

Exchange Rate Volatility, Financial Constraints and  
Trade: Empirical Evidence from Chinese Firms  
Online appendix

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Table S.1: Export Performance and Alternative Definitions of ER Volatility: Intensive Margin

Dependent variable	Log export value (firm-destination-year)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Volatility indicator	$\text{NER} \times p_{jt}/p_{China,t}$		NER		Level RER		HP-filtered RER	
Financial indicator	Ext dep		Ext dep		Ext dep		Ext dep	
Volatility ( $\alpha$ )	-0.321 <sup>a</sup> (0.098)	0.464 (0.296)	-0.332 <sup>a</sup> (0.098)	0.378 (0.244)	-0.191 <sup>a</sup> (0.054)	0.107 (0.103)	-0.210 <sup>a</sup> (0.074)	-0.001 (0.142)
Ln country GDP	0.061 (0.068)	0.061 (0.068)	0.060 (0.068)	0.060 (0.068)	0.062 (0.069)	0.062 (0.069)	0.131 <sup>b</sup> (0.056)	0.063 (0.070)
Ln country price index	0.049 <sup>a</sup> (0.014)	0.050 <sup>a</sup> (0.014)	0.049 <sup>a</sup> (0.014)	0.050 <sup>a</sup> (0.014)	0.048 <sup>a</sup> (0.014)	0.048 <sup>a</sup> (0.014)	0.049 <sup>a</sup> (0.014)	0.049 <sup>a</sup> (0.014)
Ln country-sector imports	0.357 <sup>a</sup> (0.014)	0.356 <sup>a</sup> (0.014)	0.357 <sup>a</sup> (0.014)	0.356 <sup>a</sup> (0.014)	0.357 <sup>a</sup> (0.014)	0.356 <sup>a</sup> (0.014)	0.348 <sup>a</sup> (0.014)	0.357 <sup>a</sup> (0.014)
Volatility $\times$ Fin. Vulnerability ( $\beta$ )		-2.111 <sup>a</sup> (0.647)		-1.905 <sup>a</sup> (0.492)		-0.806 <sup>a</sup> (0.207)		-0.553 <sup>b</sup> (0.203)
Fixed effects	Firm-country and year							
R-squared	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03
Observations	3,731,351							
Number of firm-country pairs	1,128,873							

Notes: Export performance is defined as the firm-country-level. NER: Nominal Exchange Rate.  $p_{jt}$ : partners consumer price level.  $p_{China,t}$ : Chinese consumer price level. RER: Real Exchange Rate defined as the nominal exchange rate of the Yuan with respect to the partner's currency multiplied by the partner's consumer price level. Level RER: volatility is computed as the yearly standard deviations of the log level of RER. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level; <sup>a</sup>, <sup>b</sup> and <sup>c</sup> respectively denote significance at the 1%, 5% and 10% levels.

Table S.2: Firm-Country Export Performance and RER Volatility: Alternative Indicator of Intensive Margin

