

# Dominant Currencies

## How firms choose currency invoicing and why it matters

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# The Dollar Hegemon

summary piece by Gourinchas (2019)

- 1 Global trade is invoiced in dollars — **Dominant Currency Paradigm (DCP)** (Gopinath et al. 2019)
- 2 Cross-border financial flows, security issuances are in dollars (e.g. Maggiori, Neiman and Schreger 2020)
- 3 Monetary authorities anchor to the dollar (e.g. Ilzetzki, Reinhart and Rogoff 2019)
- 4 International reserves are held in dollars (safe assets)
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  - 3 Monetary authorities anchor to the dollar (e.g. Ilzetki, Reinhart and Rogoff 2019)
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    - with likely strong complementarities
- This paper: analysis of the DCP (foreign-currency invoicing) mechanism at the very micro (firm-product-destination) level

## This Paper: Currency Use in Trade

- Currency use in international trade is central for
  - ① international transmission of shocks
  - ② optimal monetary and exchange rate policy
- Evidence in favor of endogenous currency choice
  - active firm-level decision (in the cross section)
  - slow changes in the roles of individual currencies over time
- Dominant currencies: US dollar and Euro
  - welfare benefits?
  - macro consequences of a switch from dollar to euro (or yuan)
- Unique role of Belgian data:
  - detailed micro-level data suitable for firm-level analysis
  - substantial variation in currency use in the cross-section

## Main Findings

- ① Little role for PCP in imports & LCP in exports (ex-EU trade)

Instead, two **dominant currencies**:

- **regional Euro**: dominates by count of transactions
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- ② Substantial variation in currency use **within** country×industry

Firm-level characteristics key determinants of currency choice

- import intensity, in particular in foreign currency
- size of the firm
- currency use by competitors (strategic complementarities)
- foreign ownership (cross-border FDI, global value chains)

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- ③ Currency choice feeds back into the dynamics of ERPT, still matters beyond annual horizon and for quantities

- causal allocative effect of foreign-currency price stickiness

- ④ These patterns are consistent with a sticky-price model of currency choice, which thereby has real consequences

## Related Literature

- 1 Theory of currency choice and ERPT
  - Engel (2006)
  - Gopinath, Itskhoki and Rigobon (2010)
  - Mukhin (2018), Cravino (2017)
- 2 Firm-level analysis of exchange rate pass-through
  - Berman, Martin and Mayer (2012)
  - Amiti, Itskhoki and Konings (2014, 2019)
- 3 Empirical analysis of currency choice and dominant currencies
  - Goldberg and Tille (2008)
  - Gopinath (2016), Gopinath, Boz, Casas, Díez, Gourinchas and Plagborg-Møller (2020)
  - Chung (2016), Chen, Chung and Novy (2018), Corsetti, Crowley and Han (2020), Barbiero (2019), Auer, Burstein and Lein (2018), Goldberg and Tille (2016), Devereux, Dong, and Tomlin (2017), Drenik and Perez (2018)



# THEORETICAL FRAMEWORK

## Model Environment

- Consider a problem of a Belgian exporter  $i$  serving its product in a given industry  $s$  in foreign country  $k$
- The **desired export price** of the firm in producer currency is:

$$\tilde{p}_i = \tilde{p}_i(\Omega) = \arg \max_{p_i} \Pi_i(p_i|\Omega)$$

- $\Pi_i(\cdot)$  is profit (surplus) function
- state vector  $\Omega$  includes exogenous states (e.g., productivity), endogenous shocks (e.g., exchange rate) and competitor prices

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  - state vector  $\Omega$  includes exogenous states (e.g., productivity), endogenous shocks (e.g., exchange rate) and competitor prices
- Desired price can be converted to any currency  $\ell$ :

$$\tilde{p}_i^\ell = \tilde{p}_i + e_\ell$$

- $e_\ell$  is euro- $\ell$  bilateral exchange rate, with an increase in  $e_\ell$  corresponding to a euro appreciation ( $\ell$  depreciation)
- $\ell = D$  corresponds to the Dollar and  $\ell = k$  to the destination currency with a special notation:

$$\tilde{p}_i^* \equiv \tilde{p}_i^k = \tilde{p}_i + e_k$$

## Nominal Rigidities

- A firm's **presets price**  $\bar{p}_i^\ell$  in currency  $\ell$  before  $\Omega$  is realized
- With probability  $\delta$ ,  $\bar{p}_i^\ell$  stays in effect ex post, and otherwise the price is adjusted to its desired level  $\tilde{p}_i$
- Hence, the **realized producer-currency price** is:

$$p_i = \begin{cases} \bar{p}_i^\ell - e_\ell, & \text{w/prob. } \delta \\ \tilde{p}_i, & \text{w/prob. } 1 - \delta \end{cases}$$

