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

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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

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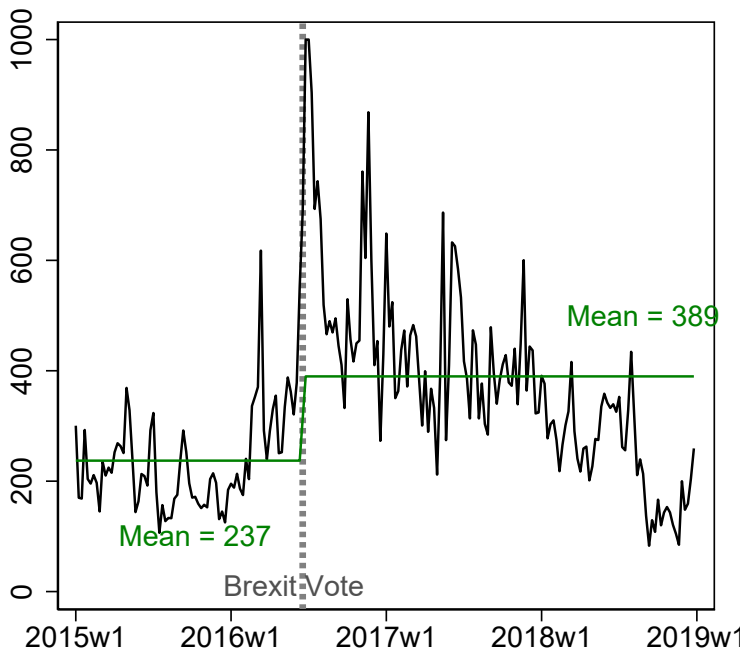

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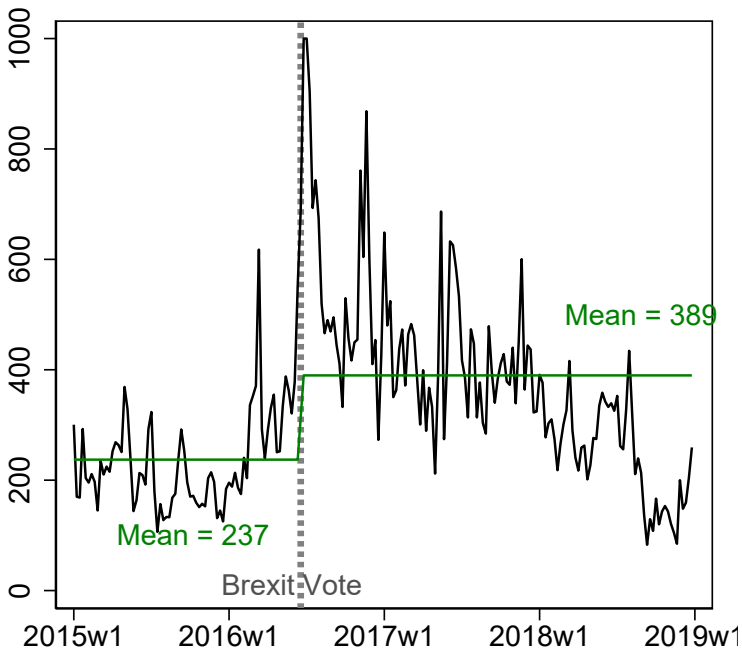
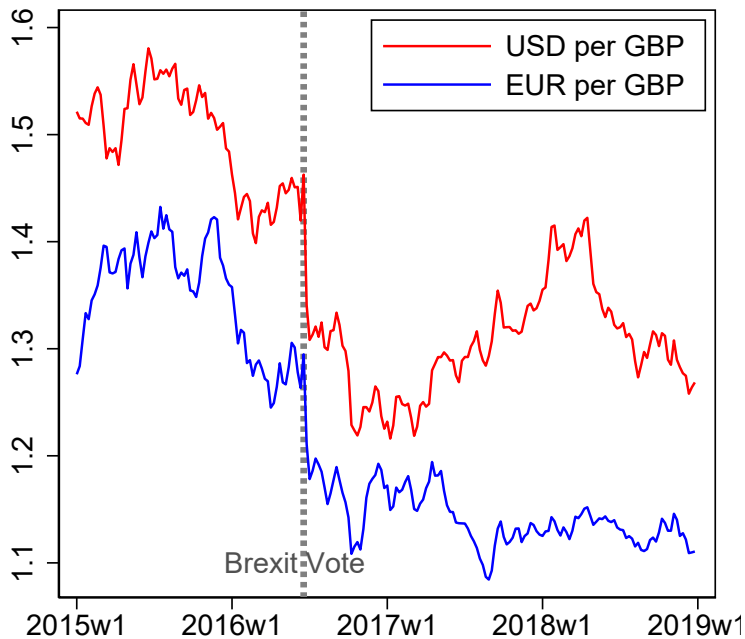


(b) Bilateral exchange rate



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- 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**

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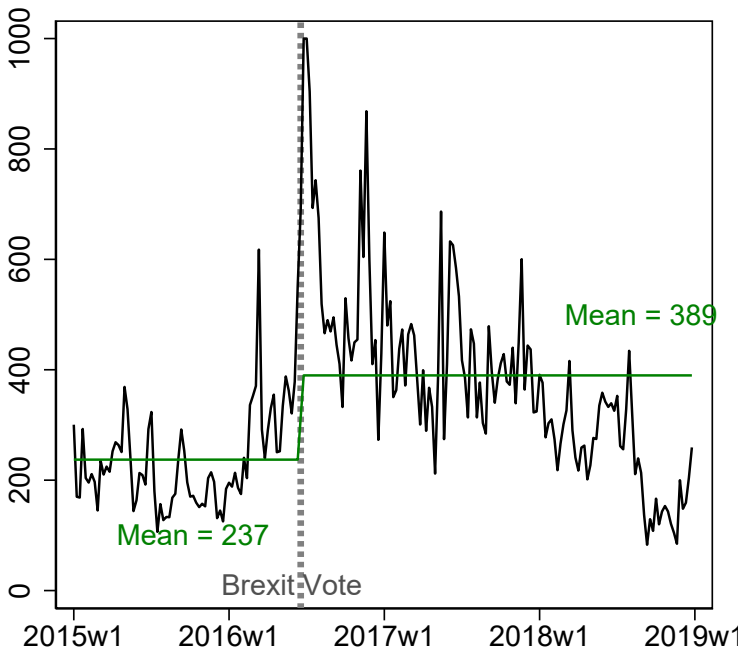

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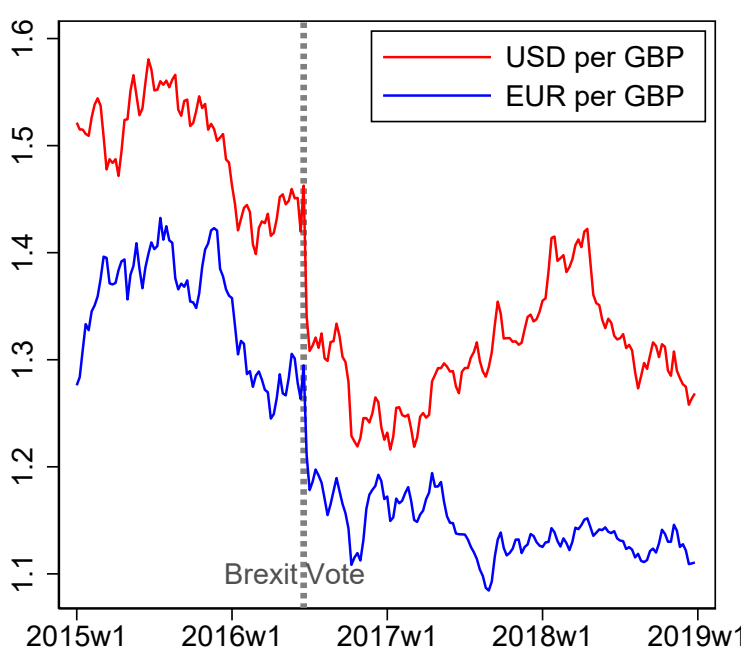