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log average export value (firm-dest.-year)=total exp. value / Nb of exp. prod.							
Financial indicator		Ext dep	Intang.	R&D int		External dependence		
RER volatility ( $\alpha$ )	-0.198 <sup>a</sup> (0.065)	0.304 <sup>c</sup> (0.155)	0.095 (0.109)	0.167 (0.104)	0.503 <sup>a</sup> (0.144)	0.504 <sup>a</sup> (0.149)	0.237 (0.169)	0.220 (0.147)
Ln country GDP	-0.025 (0.052)	-0.025 (0.052)	-0.025 (0.052)	-0.025 (0.052)	-0.026 (0.052)	-0.026 (0.052)	-0.026 (0.052)	-0.025 (0.052)
Ln country price index	0.023 <sup>c</sup> (0.012)	0.023 <sup>c</sup> (0.012)	0.023 <sup>c</sup> (0.012)	0.023 <sup>c</sup> (0.012)	0.023 <sup>c</sup> (0.012)	0.023 <sup>c</sup> (0.012)	0.023 <sup>c</sup> (0.012)	0.023 <sup>c</sup> (0.012)
Ln country-sector imports	0.290 <sup>a</sup> (0.019)	0.289 <sup>a</sup> (0.018)	0.290 <sup>a</sup> (0.019)	0.289 <sup>a</sup> (0.018)	0.289 <sup>a</sup> (0.018)	0.289 <sup>a</sup> (0.018)	0.289 <sup>a</sup> (0.018)	0.287 <sup>a</sup> (0.018)
RER Volatility $\times$ Fin. vulnerability ( $\beta$ )		-1.349 <sup>a</sup> (0.346)	-3.890 <sup>a</sup> (1.094)	-14.796 <sup>a</sup> (3.571)	-2.181 <sup>a</sup> (0.274)	-2.196 <sup>a</sup> (0.278)	-1.215 <sup>b</sup> (0.472)	-1.137 <sup>a</sup> (0.341)
RER Volatility $\times$ Financial vulnerability $\times$ High Fin. Devt (above median)					2.003 <sup>a</sup> (0.702)			
RER Volatility $\times$ Financial vulnerability $\times$ High Fin. Devt (above mean)					-0.484 (0.430)	2.020 <sup>a</sup> (0.698)		
RER Volatility $\times$ High Fin. Devt (above median)						-0.480 (0.434)		
RER Volatility $\times$ High Fin. Devt (above mean)							6.061 <sup>a</sup> (1.695)	2.743 <sup>a</sup> (0.827)
RER Volatility $\times$ Financial vulnerability $\times$ Fin. Devt ( $\delta$ )							-1.780 <sup>a</sup> (0.639)	-0.543 <sup>c</sup> (0.311)
RER Volatility $\times$ Fin. Devt ( $\gamma$ )								0.216 <sup>c</sup> (0.125)
Financial vulnerability $\times$ Fin. Devt							-0.004 (0.023)	-0.088 <sup>b</sup> (0.035)
Financial Development								
Fixed effects					Firm-country and year			
R-squared	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Observations					3,731,351			
Number of firm-country pairs					1,128,873			

Notes:Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level; <sup>a</sup>, <sup>b</sup> and <sup>c</sup> respectively denote significance at the 1%, 5% and 10% levels.

Table S.3: Export Performance and Alternative Definitions of ER Volatility: Extensive Margin

Dependent variable	$Pr(X_{i,j,t}^F > 0 \mid X_{i,j,t-1}^F = 0)$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Volatility indicator	$NER \times p_{jt}/p_{China,t}$		NER		Level RER		HP-filtered RER	
Financial indicator	Ext dep		Ext dep		Ext dep		Ext dep	
Volatility ( $\alpha$ )	-0.801 <sup>a</sup> (0.071)	0.232 (0.330)	-0.754 <sup>a</sup> (0.070)	0.078 (0.226)	-0.393 <sup>a</sup> (0.055)	.174 (0.228)	-0.179 <sup>b</sup> (0.078)	0.298 (0.229)
Ln country GDP	-0.219 <sup>a</sup> (0.057)	-0.218 <sup>a</sup> (0.057)	-0.220 <sup>a</sup> (0.057)	-0.219 <sup>a</sup> (0.057)	-0.212 <sup>a</sup> (0.056)	-0.212 <sup>a</sup> (0.056)	-0.206 <sup>a</sup> (0.056)	-0.207 <sup>a</sup> (0.056)
Ln country price index	0.124 <sup>a</sup> (0.021)	0.124 <sup>a</sup> (0.021)	0.125 <sup>a</sup> (0.021)	0.124 <sup>a</sup> (0.021)	0.120 <sup>a</sup> (0.021)	0.119 <sup>a</sup> (0.021)	0.122 <sup>a</sup> (0.021)	0.122 <sup>a</sup> (0.021)
Ln country-sector imports	0.379 <sup>a</sup> (0.033)	0.378 <sup>a</sup> (0.033)	0.379 <sup>a</sup> (0.033)	0.378 <sup>a</sup> (0.033)	0.380 <sup>a</sup> (0.033)	0.379 <sup>a</sup> (0.032)	0.381 <sup>a</sup> (0.032)	0.381 <sup>a</sup> (0.032)
Volatility $\times$ Fin. Vulnerability ( $\beta$ )		-2.804 <sup>a</sup> (0.783)		-2.243 <sup>a</sup> (0.450)		-1.524 <sup>b</sup> (0.654)		-1.323 <sup>c</sup> (0.676)
Fixed effects	Firm-country and year							
Pseudo R-squared	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03
Observations	8,801,335							
Number of firm-country pairs	1,867,840							

Notes: Export performance is defined as the firm-country-level. NER: Nominal Exchange Rate.  $p_{jt}$ : partners consumer price level.  $p_{China,t}$ : Chinese consumer price level. RER: Real Exchange Rate defined as the nominal exchange rate of the Yuan with respect to the partner's currency multiplied by the partner's consumer price level. Level RER: volatility is computed as the yearly standard deviations of the log level of RER. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level; <sup>a</sup>, <sup>b</sup> and <sup>c</sup> respectively denote significance at the 1%, 5% and 10% levels.

