

# **The Swift Decline of the British Pound: Evidence from UK Trade-invoicing after the Brexit Vote**

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## Motivation

- Firms' currency choices have important implications for international transmission of shocks and design of stabilization policy
  - Tight link between invoicing currency and exchange rate pass-through
  - Implication of US dollar's dominance (Gopinath et al 20)

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- Recent empirical works document rich heterogeneity of firms' currency choices focusing on **cross sectional** variation
  - Currency of imported inputs; currency of competitors; firm's market power (Goldberg & Tille 08, 16; Chung 16; Amiti, Itskhoki, Konings 22)

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- This paper: Dissect changes in aggregate currency shares for UK exporters, investigating uncertainty brought by a political event

## This paper

Study changes in firms' invoicing currency choices after Brexit referendum, using transnational level data from UK exporters (2010-2019)

**Background:** Brexit referendum on June 23, 2016

- Outcome largely unexpected: 51.9% leave vs 48.1% remain
- Created huge uncertainty about future economic policy and exchange rates

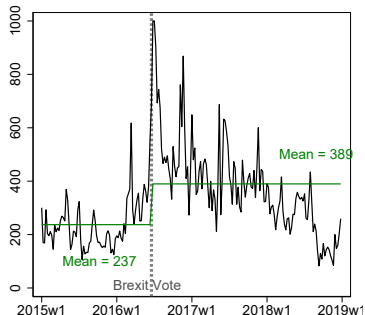
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(a) Bloom's policy uncertainty index



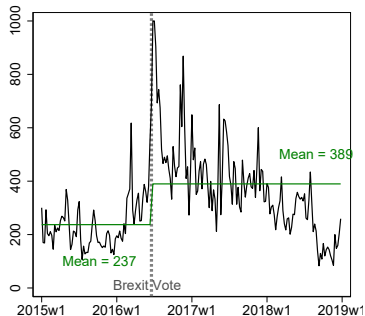
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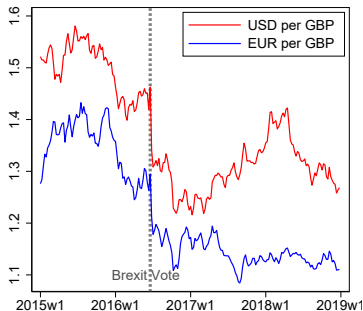
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(b) Bilateral exchange rate



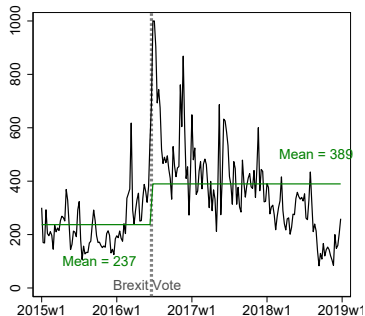
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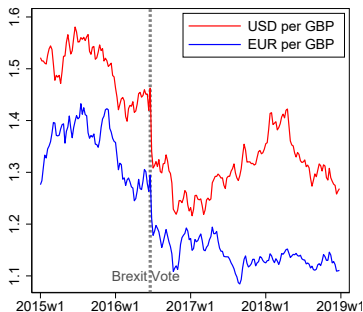
### Background: Brexit referendum on June 23, 2016

- Outcome largely unexpected: 51.9% leave vs 48.1% remain
- Created huge uncertainty about future economic policy and exchange rates
- **No material change in economic or trade policy until 2020**

(a) Bloom's policy uncertainty index



(b) Bilateral exchange rate



## Key results

Focusing on extra-EU exports where invoicing data is available, we find

### 1. Swift decline in sterling usage after the Brexit referendum

- Sterling share: 60% in 2016  $\Rightarrow$  45% in 2019
- Dollar and local currency shares increased
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2. Novel decomposition to understand the underlying micro margins
  - Decompose agg. changes into firm, destination, product, and intensive margins
  - Redefine intensive margin of trade and introduce two new concepts:
    - (a) currency switch and (b) within-currency trade intensity $\Rightarrow$  Drove majority of the decline in sterling usage