Key results

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
   - Changes were widespread across destination markets

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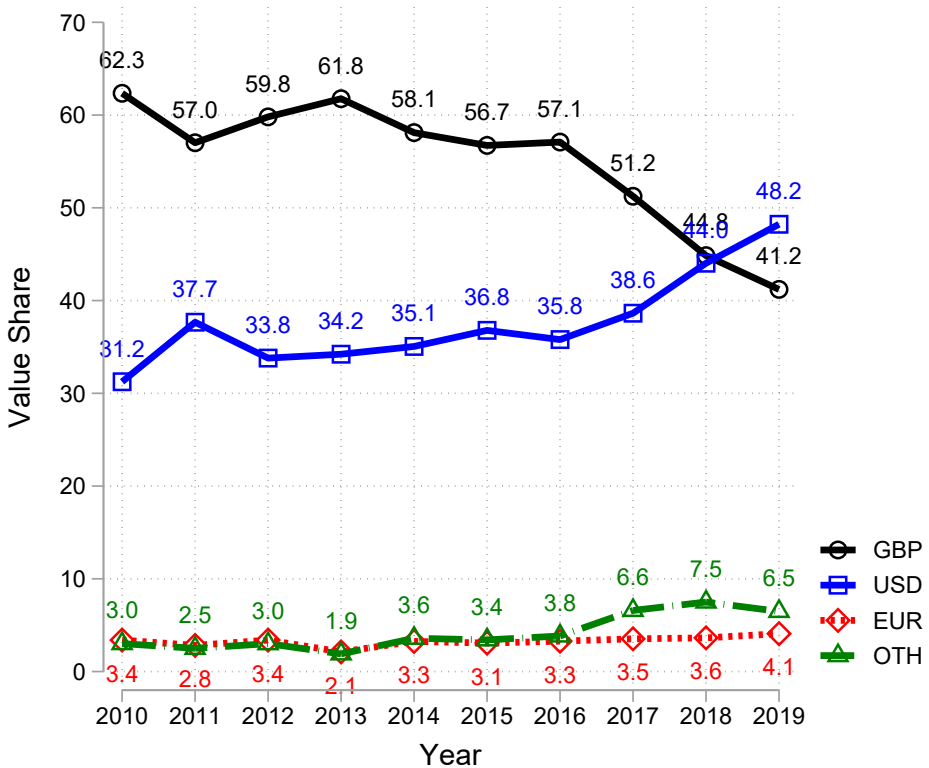
3. Significant role of firm heterogeneity
   - For more dollar imports $\Rightarrow$ more likely to switch to dollars for exports
   - For markets with more US competitors $\Rightarrow$ more likely to switch to dollars

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

▸ Data ▸ Constant value share measure ▸ Other currencies ▸ High frequency ▸ By product type

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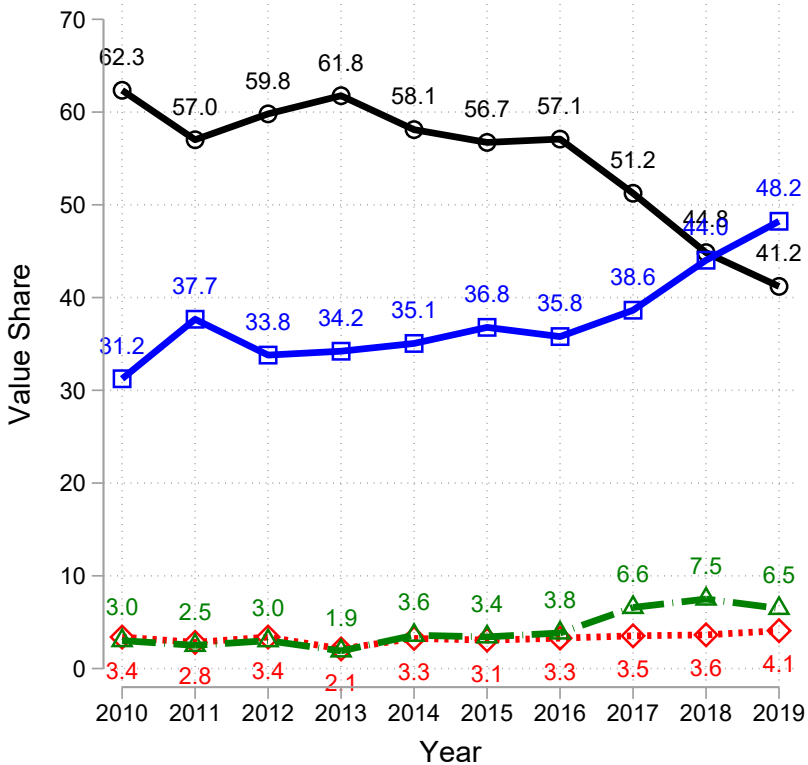
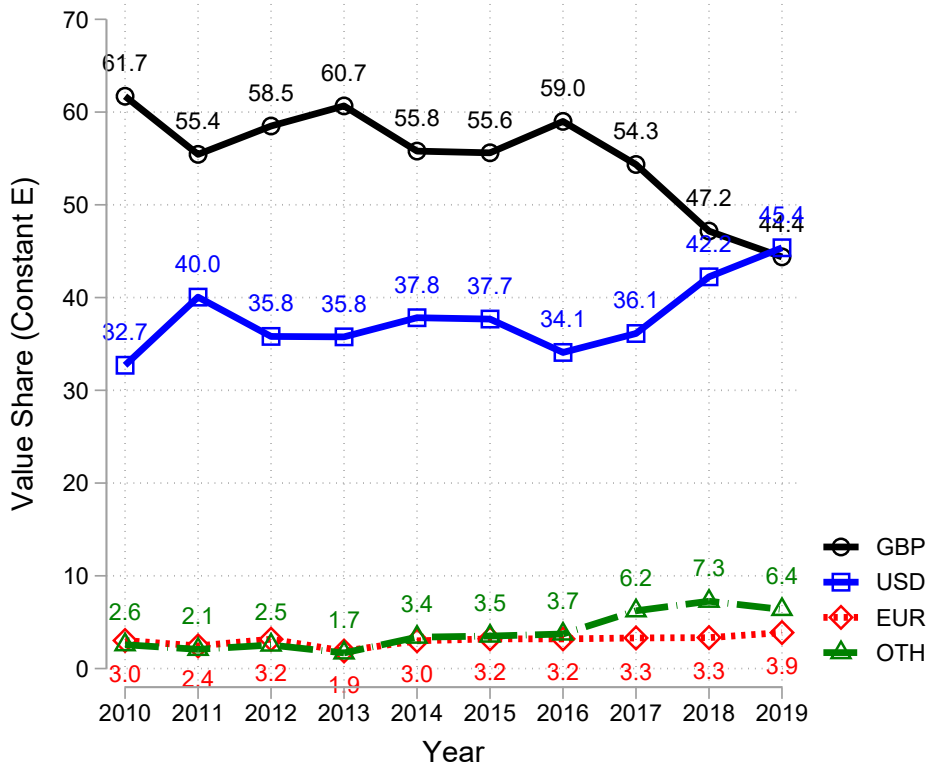