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- The optimal preset price in currency  $\ell$  solves:

$$\bar{p}_i^\ell = \arg \max_{\bar{p}_i^\ell} \mathbb{E} \Pi_i(\bar{p}_i^\ell - e_\ell | \Omega)$$

- **Lemma 1 (Preset prices)** For any currency  $\ell$ , the first-order approximation to the optimal preset price is:

$$\bar{p}_i^\ell = \mathbb{E}\{\tilde{p}_i + e_\ell\}.$$

## Optimal Currency Choice

- A firm chooses currency  $\ell$  in which to preset  $\bar{p}_i^\ell$ :

$$\ell = \arg \max_{\ell} \left\{ \max_{\bar{p}_i^\ell} \mathbb{E} \Pi_i(\bar{p}_i^\ell - e_\ell | \Omega) \right\}$$

- $\ell$  minimizing the loss from stickiness  $\Pi_i(\tilde{p}_i) - \Pi_i(\bar{p}_i^\ell - e_\ell)$

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- **Lemma 2 (Currency choice)** For a general  $\Pi_i(\cdot)$ , the optimal currency choice is second-order equivalent to:

$$\ell = \arg \min_{\ell} \left\{ \text{var}(\tilde{p}_i + e_\ell) \right\}.$$

— optimal  $\ell$  has the least volatile  $\tilde{p}_i^\ell$ , making easier target for  $\bar{p}_i^\ell$

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- Lemma 2 replaces complex problem with a more tractable, e.g.  $\ell$  is preferred over the producer currency iff:

$$\text{var}(\tilde{p}_i) > \text{var}(\tilde{p}_i^\ell) = \text{var}(\tilde{p}_i + e_\ell) \Leftrightarrow \frac{\text{cov}(\tilde{p}_i + e_\ell, e_\ell)}{\text{var}(e_\ell)} < \frac{1}{2},$$

or equivalently low **desired ERPT**



## PCP, LCP and DCP

- Three common cases:
  - ① PCP = producer currency pricing (euro)
  - ② LCP = local (destination) currency pricing
  - ③ DCP = dominant currency pricing (dollar)

## PCP, LCP and DCP

- Three common cases:
  - ① PCP = producer currency pricing (euro)
  - ② LCP = local (destination) currency pricing
  - ③ DCP = dominant currency pricing (dollar)
- Resulting destination-currency price over preset price duration:

$$p_i^* = \begin{cases} \bar{p}_i + e_k, & \text{under PCP (euro),} \\ \bar{p}_i^D + e_k^D, & \text{under DCP (dollar),} \\ \tilde{p}_i^*, & \text{under LCP (destination currency } k), \end{cases}$$

— contrast the desired  $\tilde{p}_i^*$  with realized  $p_i^*$

## Desired ERPT

- Desired (log) markup:  $\tilde{p}_i = \tilde{\mu}_i + mc_i$ , where  $\tilde{\mu}_i = \mathcal{M}_i(p_i - z)$
- Desired price decomposition (AIK 2019):

$$\tilde{p}_i = \frac{1}{1 + \Gamma_i} mc_i + \frac{\Gamma_i}{1 + \Gamma_i} (z_k^* - e_k) + \varepsilon_i$$

- $z_k^*$  is the competitor price index in the destination currency
- $\Gamma_i \equiv -\partial\tilde{\mu}_i/\partial p_i$ , elasticity of desired markup, **increases in  $S_i$**
- $1/(1 + \Gamma_i)$  is the own cost pass-through
- $\Gamma_i/(1 + \Gamma_i)$  reflects **strategic complementarities** in price setting