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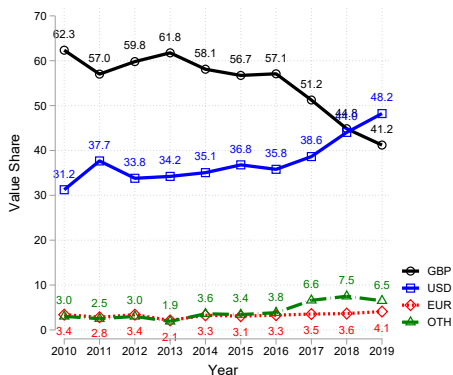
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3. Significant role of firm heterogeneity
  - For more dollar imports  $\Rightarrow$  more likely to switch to dollars for exports
  - For markets with more US competitors  $\Rightarrow$  more likely to switch to dollars



# The swift decline of the British pound

Invoicing currencies in UK's extra-EU exports

(a) Value share

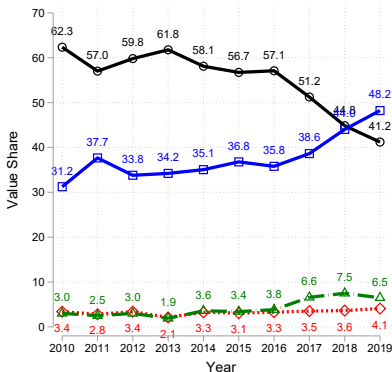


⇒ Fewer firms used sterling after the Brexit referendum

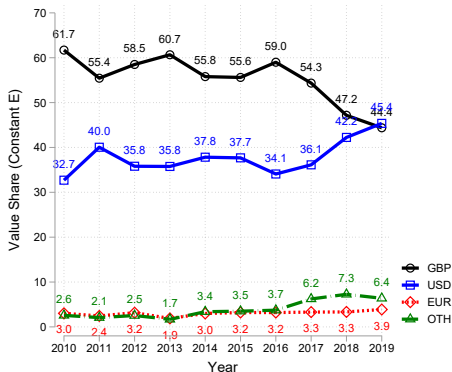
# The swift decline of the British pound

## Invoicing currencies in UK's extra-EU exports

(a) Value share



(b) Constant (exchange rate) value share



- ⇒ Fewer firms used sterling after the Brexit referendum
- ⇒ Smaller decline after accounting for mechanical effect of exchange rate movements

► Data

► Constant value share measure

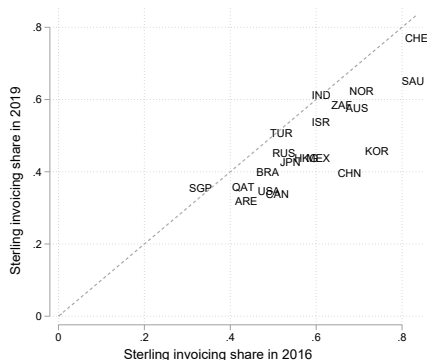
► Other currencies

► High frequency

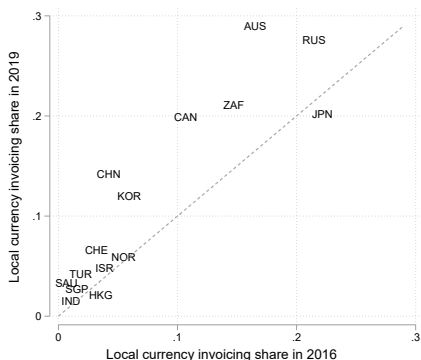
► By product type

## Widespread changes across markets

(a) GBP: 2019 vs 2016



(b) Local currency: 2019 vs 2016



- Changes in invoicing patterns were widespread across destination markets

Note: No notable change in trade shares of these countries during 2016-2019

[▶ Detail](#)

# Decomposing British invoicing currency choices

## Extensive margins:

1. **Firm margin:** Entering, exiting and continuing firms
2. **Foreign country margin:** Among continuing firms: foreign market entry, exit, and continuation
3. **Product margin:** Among continuing firm-markets: introduction, removal and continuation of products

## Intensive margins:

4. **Currency switch:** Among continuing firm-market-product triplets: change of currency
5. **Trade intensity margin:** Among continuing firm-market-product-currency quartets: change in value traded

## Decomposition

$$\Delta_s x_t^k = \underbrace{\sum_{f \in \mathcal{E}} x_{ft}^k - \sum_{f \in \mathcal{X}} x_{ft-s}^k}_{\text{Net firm entry}} + \underbrace{\sum_{f \in \mathcal{C}} \Delta_s x_{ft}^k}_{\text{Continuing firms}},$$

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$$\Delta_s x_{fpdt}^k = \underbrace{x_{fpdt}^k \mathbb{1}(\mathcal{A}_{fpd}^k) - x_{fpdt-s}^k \mathbb{1}(\mathcal{B}_{fpd}^k)}_{\text{Currency switch}} + \underbrace{\Delta_s x_{fpdt}^k \mathbb{1}(\mathcal{C}_{fpd}^k)}_{\text{Within-currency trade intensity}}$$