(b) Constant (exchange rate) value share



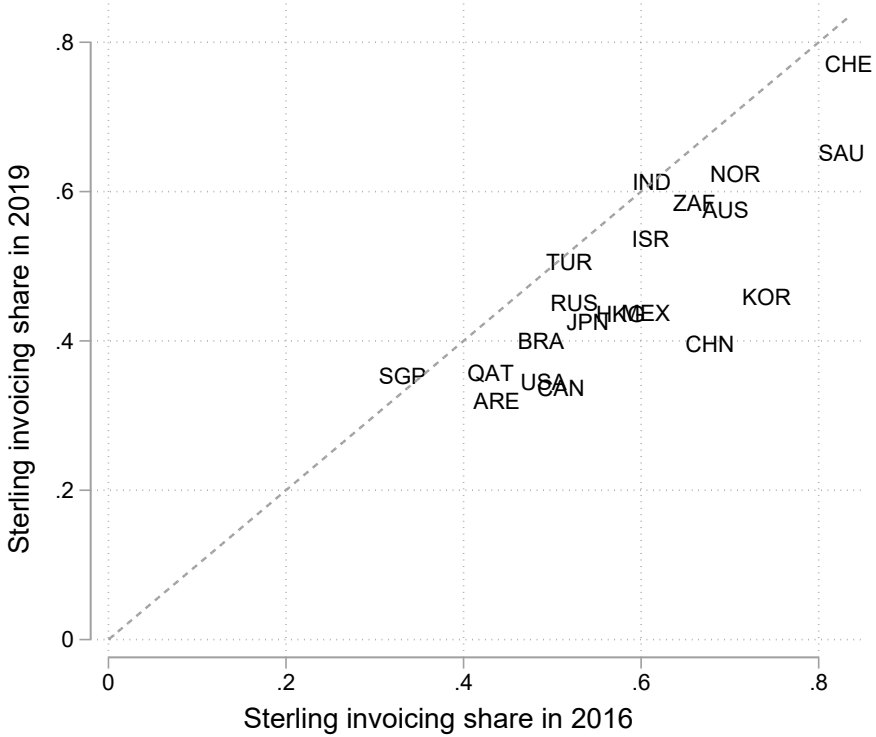
⇒ Fewer firms used sterling after the Brexit referendum

⇒ Smaller decline after accounting for mechanical effect of exchange rate movements

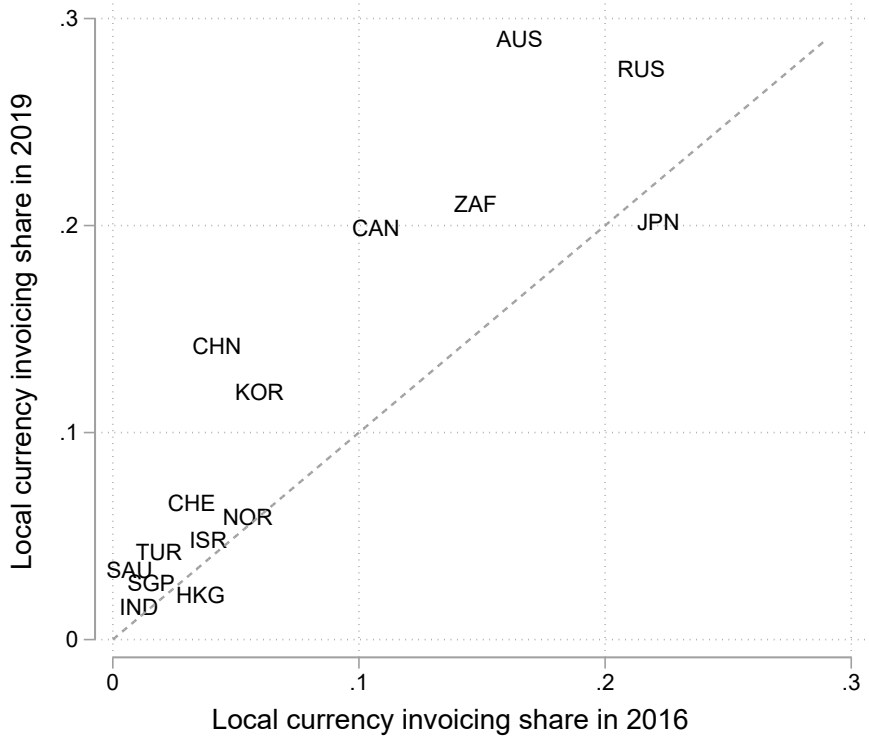
▸ Data ▸ Constant value share measure ▸ Other currencies ▸ High frequency ▸ By product type

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

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

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

$\mathcal{A}_{fpd}^k$: 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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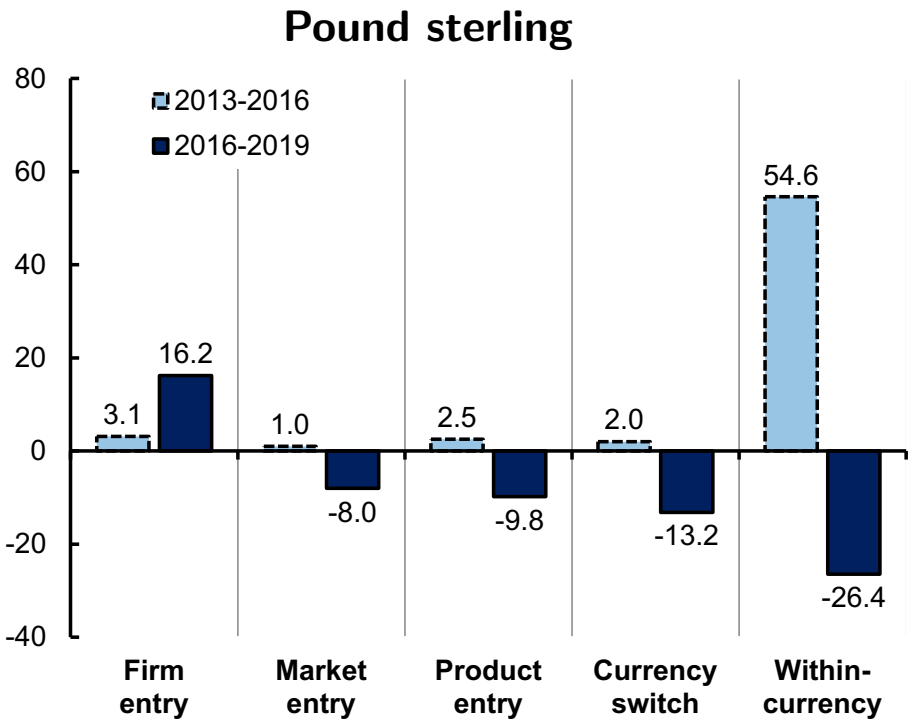
- **Currency switch** and **within currency** explain majority of the decline