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  - $\Gamma_i/(1 + \Gamma_i)$  reflects **strategic complementarities** in price setting
- **Lemma 3 (Desired ERPT)**

$$d\tilde{p}_i^* = (1 - \varphi_i - \gamma_i)de_k + (\varphi_i^D + \gamma_i^D)de_k^D, \quad \text{where}$$

$$\varphi_i \equiv -\frac{\partial mc_i}{\partial e_k}, \quad \varphi_i^D \equiv \frac{\partial mc_i}{\partial e_k^D}, \quad \gamma_i \equiv -\frac{\Gamma_i}{1 + \Gamma_i} \frac{\partial [z_k^* - mc_i - e_k]}{\partial e_k}, \quad \gamma_i^D \equiv \frac{\Gamma_i}{1 + \Gamma_i} \frac{\partial [z_k^* - mc_i - e_k]}{\partial e_k^D}$$

- A firm with  $\Gamma_i = 0$  has  $\gamma_i = \gamma_i^D = 0$  and  $mc_i$  stable in producer currency has  $\varphi_i = \varphi_i^D = 0$  – optimally chooses PCP
- Foreign inputs lead to  $\gamma_i \geq \gamma_i^D > 0$ , encouraging LCP/DCP

## Realized ERPT

- Realized ERPT:

$$d\rho_i^* = \begin{cases} d[\bar{p}_i^\ell + e_k^\ell] = de_k^\ell, & \text{prob. } \delta, \\ d\tilde{p}_i^*, & \text{o/w,} \end{cases} \Rightarrow \mathbb{E}d\rho_i^* = \delta de_k^\ell + (1-\delta)d\tilde{p}_i^*$$

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- PCP ( $\iota_i = 0$ ), DCP ( $\iota_i = \iota_i^D = 1$ ) and LCP ( $\iota_i = 1, \iota_i^D = 0$ ):

$$\mathbb{E}d\rho_i^* = de_k + \delta [-\iota_i de_k + \iota_i^D de_k^D] + (1-\delta) [-(\varphi_i + \gamma_i) de_k + (\varphi_i^D + \gamma_i^D) de_k^D]$$

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- 2 bracket = flexible-price determinants (controls for firm type)

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- ① bracket = sticky-price determinants (direct causal effect)
  - ② bracket = flexible-price determinants (controls for firm type)
- ERPT Dynamics — consider a dynamic Calvo environment with varying horizon  $h$  (months):

$$\hat{\delta}(h) = \frac{1}{h} \frac{\delta}{1 - \delta} (1 - \delta^h)$$

—  $\delta^h$  is fraction of firms that have yet to adjust in  $h$  periods

**DATA**



## Dataset

- We merge 3 micro-level datasets on Belgian firms:
  - ① **NBB and Customs:** New data on currency choice of Belgian firms at the firm-product-country-month level for both imports and exports from February 2017 to March 2019
    - CN 8-digit level (over 10,000 products)
    - Only extra-EU trade
  - ② **Customs:** Import and export data on values and quantities at firm-product-country level
    - annual data from 2012 to 2019
  - ③ **VAT:** firm-level data on firm characteristics
    - includes material costs, wagebill and employment
- Baseline industry *s* definition: NACE 4-digit level

## Key Variables

- **Currency use:**  $\iota_{ikt} = 1$  for non-Euro,  $\iota_{ikt}^D = 1$  for Dollar, by firm  $\times$  CN8-product  $\times$  destination  $\times$  time
- **Export price change:** in euros by firm-product-destination-time

$$\Delta p_{ikt}^* = \Delta \log \frac{\text{Export Value}_{ikt}^*}{\text{Export Quantity}_{ikt}}$$

- **Import intensity:** at the firm-year level

$$\varphi_{it} \equiv \frac{\text{Total non-EU import value}_{it}}{\text{Total variable costs}_{it}}$$

— further split by currency (Euro vs non-Euro):  $\varphi_{it} = \varphi_{it}^E + \varphi_{it}^X$

- **Firm size:** market share  $S_{ikt}$  and  $\log \text{Employment}_{it}$
- **Other variables:** FDI/ownership

# STYLIZED FACTS

# Currency Use in Trade

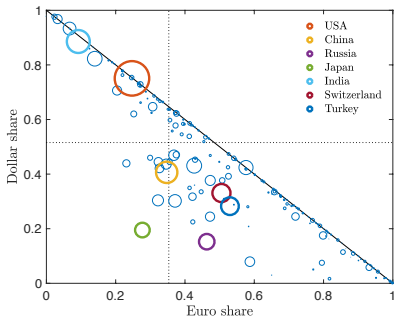
Outside EU

	Exports				Imports			
	Count share	Value share			Count share	Value share		
		All	Diff	Non-diff		All	Diff	Non-diff
Euro	0.659	0.353	0.398	0.293	0.377	0.380	0.484	0.244
Dollar	0.230	0.516	0.393	0.681	0.526	0.536	0.378	0.742
Other	0.111	0.131	0.209	0.026	0.097	0.084	0.137	0.014