Table S.4: Firm-Country Export Performance and RER Volatility: Alternative Indicator of Extensive Margin (I)

Dependent variable	$Pr(X_{i,t}^F > 0)$							
Financial indicator	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Ext dep		Intang.	R&D int	External dependence			
RER volatility ( $\alpha$ )	-0.638 <sup>a</sup> (0.115)	0.517 (0.318)	0.154 (0.201)	-0.156 (0.250)	-0.347 (0.620)	-0.496 (0.736)	0.389 (0.312)	0.215 (0.308)
Ln country GDP	0.249 <sup>a</sup> (0.056)	0.249 <sup>a</sup> (0.056)	0.248 <sup>a</sup> (0.056)	0.249 <sup>a</sup> (0.056)	0.236 <sup>a</sup> (0.053)	0.233 <sup>a</sup> (0.053)	0.237 <sup>a</sup> (0.051)	0.241 <sup>a</sup> (0.051)
Ln country price index	0.045 <sup>a</sup> (0.017)	0.045 <sup>a</sup> (0.017)	0.046 <sup>a</sup> (0.017)	0.045 <sup>a</sup> (0.017)	0.044 <sup>a</sup> (0.016)	0.044 <sup>a</sup> (0.016)	0.045 <sup>a</sup> (0.017)	0.045 <sup>a</sup> (0.017)
Ln country-sector imports	0.345 <sup>a</sup> (0.024)	0.345 <sup>a</sup> (0.024)	0.345 <sup>a</sup> (0.024)	0.345 <sup>a</sup> (0.024)	0.347 <sup>a</sup> (0.024)	0.347 <sup>a</sup> (0.024)	0.347 <sup>a</sup> (0.023)	0.343 <sup>a</sup> (0.023)
RER Volatility $\times$ Fin. vulnerability ( $\beta$ )		-3.169 <sup>a</sup> (0.624)	-10.343 <sup>a</sup> (1.700)	-20.378 <sup>a</sup> (6.387)	-7.172 <sup>a</sup> (1.692)	-7.683 <sup>a</sup> (1.670)	-3.019 <sup>a</sup> (1.044)	-2.330 <sup>a</sup> (0.481)
RER Volatility $\times$ Financial vulnerability $\times$ High Fin. Devt (above median)						7.092 <sup>a</sup> (2.462)		
RER Volatility $\times$ Financial vulnerability $\times$ High Fin. Devt (above mean)							2.357 (1.535)	
RER Volatility $\times$ High Fin. Devt (above median)					2.307 (1.530)			
RER Volatility $\times$ High Fin. Devt (above mean)							11.958 <sup>a</sup> (4.575)	1.124 (1.859)
RER Volatility $\times$ Financial vulnerability $\times$ Fin. Devt ( $\delta$ )							-2.324 (1.418)	1.576 <sup>c</sup> (0.831)
RER Volatility $\times$ Fin. Devt ( $\gamma$ )								0.856 <sup>c</sup> (0.474)
Financial vulnerability $\times$ Fin. Devt							0.581 (0.367)	0.253 (0.321)
Financial Development								
Fixed effects					Firm-country and year			
Pseudo R-squared	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Observations					15,070,749			
Number of firm-country pairs					2,179,037			

Notes: Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level; <sup>a</sup>, <sup>b</sup> and <sup>c</sup> respectively denote significance at the 1%, 5% and 10% levels.

Table S.5: Firm-Country Export Performance and RER Volatility: Alternative Indicator of Extensive Margin (II)