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



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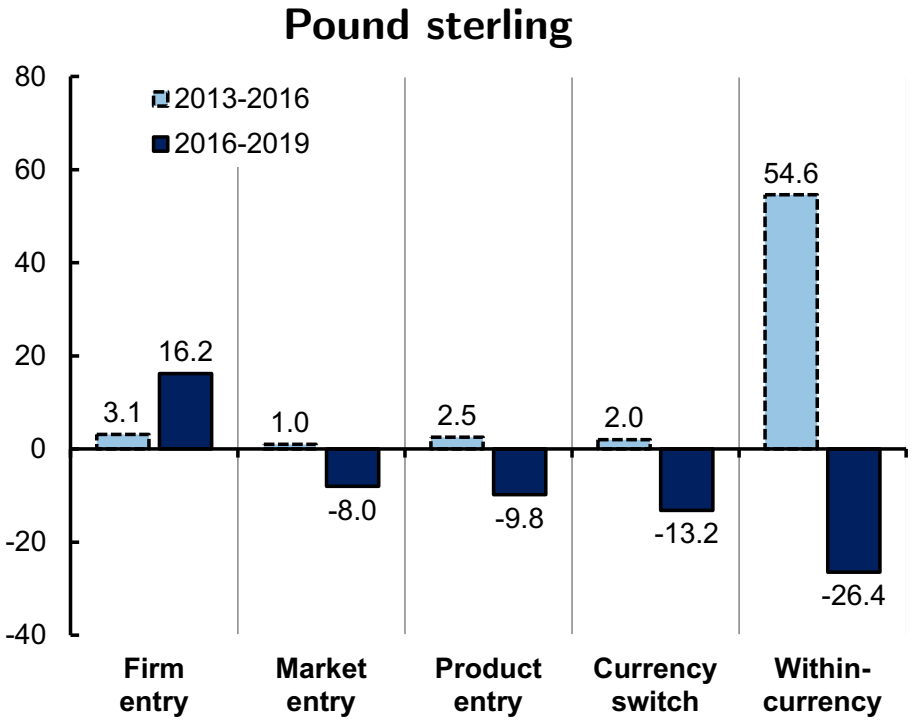

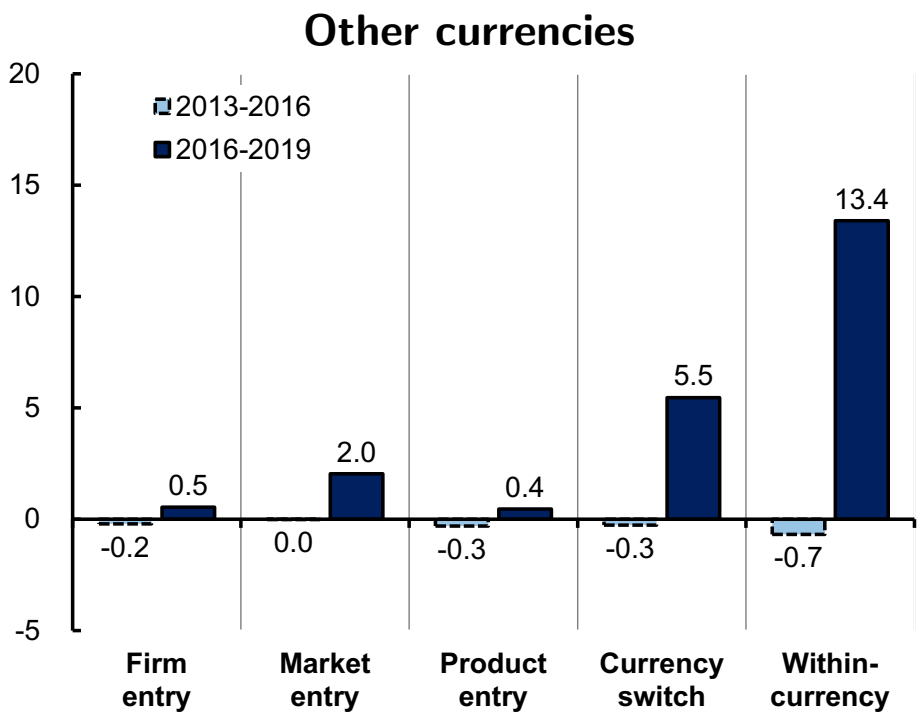

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▸ USD and EUR results ▸ Transaction share results

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^k_{fpdt} on firm and market characteristics:

$$\begin{aligned} S^k_{fpdt} = \quad & \alpha_0 \cdot imp\_local_{fd} + \alpha_1 \cdot (imp\_local_{fd} \times D_t) \\ & + \alpha_2 \cdot (imp\_USD_f \times D_t) + \alpha_3 \cdot (imp\_EUR_f \times D_t) \\ & + FE_f + FE_{pd} + FE_t + \epsilon_{fpdt} \end{aligned}$$

- 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 ≥ 2016
- $imp\_local_{fd}, imp\_USD_f, imp\_EUR_f$: firm's import share in local, USD and EUR

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- $US\_share_{id}, EU\_share_{id}$: 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	-9.27***	21.93***
	(2.25)	(3.16)	(5.68)
Local currency import share × post 2016	0.70	-0.46	0.80
	(1.36)	(1.62)	(2.86)
Dollar import share × post 2016	-1.67***	1.97***	-0.17
	(0.44)	(0.30)	(0.17)
Euro import share × post 2016	-2.12**	0.41	0.12
	(1.05)	(0.69)	(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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	(0.32)	(0.24)	(0.12)
Firm's market share (HS6) × post 2016	1.80***	-1.15***	-0.29*
	(0.37)	(0.32)	(0.15)
Firm size × post 2016	0.04	-0.04	0.06
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US market share (HS6) × post 2016	-0.09	1.02**	-0.42*
	(0.58)	(0.40)	(0.22)
EU market share (HS6) × post 2016	-0.82*	-0.91***	-0.34
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R^2	0.47	0.50	0.29
Firm + Country-Product + Year FEs	Yes	Yes	Yes

Conclusion

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

1. A swift decline in sterling use after the 2016 Brexit vote
   - Sterling share: 60% in 2016 $\Rightarrow$ 45% in 2019
   - Changes were widespread across destination markets

2. Most of this decline was driven by
   - Continuously-operating firms switch from sterling to dollars or local currencies
   - Decline in within-currency trade intensity for sterling loyal firms

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

Back

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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Accounting for mechanical valuation effect of exchange rate movements

To fix ideas, consider an example of two currencies:

	Before ($e_0 = 1.00$)		After ($e_1 = 0.9$)	
	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:

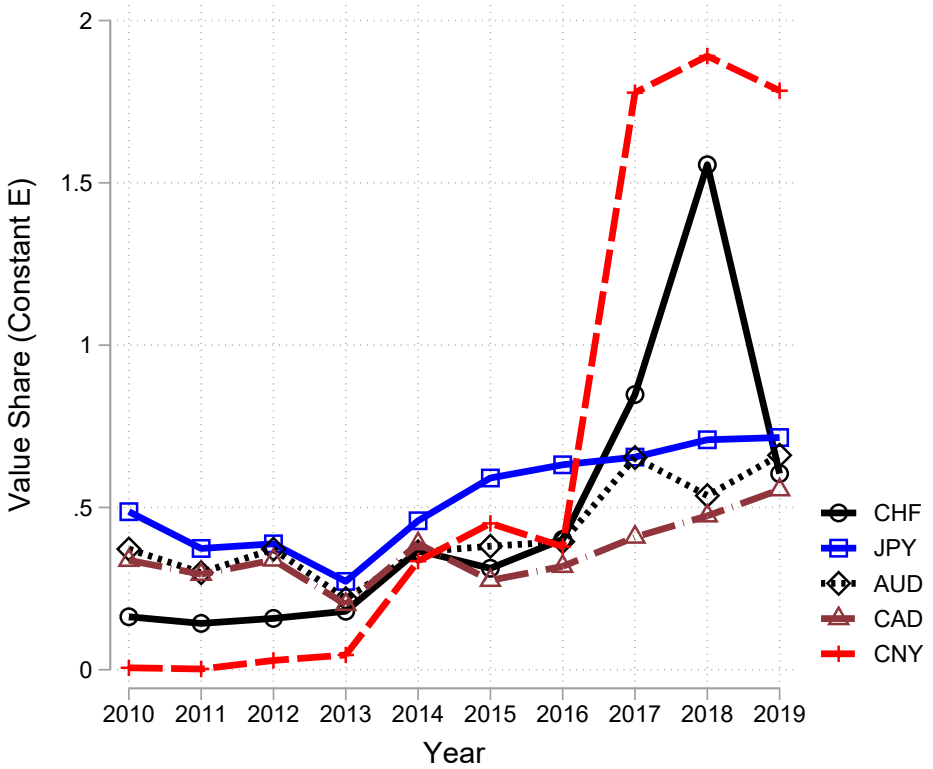
$$\text{Constant value share of USD at } t = \frac{v_t^{USD} e_t / e_0}{v_t^{USD} e_t / e_0 + v_t^{GBP}}$$