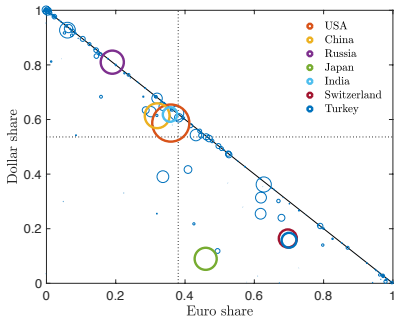
- 1 Euro and US dollar dominate trade flows
  - PCP is uncommon for imports and LCP uncommon for exports
  - some presence of LCP in exports for differentiated goods
- 2 Euro is dominant by count vs Dollar dominates by value
  - smaller transaction are predominantly priced in Euro
  - non-differentiated goods are predominantly priced in Dollar
  - even though US accounts for less than 20% of Belgian exports; however, trade share with dollar-pegged countries is  $\approx 50\%$

## Dominant Currencies

(a) Exports



(b) Imports



- Dominance of Euro+Dollar; some role for LCP in exports
- A lot of variation in the relative role of Euro vs Dollar

# Variance Decomposition

## Currency choice in exports

- Value-weighted projections of  $l_{ikt}$  (non-Euro indicator)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Adjusted $R^2$	0.619	0.850	0.155	0.371	0.612	0.713	0.865	0.877
# of observations ('000)	3,491.2	3,458.7	3,497.3	3,497.3	3,483.3	3,430.8	3,445.7	3,394.3
# of fixed effects ('000)	16.5	84.8	0.2	1.2	58.7	171.1	141.5	249.6
• firm	✓							
• firm×destination		✓					✓	✓
• destination			✓					
• HS4 industry				✓				
• HS4 industry×destination					✓		✓	
• CN8 product×destination						✓		✓

- Almost *no* variation in currency choice over time, at the level of the firm-product-destination
- Firm-destination fixed effects absorb the bulk of variation in currency choice, considerably more than product-destination

# **EMPIRICAL RESULTS I: CURRENCY CHOICE**

## Currency Choice: Exports

Dep. var.: $l_{ikt}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\varphi_i$	0.417*** (0.143)	0.270** (0.107)					
$\varphi_i^E$			0.057 (0.148)	0.064 (0.150)	-0.004 (0.189)	0.121 (0.141)	0.074 (0.160)
$\varphi_i^X$			0.326** (0.165)	0.316* (0.162)	0.565*** (0.197)	0.358** (0.180)	0.368* (0.194)
$\log L_i$	0.092*** (0.024)	0.084*** (0.016)	0.082*** (0.015)	0.055*** (0.013)	0.061*** (0.018)	0.053*** (0.012)	0.054*** (0.013)
$S_{ik}$	-0.028 (0.029)	-0.022 (0.030)	-0.024 (0.030)	-0.021 (0.029)	-0.020 (0.026)	-0.012 (0.017)	0.027 (0.025)
out-FDI <sub><i>i</i></sub>				0.125*** (0.041)	0.089** (0.045)	0.115*** (0.040)	0.121*** (0.043)
in-FDI <sub><i>i</i></sub>				0.016 (0.039)	0.051 (0.047)	0.026 (0.039)	0.026 (0.041)
$\bar{l}_{-ikt}$					0.174*** (0.027)	0.037** (0.018)	0.620** (0.277)
# obs.	741,565	734,012	734,012	734,012	676,966	676,937	656,389
$R_{adj}^2$	0.290	0.575	0.577	0.582	0.327	0.391	—
Fixed Effects:							
year	✓	✓	✓	✓	✓	✓	✓
destination	✓				✓	✓	✓
industry (HS4)						✓	✓
industry×destination		✓	✓	✓			