$\forall p \in \mathcal{C}_{fd}, d \in \mathcal{C}_f, f \in \mathcal{C}.$

$\mathcal{A}_{fpd}^k$  : currency added;     $\mathcal{B}_{fpd}^k$  : currency dropped;     $\mathcal{C}_{fpd}^k$  : no change in currency

# Changes in invoicing by trade margins: 2016-2019

Measure: constant trade value (in million £)

Margins	GBP	USD	EUR	Others	Total
Net firm entry	3,930	1,184	109	131	5,355
Net market entry	-1,949	2,378	251	493	1,175
Net product entry	-2,373	5,473	101	109	3,311
Currency switch	-3,193	2,236	305	1,325	674
Within currency	-6,412	15,762	1,135	3,249	13,736
Total changes	-9,995	27,036	1,903	5,309	24,253



# Changes in invoicing by trade margins: 2016-2019

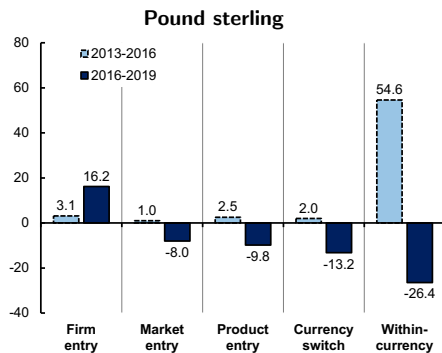
Margins	GBP	USD	EUR	Others	Total
Net firm entry	16.21%	4.88%	0.45%	0.54%	22.09%
Net market entry	-8.04%	9.81%	1.04%	2.03%	4.85%
Net product entry	-9.79%	22.57%	0.42%	0.45%	13.65%
Currency switch	-13.16%	9.22%	1.26%	5.46%	2.78%
Within currency	-26.44%	64.98%	4.68%	13.40%	56.62%
Total changes	-41.21%	111.51%	7.85%	21.89%	100%

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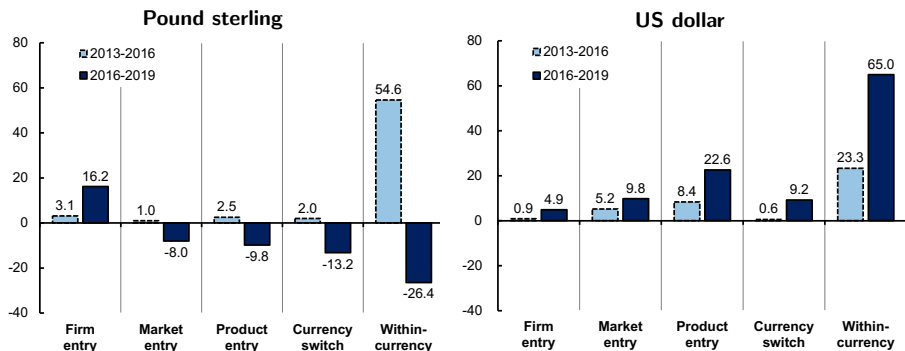
- **Currency switch** and **within currency** explain majority of the decline

# Comparing contribution of micro margins during 2013-2016 vs 2016-2019



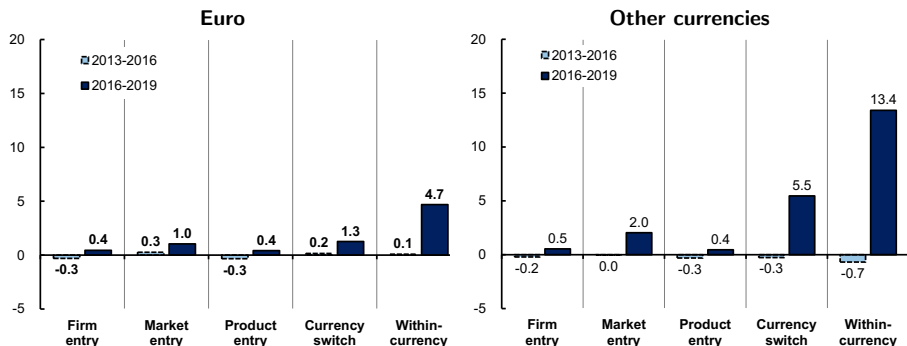
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- Differential contribution of the margins during 'normal times' vs 'big changes'