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

Back

Other invoicing currencies in UK's extra-EU exports

(c) Others: Constant value share

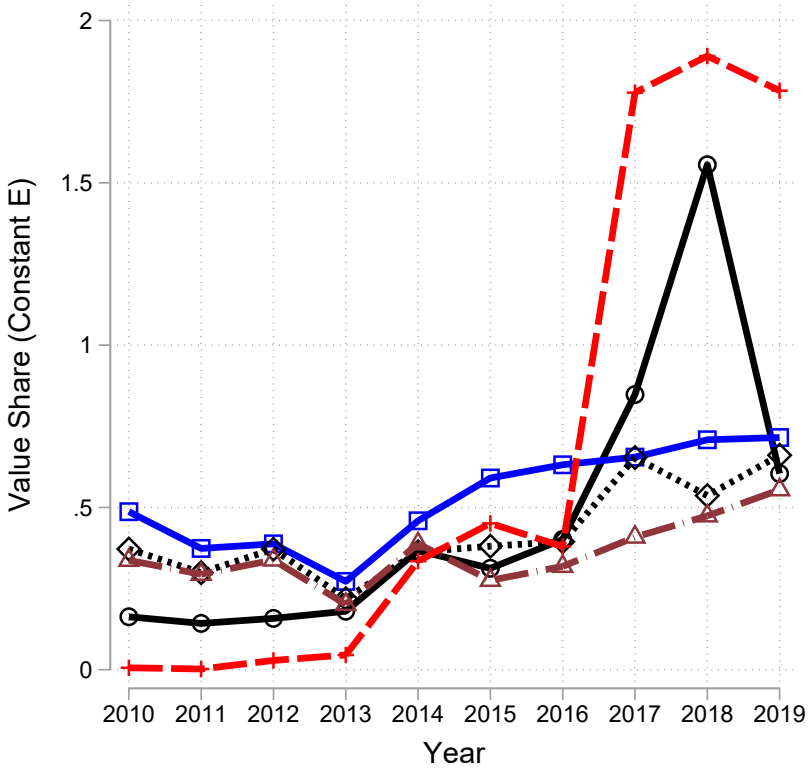


- Aggregate transaction share invoiced in all other currencies rose after Brexit

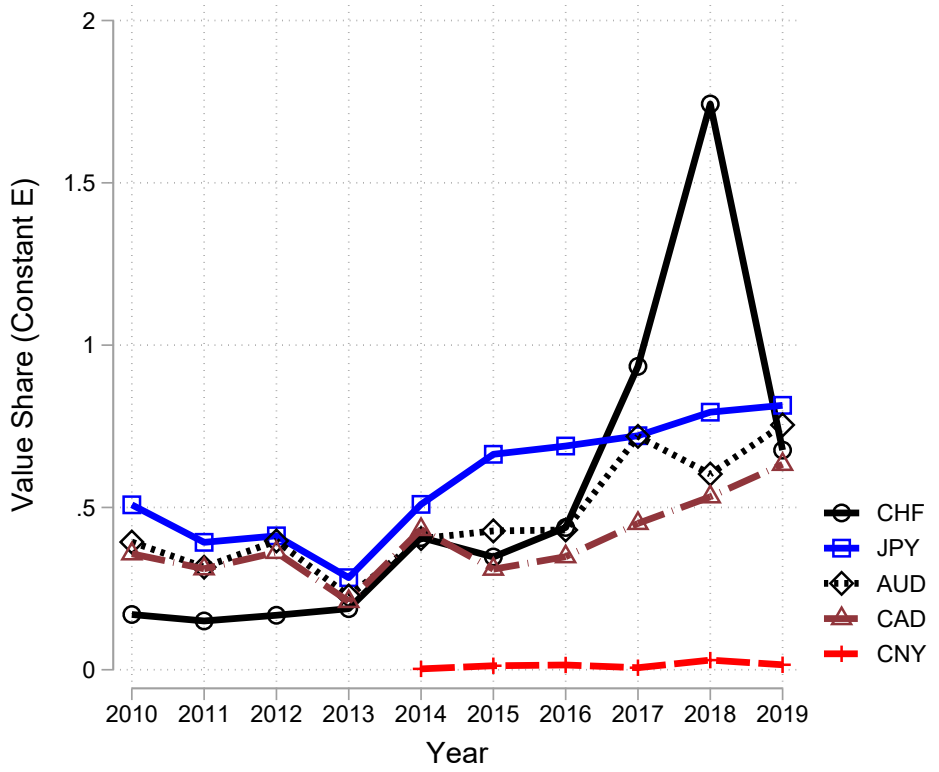
Back

Other invoicing currencies in UK's extra-EU exports

(c) Others: Constant value share



(d) Others excluding China

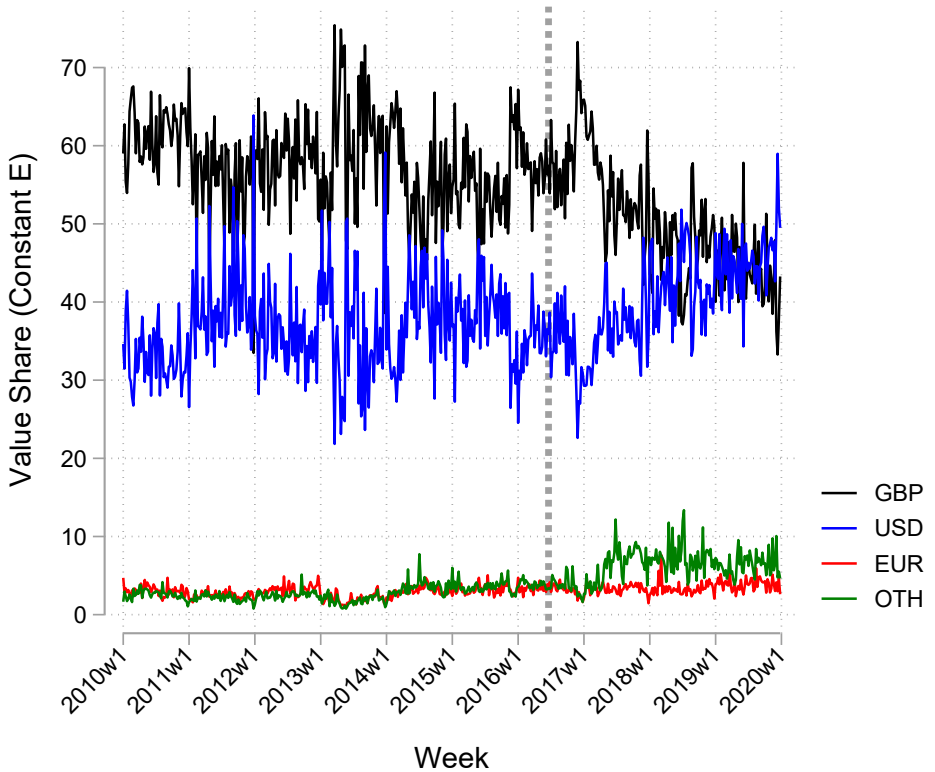


- Aggregate transaction share invoiced in all other currencies rose after Brexit
- Most changes in CNY were driven by exports to China (local currency pricing)