## Currency Choice: Imports

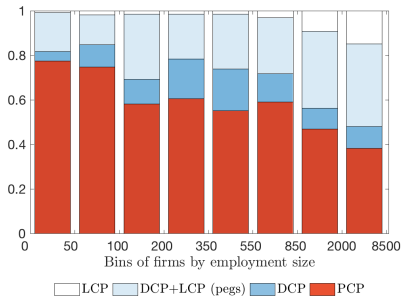
Dep. var.: $t_{ikt}^M$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\chi_i$	0.106* (0.059)	0.104** (0.050)					
$\chi_i^E$			0.007 (0.059)	0.002 (0.060)	0.013 (0.086)	-0.008 (0.070)	0.031 (0.074)
$\chi_i^X$			0.273*** (0.095)	0.267*** (0.098)	0.377*** (0.115)	0.322*** (0.105)	0.351*** (0.121)
$\log L_i$	-0.006 (0.007)	-0.008 (0.006)	-0.011** (0.005)	-0.007 (0.010)	-0.005 (0.013)	-0.006 (0.011)	-0.003 (0.011)
$S_{ijk}^M$	-0.053* (0.029)	-0.154*** (0.028)	-0.152*** (0.028)	-0.149*** (0.028)	-0.089** (0.036)	-0.104*** (0.028)	-0.101*** (0.032)
out-FDI <sub>i</sub>				0.001 (0.033)	0.001 (0.046)	0.003 (0.039)	0.005 (0.041)
in-FDI <sub>i</sub>				-0.027 (0.034)	-0.029 (0.045)	-0.027 (0.038)	-0.025 (0.040)
$\bar{t}_{-ijkt}^M$					0.151*** (0.023)	0.042** (0.019)	0.791*** (0.219)
# obs.	270,477	267,009	267,009	267,009	235,062	235,022	223,991
$R_{adj}^2$	0.261	0.456	0.458	0.459	0.275	0.340	—
Fixed Effects:							
year	✓	✓	✓	✓	✓	✓	✓
country (source)	✓				✓	✓	✓
industry (HS4)						✓	✓
industry×country		✓	✓	✓			

## Currency Choice: Vehicle Currency

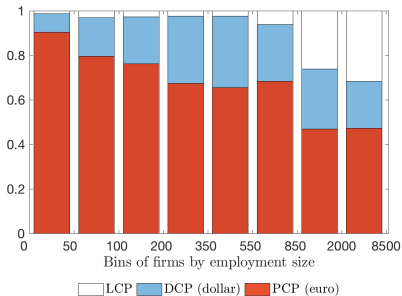
Dep. var.: $l_{ikt}^D$	(1)	(2)	(3)	(4)	(5)	(6)
$\varphi_i$	-0.204 (0.168)	-0.027 (0.109)				
$\varphi_i^E$			-0.106 (0.134)	-0.108 (0.135)	-0.070 (0.121)	-0.127 (0.161)
$\varphi_i^X$			0.457*** (0.156)		0.504*** (0.146)	0.729*** (0.216)
$\varphi_i^D$				0.490*** (0.163)		
$\log L_i$	-0.092*** (0.012)	-0.088*** (0.010)	-0.079*** (0.010)	-0.077*** (0.010)	-0.093*** (0.017)	-0.095*** (0.022)
$S_{ik}$	0.061* (0.037)	0.049 (0.051)	0.012 (0.044)	0.009 (0.044)	0.012 (0.044)	0.113 (0.069)
out-FDI <sub>i</sub>					0.051 (0.042)	0.107* (0.060)
in-FDI <sub>i</sub>					0.026 (0.034)	-0.022 (0.061)
$\tau_{-ikt}^D$						1.516** (0.697)
# obs.	113,327	111,606	111,606	111,606	111,606	104,584
$R_{adj}^2$	0.650	0.878	0.882	0.882	0.883	—
Fixed Effects:						
year	✓	✓	✓	✓	✓	✓
destination	✓					✓
industry (HS4)						✓
industry×destination		✓	✓	✓	✓	

# Currency of Exports and Firm Size

(a) All destinations (ex-EU)