Dependent variable	Log Nb of products exported (firm-destination-year)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial indicator		Ext dep	Intang.	R&D int		Ext dep		
RER volatility ( $\alpha$ )	-0.106 <sup>c</sup> (0.061)	0.098 (0.108)	0.029 (0.086)	-0.013 (0.095)	-0.048 (0.240)	-0.037 (0.249)	0.075 (0.100)	0.071 (0.103)
Ln country GDP	0.086 <sup>a</sup> (0.021)	0.086 <sup>a</sup> (0.021)	0.086 <sup>a</sup> (0.021)	0.086 <sup>a</sup> (0.021)	0.085 <sup>a</sup> (0.021)	0.085 <sup>a</sup> (0.021)	0.083 <sup>a</sup> (0.020)	0.084 <sup>a</sup> (0.020)
Ln country price index	0.026 <sup>a</sup> (0.004)	0.026 <sup>a</sup> (0.004)	0.026 <sup>a</sup> (0.004)	0.026 <sup>a</sup> (0.004)	0.026 <sup>a</sup> (0.004)	0.026 <sup>a</sup> (0.004)	0.026 <sup>a</sup> (0.004)	0.026 <sup>a</sup> (0.004)
Ln country-sector imports	0.067 <sup>a</sup> (0.012)	0.067 <sup>a</sup> (0.012)	0.067 <sup>a</sup> (0.012)	0.067 <sup>a</sup> (0.012)	0.067 <sup>a</sup> (0.012)	0.067 <sup>a</sup> (0.012)	0.067 <sup>a</sup> (0.012)	0.067 <sup>a</sup> (0.012)
RER Volatility $\times$ Fin. vulnerability ( $\beta$ )		-0.551 <sup>a</sup> (0.162)	-1.795 <sup>a</sup> (0.611)	-3.778 <sup>b</sup> (1.754)	-0.642 <sup>a</sup> (0.219)	-0.679 <sup>a</sup> (0.244)	-0.503 <sup>a</sup> (0.164)	-0.486 <sup>a</sup> (0.153)
RER Volatility $\times$ Financial vulnerability $\times$ High Fin. Devt (above median)					0.059 (0.267)			
RER Volatility $\times$ Financial vulnerability $\times$ High Fin. Devt (above mean)					0.469 (0.560)	0.157 (0.282)		
RER Volatility $\times$ Fin. Devt ( $\gamma$ )						0.432 (0.557)	1.008 (0.651)	0.291 (0.520)
Financial vulnerability $\times$ Fin. Devt							-0.390 (0.269)	-0.123 (0.256)
Financial Development							0.090 <sup>c</sup> (0.045)	0.072 (0.050)
Fixed effects								
R-squared	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Observations								
Number of firm-country pairs								

Notes: Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level; <sup>a</sup>, <sup>b</sup> and <sup>c</sup> respectively denote significance at the 1%, 5% and 10% levels.

Table S.6: Firm-Sector-Country Export Performance and RER Volatility: Intensive Margin

Dependent variable	Log export value (firm-sector-destination-year)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial indicator		Ext dep	Intang.	R&D int		Ext dep		
RER volatility ( $\alpha$ )	-0.246 <sup>b</sup> (0.100)	0.433 <sup>c</sup> (0.213)	0.029 (0.174)	0.207 (0.177)	0.484 <sup>b</sup> (0.224)	0.521 <sup>b</sup> (0.244)	0.321 (0.205)	0.335 (0.204)
Ln country GDP	0.098 (0.070)	0.097 (0.070)	0.098 (0.070)	0.098 (0.070)	0.094 (0.069)	0.095 (0.070)	0.096 (0.069)	0.089 (0.068)
Ln country price index	0.041 <sup>a</sup> (0.011)	0.041 <sup>a</sup> (0.011)	0.041 <sup>a</sup> (0.011)	0.041 <sup>a</sup> (0.011)	0.040 <sup>a</sup> (0.011)	0.041 <sup>a</sup> (0.011)	0.041 <sup>a</sup> (0.011)	0.038 <sup>a</sup> (0.013)
Ln country-sector imports	0.316 <sup>a</sup> (0.013)	0.315 <sup>a</sup> (0.013)	0.316 <sup>a</sup> (0.013)	0.315 <sup>a</sup> (0.013)	0.315 <sup>a</sup> (0.013)	0.315 <sup>a</sup> (0.013)	0.312 <sup>a</sup> (0.013)	0.312 <sup>a</sup> (0.013)
RER Volatility $\times$ Fin. vulnerability ( $\beta$ )		-1.828 <sup>a</sup> (0.464)	-3.470 <sup>c</sup> (1.719)	-18.719 <sup>a</sup> (5.282)	-2.351 <sup>a</sup> (0.474)	-2.773 <sup>a</sup> (0.445)	-1.565 <sup>a</sup> (0.415)	-1.594 <sup>a</sup> (0.419)
RER Volatility $\times$ Financial vulnerability $\times$ High Fin. Devt (above median)					2.905 <sup>a</sup> (0.823)			
RER Volatility $\times$ Financial vulnerability $\times$ High Fin. Devt (above mean)					-0.465 (0.399)	2.062 <sup>b</sup> (0.782)		
RER Volatility $\times$ High Fin. Devt (above median)							-0.111 (0.246)	
RER Volatility $\times$ High Fin. Devt (above mean)								2.607 <sup>b</sup> (1.080)
RER Volatility $\times$ Fin. vulnerability $\times$ Fin. Devt ( $\delta$ )								2.569 <sup>b</sup> (1.049)
RER Volatility $\times$ Fin. Devt ( $\gamma$ )								-0.614 (0.484)
Financial vulnerability $\times$ Fin. Devt								0.316 <sup>c</sup> (0.177)
Financial Development								-0.074 (0.061)
Fixed effects					Firm-sector-country and year			
Province-year fixed-effects	no	no	no	no	no	no	no	yes
R-squared	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Observations								
Number of firm-country-sector triads					8,701,658			
					4,774,027			