▸ Back

High frequency analysis

(a) All: Constant value share

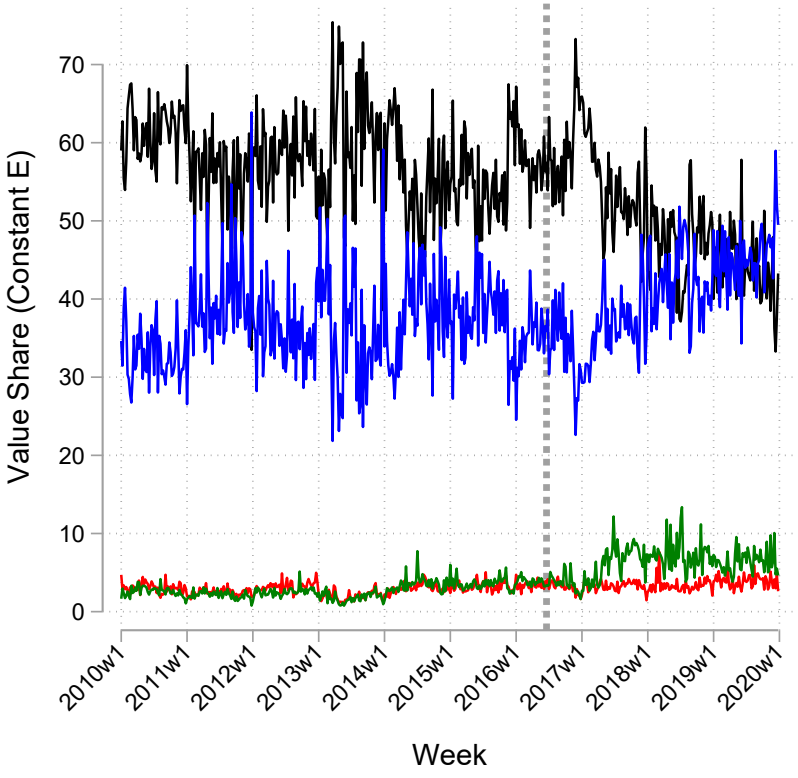


- Sterling share initially rose due to higher demand (when prices are sticky)
- Steady decline after 6 months post Brexit referendum

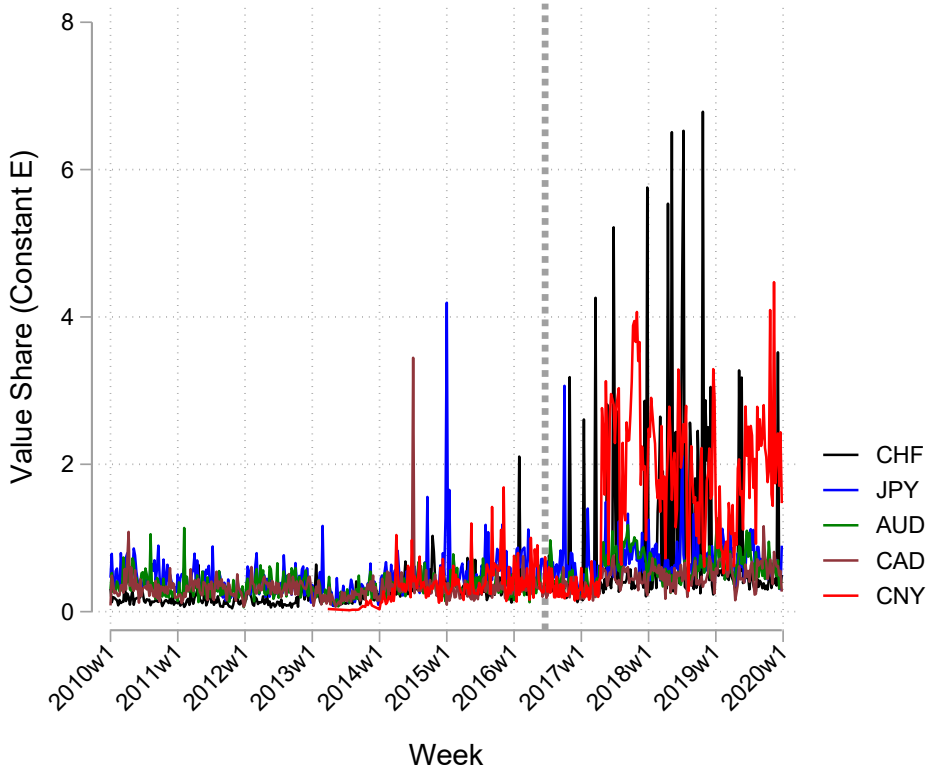
Back

High frequency analysis

(a) All: Constant value share



(b) Others: Constant value share

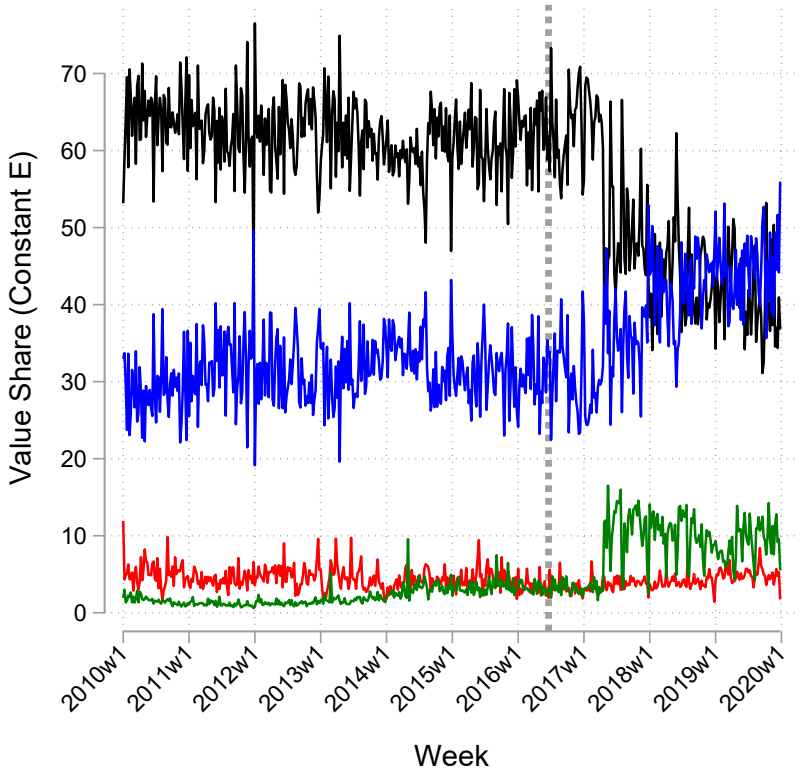


- Sterling share initially rose due to higher demand (when prices are sticky)
- Steady decline after 6 months post Brexit referendum
- Similarly, most increases in other currencies occurred after 2017