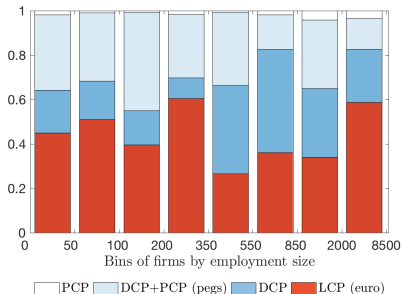
(b) Excluding US and dollar pegs



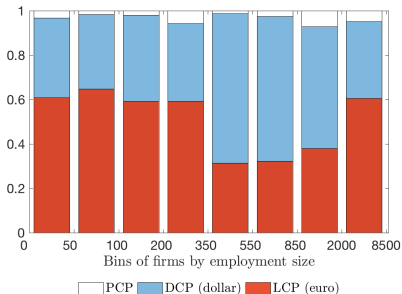
Employment size bins	<50	50-100	100-200	200-350	350-550	550-850	850-2000	≥2,000
Number of firms	1,948	299	246	115	60	36	23	12
Share in total exports	6%	7%	11%	10%	7%	10%	13%	35%
Share in total imports	5%	3%	8%	9%	7%	10%	8%	50%

# Currency of Imports and Firm Size

(a) All source countries (ex-EU)



(b) Excluding US and dollar pegs



Employment size bins	<50	50-100	100-200	200-350	350-550	550-850	850-2000	≥2,000
Number of firms	1,948	299	246	115	60	36	23	12
Share in total exports	6%	7%	11%	10%	7%	10%	13%	35%
Share in total imports	5%	3%	8%	9%	7%	10%	8%	50%

# **EMPIRICAL RESULTS II: EXCHANGE RATE PASS-THROUGH**

## ERPT — conventional spec.

$$\Delta p_{ikt}^* = [\alpha + \beta\varphi_i + \gamma S_{ik} + \delta l_{ikt}] \Delta e_{kt} + \text{F.E./controls} + \epsilon_{ikt}$$

Dep. var.: $\Delta p_{ikt}^*$	All countries				OECD	US only
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta e_{kt}$	1.111*** (0.031)	1.075*** (0.029)	1.075*** (0.029)	—	1.047*** (0.037)	—
$\Delta e_{kt} \cdot \varphi_i$	-0.272*** (0.087)	-0.173** (0.077)				
$\Delta e_{kt} \cdot \varphi_i^E$			-0.081 (0.139)	0.125 (0.174)	-0.418 (0.354)	0.328 (0.269)
$\Delta e_{kt} \cdot \varphi_i^X$			-0.227** (0.106)	-0.306** (0.122)	-0.416*** (0.147)	-0.533* (0.221)
$\Delta e_{kt} \cdot S_{ik}$	-0.061** (0.028)	-0.061** (0.028)	-0.061** (0.028)	-0.058 (0.046)	-0.146* (0.082)	-0.174** (0.067)
$\Delta e_{kt} \cdot \log L_i$	-0.017*** (0.006)	-0.003 (0.006)	-0.003 (0.006)	-0.007 (0.006)	0.005 (0.006)	-0.010 (0.012)
$\Delta e_{kt} \cdot l_{ik}$		-0.207*** (0.038)	-0.206*** (0.037)	-0.148*** (0.043)	-0.300*** (0.042)	-0.240** (0.082)
# obs.	262,043	262,043	262,043	221,702	88,144	21,635
$R^2_{adj.}$	0.056	0.057	0.057	0.078	0.019	0.020
Fixed Effects:						
year	✓	✓	✓		✓	✓
industry×destination	✓	✓	✓		✓	✓
industry×destination×year				✓		

## ERPT — full specification

$$\Delta p_{ikt}^* = [\alpha + \beta \varphi_i + \gamma S_{ik} + \delta l_{ik}] \Delta e_{kt} + [\beta^D \varphi_i + \gamma^D S_{ik} + \delta^D l_{ik}^D] \Delta e_{kt}^D + \text{F.E.} + \epsilon_{ikt}$$

Dep. var.: $\Delta p_{ikt}^*$	USD/Pegs	Non-pegged		All countries	
	(1)	(2)	(3)	(4)	(5)
$\Delta e_{kt}$	1.130*** (0.075)	1.064*** (0.032)	1.006*** (0.015)	1.011*** (0.015)	—
$\Delta e_{kt} \cdot \varphi_i$	-0.514*** (0.136)	-0.058 (0.090)	-0.339*** (0.100)	-0.392*** (0.077)	-0.354*** (0.100)
$\Delta e_{kt}^D \cdot \varphi_i$			0.414*** (0.086)	0.435*** (0.076)	0.386*** (0.113)
$\Delta e_{kt} \cdot S_{ik}$	-0.101* (0.058)	-0.049 (0.032)	-0.031 (0.049)	-0.047 (0.035)	-0.058 (0.072)
$\Delta e_{kt}^D \cdot S_{ik}$			0.023 (0.042)	-0.011 (0.035)	0.006 (0.068)
$\Delta e_{kt} \cdot l_{ik}$	-0.358*** (0.038)	-0.133*** (0.042)	-0.330*** (0.057)	-0.342*** (0.036)	-0.235*** (0.047)
$\Delta e_{kt}^D \cdot l_{ik}^D$			0.306*** (0.051)	0.321*** (0.042)	0.235*** (0.050)
# obs.	99,025	163,018	150,659	240,440	200,888
$R^2_{adj}$	0.016	0.074	0.078	0.062	0.086
Fixed Effects:					
year	✓	✓	✓	✓	
industry × destination	✓	✓	✓	✓	
industry × destination × year					✓