Notes: Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level; <sup>a</sup>, <sup>b</sup> and <sup>c</sup> respectively denote significance at the 1%, 5% and 10% levels.



Table S.8: Firm-Sector-Country Performance, RER Volatility and sectoral indicators of financial vulnerability

Dependent variable	Log export value (firm-sector-dest.-year)				Log Nb of prod. exported (firm-sector-dest.-year)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Financial indicator		Ext dep	Intang.	R&D int	Ext dep		Ext dep	Intang.	R&D int	Ext dep
RER volatility ( $\alpha$ )	-0.246 <sup>b</sup> (0.100)	0.131 (0.149)	-0.135 (0.148)	-0.180 (0.129)	0.118 (0.147)	-0.031 (0.035)	0.134 <sup>a</sup> (0.038)	-0.039 (0.053)	0.018 (0.046)	0.014 (0.046)
Ln country GDP	0.098 (0.070)	0.092 (0.070)	0.092 (0.074)	0.092 (0.074)	0.089 (0.070)	0.048 <sup>b</sup> (0.021)	0.046 <sup>b</sup> (0.022)	0.045 <sup>b</sup> (0.022)	0.046 <sup>b</sup> (0.022)	0.044 <sup>c</sup> (0.022)
Ln country price index	0.041 <sup>a</sup> (0.011)	0.042 <sup>a</sup> (0.012)	0.043 <sup>a</sup> (0.012)	0.043 <sup>a</sup> (0.012)	0.042 <sup>a</sup> (0.012)	0.029 <sup>a</sup> (0.005)	0.030 <sup>a</sup> (0.005)	0.031 <sup>a</sup> (0.005)	0.031 <sup>a</sup> (0.005)	0.030 <sup>a</sup> (0.005)
Ln country-sector imports	0.316 <sup>a</sup> (0.013)	0.313 <sup>a</sup> (0.012)	0.313 <sup>a</sup> (0.014)	0.312 <sup>a</sup> (0.014)	0.313 <sup>a</sup> (0.012)	0.056 <sup>a</sup> (0.009)	0.054 <sup>a</sup> (0.010)	0.057 <sup>a</sup> (0.009)	0.057 <sup>a</sup> (0.009)	0.057 <sup>a</sup> (0.009)
RER Volatility $\times$ Fin. vulnerability ( $\beta$ )		-0.890 <sup>a</sup> (0.225)	-1.878 (1.321)	-4.702 (3.023)	-0.875 <sup>a</sup> (0.223)		-0.396 <sup>a</sup> (0.044)	-0.133 (0.470)	-2.441 <sup>a</sup> (0.768)	-2.383 <sup>a</sup> (0.719)
RER Volatility $\times$ Financial vulnerability $\times$ Fin. Devt ( $\delta$ )					0.937 <sup>c</sup> (0.489)					0.119 (0.194)
RER Volatility $\times$ Fin. Devt ( $\gamma$ )					0.049 (0.261)					-0.030 (0.139)
Fin. Vulnerability $\times$ Fin. Devt					0.032 (0.039)					-0.001 (0.012)
Financial development					0.032 (0.042)					0.058 (0.035)
Fixed effects						Firm-sector-country and year				
R-squared	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Observations						8,701,658				
Number of firm-country-sector triads						4,774,027				

Notes: Measures of financial vulnerability are sector characteristics. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province level; <sup>a</sup>, <sup>b</sup> and <sup>c</sup> respectively denote significance at the 1%, 5% and 10% levels.