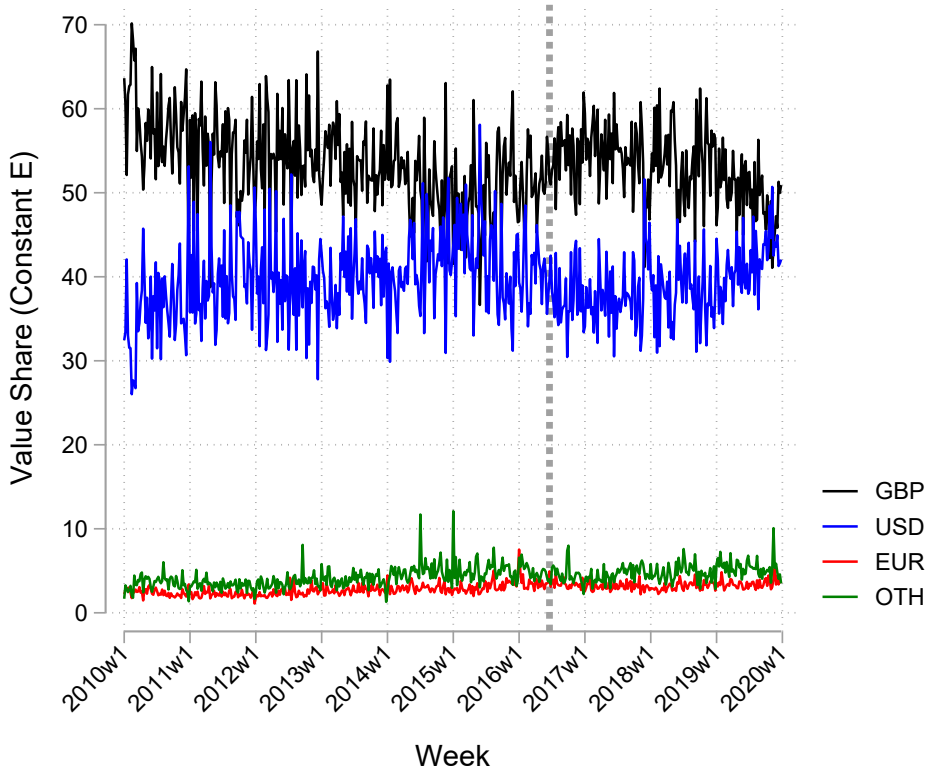
Back

Distinct patterns for high vs low differentiation goods

(a) High differentiation goods



(b) Low differentiation goods



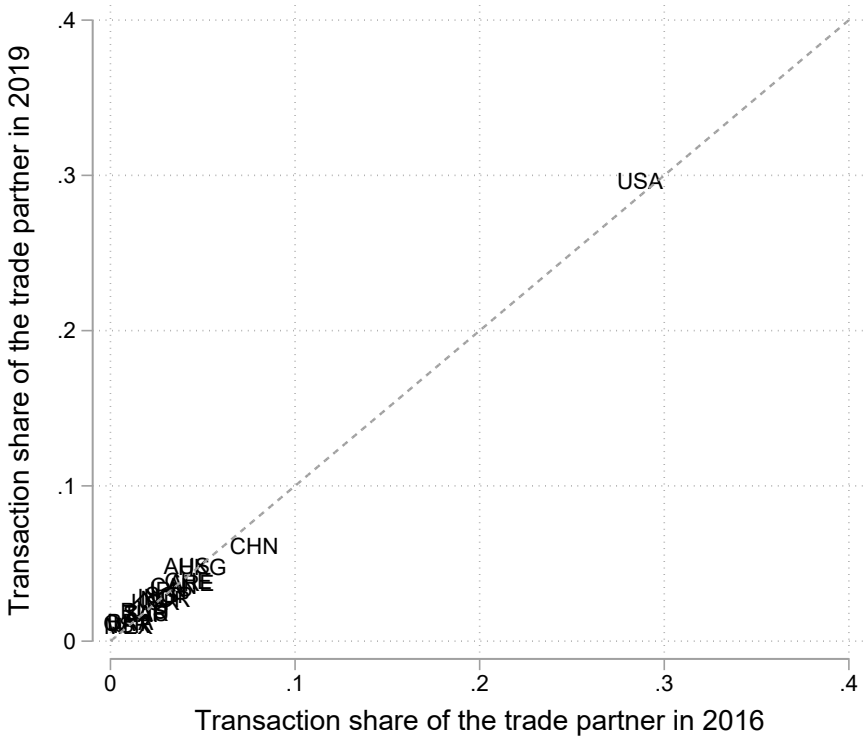
- Most changes were driven by high differentiation goods

$\Rightarrow$ Firms selling differentiated products tend to have market power and are more likely to use foreign currencies