## Quantities

$$\Delta q_{ikt}^* = -\theta \cdot \Delta p_{ikt}^* + \text{fixed effects} + \epsilon_{ikt}$$

Dep. var: $\Delta q_{ikt}^*$	(1)	(2)	(3)	(4)
$\Delta p_{ikt}^*$	- 0.446*** (0.076)	- 1.098** (0.524)	- 1.255** (0.549)	- 1.709* (0.880)
# obs.	240,188	200,595	200,595	221,564
First stage	(4) in Table 7	(5) in Table 7	(5) <sup>†</sup> in Table 7	(4) <sup>†</sup> in Table 6
Over-ID $J$ -test $\chi^2$ [ $p$ -value]	15.62 [0.02]	13.90 [0.02]	6.35 [0.10]	0.30 [0.58]
Weak IV $F$ -test	1,403.8	10.6	14.9	7.0
Fixed Effects:				
firm	✓	✓	✓	✓
industry×destination & year	✓			
industry×destination×year		✓	✓	✓



# Quantities

## First stages and reduced form

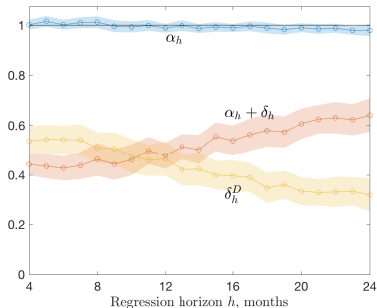
Dep. var.:	(1)		(2)		(3)		(4)	
	$\Delta p_{ikt}^*$	$\Delta q_{ikt}^*$	$\Delta p_{ikt}^*$	$\Delta q_{ikt}^*$	$\Delta p_{ikt}^*$	$\Delta q_{ikt}^*$	$\Delta p_{ikt}^*$	$\Delta q_{ikt}^*$
$\Delta e_{kt}$	1.016*** (0.014)	-0.527*** (0.096)	—	—	—	—	—	—
$\Delta e_{kt} \cdot \varphi_i$	-0.350*** (0.081)	0.270 (0.429)	-0.284*** (0.106)	-0.023 (0.641)	-0.293*** (0.105)	-0.026 (0.636)	-0.114 (0.091)	0.412 (0.405)
$\Delta e_{kt}^D \cdot \varphi_i$	0.391*** (0.075)	0.426 (0.455)	0.319*** (0.112)	0.822 (0.675)	0.320*** (0.111)	0.766 (0.668)	—	—
$\Delta e_{kt} \cdot S_{ik}$	-0.051 (0.036)	-0.006 (0.129)	-0.065 (0.074)	-0.141 (0.258)	—	—	—	—
$\Delta e_{kt}^D \cdot S_{ik}$	-0.010 (0.035)	-0.169 (0.139)	0.006 (0.068)	-0.317 (0.237)	—	—	—	—
$\Delta e_{kt} \cdot l_{ikt}$	-0.359*** (0.037)	0.466*** (0.121)	-0.259*** (0.050)	0.464*** (0.165)	-0.262*** (0.049)	0.453*** (0.163)	-0.166*** (0.045)	0.257* (0.133)
$\Delta e_{kt}^D \cdot l_{ikt}^D$	0.324*** (0.041)	-0.253 (0.167)	0.234*** (0.050)	-0.201 (0.223)	0.234*** (0.049)	-0.202 (0.222)	—	—
# obs.	240,188	240,188	200,595	200,595	200,595	200,595	221,564	221,564
Fixed Effects:								
firm	✓	✓	✓	✓	✓	✓	✓	✓
destination	✓	✓						
industry×destination	✓	✓						
industry×destination×year			✓	✓	✓	✓	✓	✓