# Comparing contribution of micro margins during 2013-2016 vs 2016-2019



- Currency switch and within-currency trade intensity explain most of the changes

► Transaction share results

## Key determinants of firms' invoicing choices

Existing micro studies have highlighted three key channels, focusing on cross-sectional variation:

1. **Operational hedging**: firms tend to choose the same export currency as their import currencies – to hedge exchange rate risk
2. **Pricing-to-market**: larger firms with market power are more likely to price in foreign currencies – to price discriminate across markets
3. **Strategic complementarity**: firms tend to use the same currency as their competitors – to keep its relative price stable

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**Next:** study how these channels change facing **uncertainty in exchange rates and economic policy brought by Brexit referendum**

## Empirical specification

Regress constant value share  $S_{f p d t}^k$  on firm and market characteristics:

$$\begin{aligned} S_{f p d t}^k = & \alpha_0 \cdot \text{imp\_local}_{fd} + \alpha_1 \cdot (\text{imp\_local}_{fd} \times D_t) \\ & + \alpha_2 \cdot (\text{imp\_USD}_f \times D_t) + \alpha_3 \cdot (\text{imp\_EUR}_f \times D_t) \\ & + \beta_0 \cdot \text{fshare}_{fid} + \beta_1 \cdot (\text{fshare}_{fid} \times D_t) + \beta_2 \cdot (\text{fsize}_f \times D_t) \\ & + \gamma_1 \cdot (\text{US\_share}_{id} \times D_t) + \gamma_2 \cdot (\text{EU\_share}_{id} \times D_t) \\ & + FE_f + FE_{pd} + FE_t + \epsilon_{fpdt} \end{aligned}$$

- $f, p, i, d, t, k$ : firm, 8-digit product, 6-digit product, destination, year, currency
- $D_t$ : Post-Brexit referendum dummy = 1 if year  $\geq 2016$
- $\text{imp\_local}_{fd}, \text{imp\_USD}_f, \text{imp\_EUR}_f$ : firm's import share in local, USD and EUR
- $\text{fshare}_{fid}$ : firm's product-level market share
- $\text{fsize}_f$ : firm's size = log total export value in all markets
- $\text{US\_share}_{id}, \text{EU\_share}_{id}$ : US and EU product-level trade share in destination  
(Proxy for competitors' USD/EUR usage; Most US/EU exporters use USD/EUR)



## Heterogeneity in invoicing choices

	GBP	USD	Local
Local currency import share	-0.08 (2.25)	-9.27*** (3.16)	21.93*** (5.68)
Local currency import share × post 2016	0.70 (1.36)	-0.46 (1.62)	0.80 (2.86)
Dollar import share × post 2016	-1.67*** (0.44)	1.97*** (0.30)	-0.17 (0.17)
Euro import share × post 2016	-2.12** (1.05)	0.41 (0.69)	0.12 (0.35)
Observations	3,807,924	3,807,924	3,807,924
$R^2$	0.47	0.50	0.29
Firm + Country-Product + Year FEs	Yes	Yes	Yes

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Firm size × post 2016	0.04 (0.08)	-0.04 (0.05)	0.06 (0.04)
US market share (HS6) × post 2016	-0.09 (0.58)	1.02** (0.40)	-0.42* (0.22)
EU market share (HS6) × post 2016	-0.82* (0.42)	-0.91*** (0.30)	-0.34 (0.22)
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Firm + Country-Product + Year FEs	Yes	Yes	Yes

# Conclusion

Using transaction-level data from UK exporters, we document:

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  - Decline in within-currency trade intensity for sterling loyal firms

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3. Significant role of firm heterogeneity
  - Firms with dollar imports were more likely to switch to dollar invoicing in exports
  - Firms exporting to markets with more US competitors were more likely to switch

# Appendix

## Data

We use the universe of extra-EU trade transactions of British firms from His Majesty's Revenue and Customs (HMRC) over 2010-2019

- Records at the level of firm, product (CN08), country and date
- Invoicing currency is reported for extra-EU trade
  - All importers
  - Exporters whose annual exports exceed £100k



# Constant exchange rate value share

## Accounting for mechanical valuation effect of exchange rate movements

To fix ideas, consider an example of two currencies:

	Before ( $e_0 = 1.00$ )			
	GBP	USD	GBP	USD
Transaction share	50%	50%	50%	50%
Price in invoiced currency	£1	\$1	£1	\$1
Price in sterling	£1	£1	£1	£1.11
Value share	50%	50%	47.4%	52.6%
Constant value share	50%	50%	50%	50%

