at 10%; ** significant at 5%; *** significant at 1%

Aggregate results

- High performance exporters do not react significantly to RER changes
- Aggregate exports should be weakly responsive to RER if exports are concentrated on high performers (high heterogeneity).
- Aggregate export volumes by sector (36) / destination and estimate reaction to RER:

$$\ln X_{sit} = \gamma_1 \ln RER_{it} + \gamma_2 \ln RER_{it-1} + \gamma_3 Z_{it} + \psi_t + \mu_{si} + \varepsilon_{sit}$$

- Z_i is a vector of country-specific controls (GDP, GDP per capita and effective RER) + sector destination fixed effects and year fixed effects
- We split the sample according to pareto parameter, and market share of 10% largest exporters.

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Aggregate results (1)

TABLE 7 : EXCHANGE RATE AND EXPORT VOLUMES, AGGREGATED

Dep. Var. : Sectoral Export Volume Sectoral Indicator	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		K (Pareto parameter)		share 10% bigger exporters		share 10% most productive	
Sub-sample	Whole Sample	High	Low	High	Low	High	Low
RER	0.903***	0.753***	1.133**	0.501**	1.319***	0,044	1.115***
	(0,218)	(0,183)	(0,446)	(0,215)	(0,309)	(0,535)	(0,240)
RER(t-1)	0,206	0.490**	-0,24	0,349	-0,037	0,005	0.523**
	(0,215)	(0,211)	(0,388)	(0,261)	(0,293)	(0,355)	(0,233)
GDP	1.469***	1.505***	1.345**	1.189***	1.187***	1.622***	1.353***
	(0,329)	(0,325)	(0,630)	(0,383)	(0,452)	(0,558)	(0,462)
…							
Total effect of RER	1.111***	1.244***	0.895*	0.850***	1.282***	0,050	1.640***
	(0,290)	(0,287)	(0,537)	(0,292)	(0,390)	(0,541)	(0,376)
Observations	8041	4789	3550	4152	3889	3670	4371
R-squared	0,96	0,97	0,96	0,96	0,97	0,96	0,97

Robust standard errors in parentheses.All estimations include sector-destination fixed effects and year dummies.
* significant at 10%; ** significant at 5%; *** significant at 1%

Aggregate results (2)

TABLE 8 : EXCHANGE RATE AND EXPORT VOLUME OF EXISTING EXPORTERS, AGGREGATED

Dep. Var. : Sectoral Volume of export, existing exporters Sectoral Indicator	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		K (Pareto Shape)		share 10% bigger		share 10% more productive	
Sub-sample	Whole Sample	High	Low	High	Low	High	Low
RER	0.678***	0.600***	0,808	0,247	1.130***	0,205	0.711**
	(0,247)	(0,193)	(0,525)	(0,254)	(0,328)	(0,544)	(0,286)
RER(t-1)	0,202	0,254	0,126	0,326	-0,168	-0,348	0.544**
	(0,228)	(0,216)	(0,439)	(0,267)	(0,278)	(0,341)	(0,254)
GDP	1.691***	1.590***	1.789**	1.325***	1.691***	2.078***	1.249***
	(0,377)	(0,314)	(0,784)	(0,451)	(0,576)	(0,712)	(0,481)
…							
Total effect of RER	0.880***	0.853***	0,934	0.573*	0.962***	-0,143	1.255***
	0,325	(0,305)	(0,629)	(0,311)	(0,443)	(0,576)	(0,391)
Observations	8040	4789	3549	4151	3889	3670	4370
R-squared	0,96	0,97	0,96	0,96	0,96	0,95	0,97

Robust standard errors in parentheses.All estimations include sector-destination fixed effects and year dummies.
* significant at 10%; ** significant at 5%; *** significant at 1%

Aggregate results (3)

TABLE 9: EXCHANGE RATE, NUMBER OF EXPORTERS AND MEAN VOLUME OF SHIPMENT

	(1)	(2)	(3)
Dep. Var	Total export volume	Number of Exporters	Mean Vol. of Shipment
RER	0.903***	0.544***	0.359*
	(0,218)	(0,057)	(0,213)
RER(t-1)	0,206	0.147***	0,059
	(0,215)	(0,043)	(0,204)
GDP	1.469***	0.738***	0.731**
	(0,329)	(0,068)	(0,322)
…			
Total effect of RER	1.111***	0.691***	0,420
	(0,290)	(0,059)	(0,285)
Observations	8041	8041	8041
R-squared	0,96	0,99	0,93

Robust standard errors in parentheses.All estimations include sector-destination fixed effects and year dummies.
* significant at 10%; ** significant at 5%; *** significant at 1%

Conclusion

We offer in this paper:

- A rich description of how firms react to RER changes
- where high performance exporters are firms that absorb RER changes in their price: their volumes are less sensitive to RER changes.
- With sufficient heterogeneity, implications for aggregate impact of exchange rate change are that:
  - a large portion of exports is due to "insensitive" firms: weakens intensive margin
  - firms that enter are small: weakens extensive margin

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The role of distribution costs 2

TABLE 15: CORRELATION BETWEEN PRODUCTIVITY AND DISTRIBUTION COSTS

	a	b	c	d	e	f
Dep. Var	Distribution margin					
Mean TFP	0.066***	0.066***	0.057***			
	(0,015)	(0,015)	(0,021)			
Median Labor Productivity				0.039***		
				(0,015)		
Mean Labor Productivity					0.046**	
					(0,019)	
Median TFP						0.058***
						(0,021)
Observations	1599	1599	1599	1906	1906	1599
Year dummies	No	Yes	Yes	Yes	Yes	Yes
Country, Sector dummies	No	No	Yes	Yes	Yes	Yes
R-squared	0,03	0,03	0,51	0,47	0,48	0,51

OLS estimation, robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. All variables are destination*sector*year specific. Distribution margins come from Campa and Goldberg (2008). Productivity and TFP computed from BRN data.

Exchange rate non-linearities

TABLE 5 : DISTRIBUTION COSTS AND NON LINEAR EFFECT OF EXCHANGE RATE VARIATIONS

Theory predicts that:

High exchange rate (depreciated level) is like high productivity

Split sample at median for each destination:

for high RER observations:

- high elasticity of export price to RER

- low elasticity of export quantity to RER

	(3)	(4)	(5)	(6)
Dep. Var.	Unit Value		Export volume	
Sub-sample	High RER	Low RER	High RER	Low RER
TFP(t-1)	0,009	0,018	0.076***	0.103**
	(0,012)	(0,015)	(0,029)	(0,042)
RER	0.326**	0,035	-0,333	0.882**
	(0,128)	(0,125)	(0,284)	(0,351)
RER*Distribution				
…				
Observations	98654	81035	87397	65319
R-squared	0,92	0,92	0,87	0,87

Robust standard errors in parentheses. Panel, within estimations (firm-destination fixed effects) with year dummies. Destination-specific controls not reported. Subsamples computed by destination. * significant at 10%; ** significant at 5%; *** significant at 1%