# EMPIRICAL RESULTS III: ERPT DYNAMICS

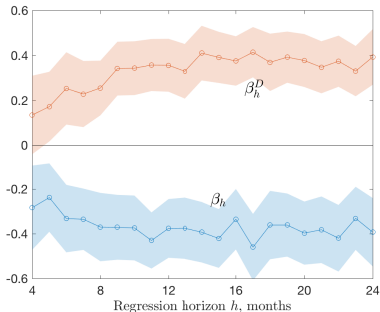
## ERPT Dynamics

$$\Delta_h p_{ikt}^* = [\alpha_h + \beta_h \varphi_i + \delta_h l_{ik}^X] \Delta_h e_{kt} + [\beta_h^D \varphi_i + \delta_h^D l_{ik}^D] \Delta_h e_{kt}^D + \text{F.E.} + \epsilon_{ikt}^h$$

(a) Sticky-price determinants



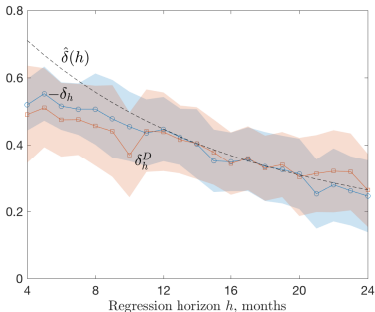
(b) Flexible-price determinants



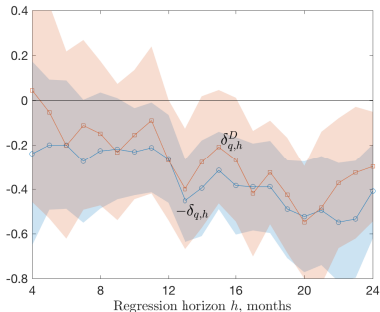
- $\alpha_h$  is the euro-destination ERPT for PCP firms,  
 $\alpha_h + \delta_h$  for the foreign-currency (LCP and DCP) firms,  
 $\delta_h^D$  is the additional dollar-destination ERPT of the DCP firms
- $\beta_h$  and  $\beta_h^D$  are ERPT per unit of the firm's import intensity  $\varphi_i$

# Dynamic Effects of Price Stickiness

(a) Prices



(b) Quantities



- $\hat{\delta}(h) = \frac{1}{h} \frac{\delta}{1-\delta} (1 - \delta^h)$  vs  $\delta^h$
- Calibrated value:  $\delta = 0.88$  to match  $\hat{\delta}(h) = -\delta_h$  at  $h = 12$
- $\delta^{12} = 0.22$  and  $\delta^{24} = 0.05$

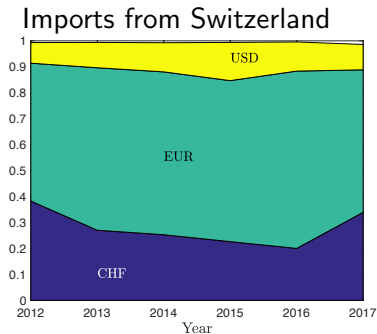
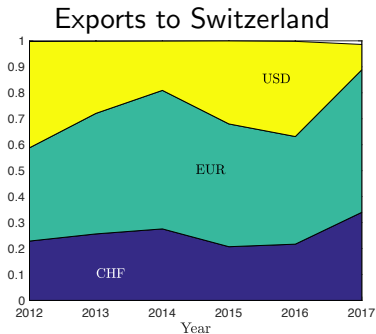
# SUMMARY

## Conclusion

- Two dominant currencies: global US dollar and regional Euro
- Currency choice is shaped by firm-level characteristics, which determine desired ERPT
- Currency choice feeds back into the dynamics of ERPT, and still matters beyond annual horizon
- There are strategic complementarities in currency choice, which may lead to multiple equilibria and persistence
- Consistent with sticky-price model of currency choice
- Effects of a shift in currency use away from the US dollar

# APPENDIX

# Currency invoicing trends





## PTM and LCP (DCP)

- Two reasons for low pass-through:
  - ① LCP: price stickiness in local currency
  - ② PTM and imported inputs (when prices adjust)
- PTM and LCP have common determinants
- PTM and LCP reinforce each other