- Accounting for this by introducing **constant (exchange rate) value share** measure:

$$\text{Constant value share of USD at } t = \frac{v_t^{USD} e_t / e_0}{v_t^{USD} e_t / e_0 + v_t^{GBP}}$$

$\Rightarrow e_t / e_0$  undoes mechanical valuation effect brought by exchange rates

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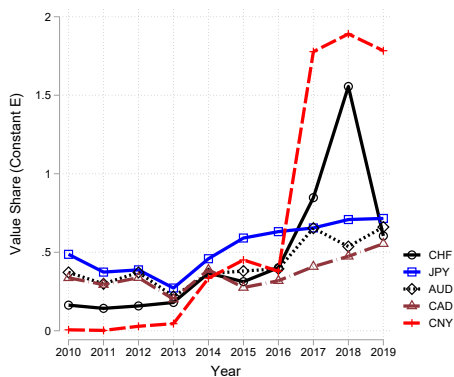
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## Other invoicing currencies in UK's extra-EU exports

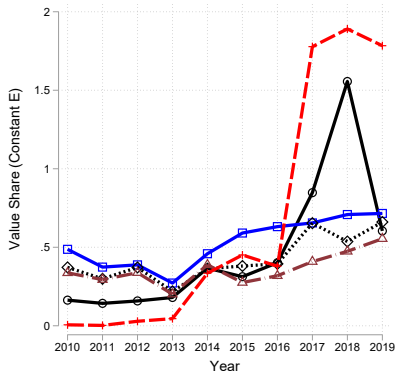
(c) Others: Constant value share



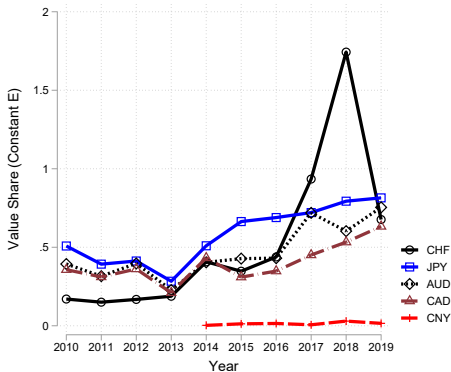
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## Other invoicing currencies in UK's extra-EU exports

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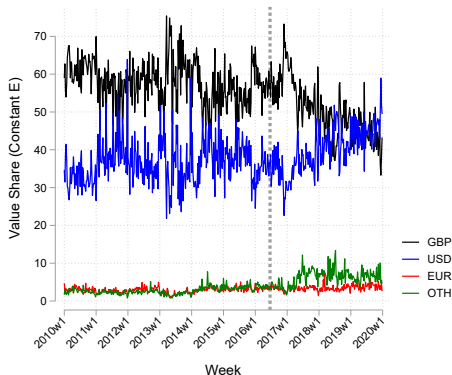
(d) Others excluding China



- Aggregate transaction share invoiced in all other currencies rose after Brexit
- Most changes in CNY were driven by exports to China (local currency pricing)

## High frequency analysis

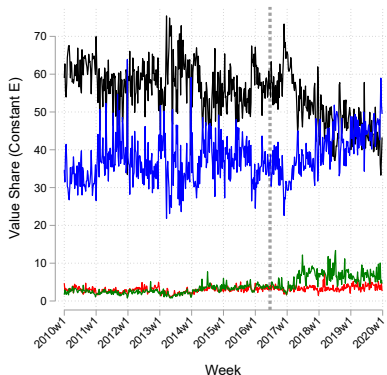
(a) All: Constant value share



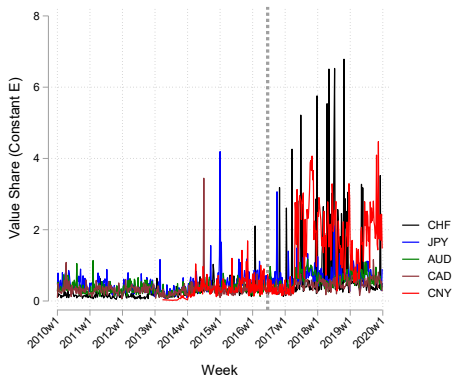
- Sterling share initially rose due to higher demand (when prices are sticky)
- Steady decline after 6 months post Brexit referendum

## High frequency analysis

(a) All: Constant value share



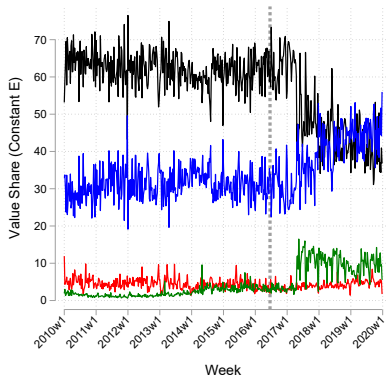
(b) Others: Constant value share



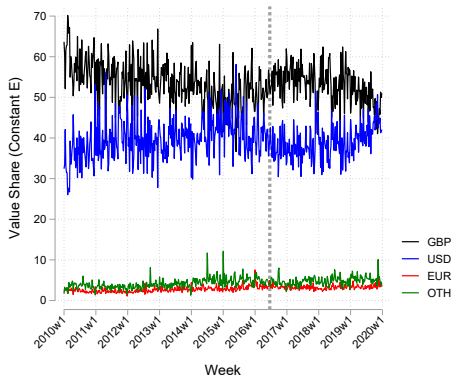
- Sterling share initially rose due to higher demand (when prices are sticky)
- Steady decline after 6 months post Brexit referendum
- Similarly, most increases in other currencies occurred after 2017

## Distinct patterns for high vs low differentiation goods

(a) High differentiation goods



(b) Low differentiation goods



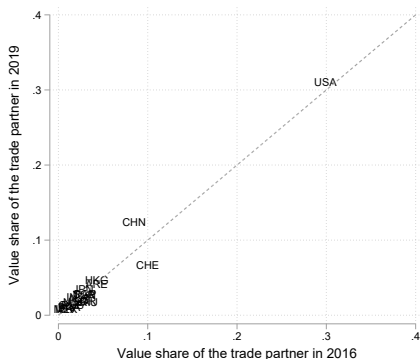
- Most changes were driven by high differentiation goods
- ⇒ Firms selling differentiated products tend to have market power and are more likely to use foreign currencies

## Trade share across markets

(a) Transaction share: 2019 vs 2016



(b) Value share: 2019 vs 2016



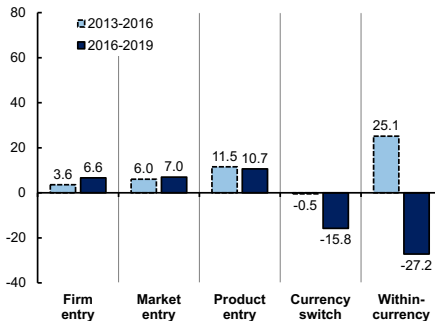
- No notable change in trade shares of these countries during 2016-2019



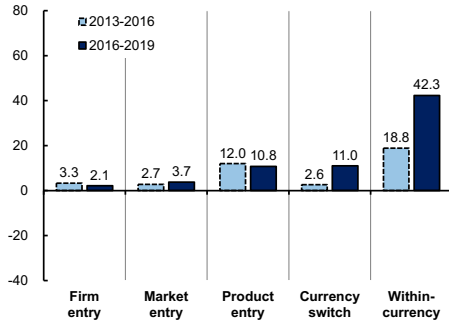
# Comparing contribution of micro margins

Transaction share measure

Pound sterling



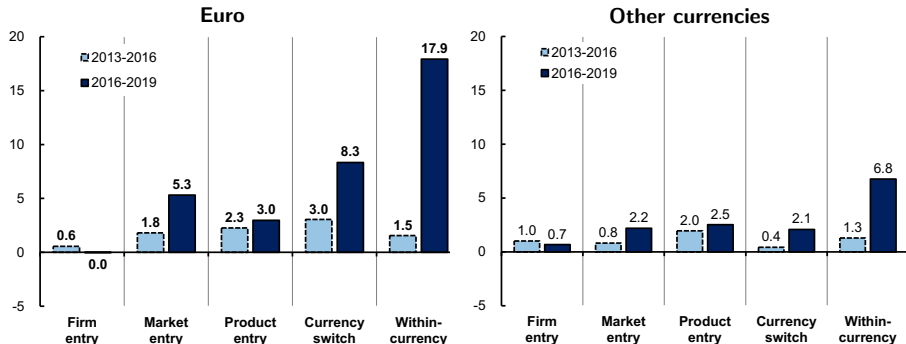
US dollar



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# Comparing contribution of micro margins

Transaction share measure



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