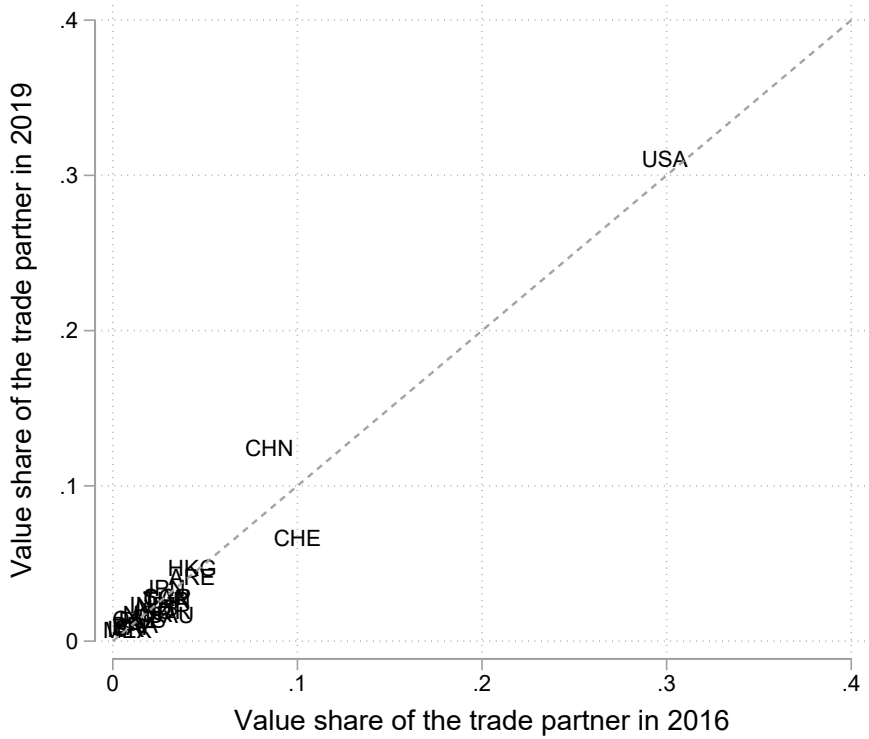
Back

Trade share across markets

(a) Transaction share: 2019 vs 2016



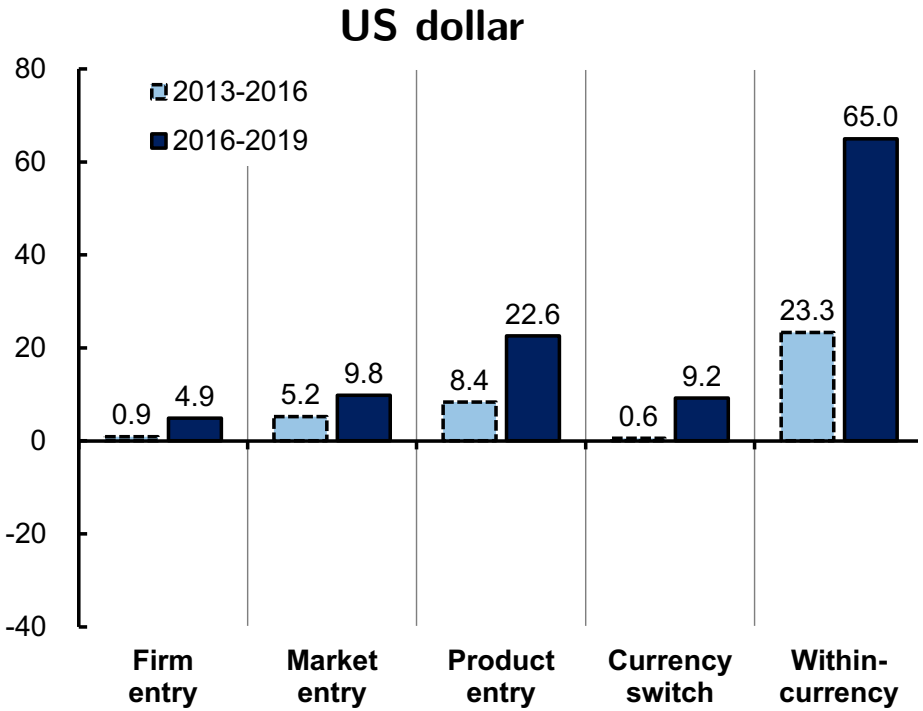
(b) Value share: 2019 vs 2016

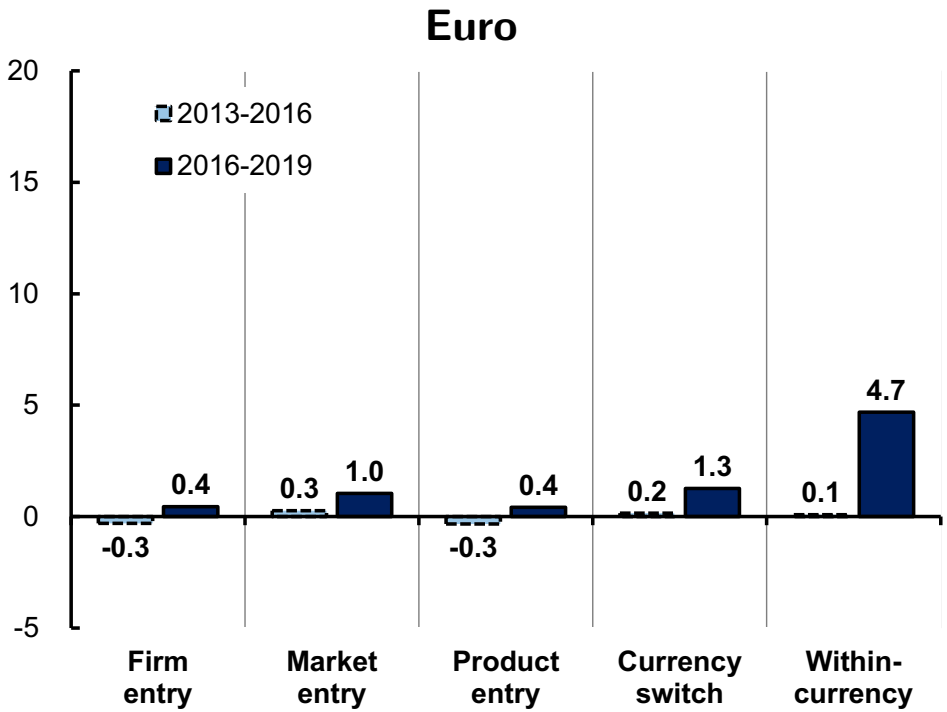


- No notable change in trade shares of these countries during 2016-2019

Back

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

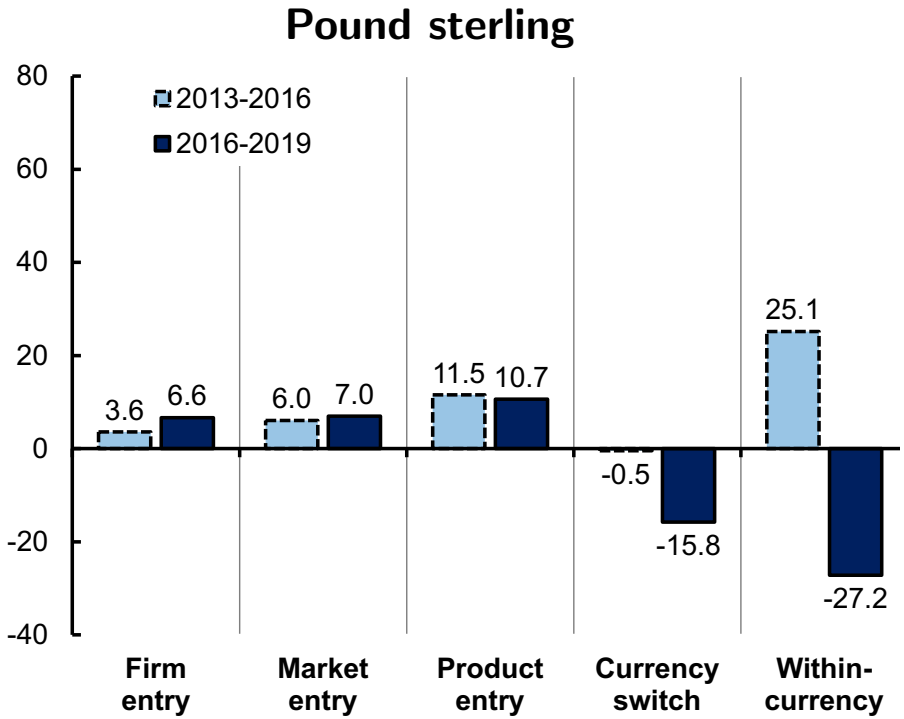


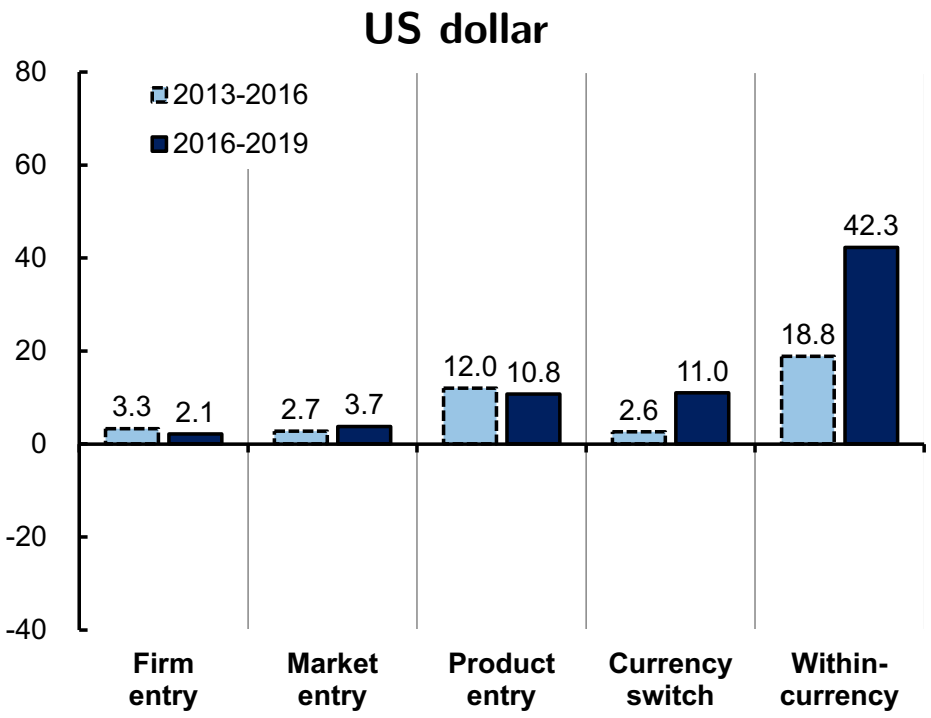


Back

Comparing contribution of micro margins

Transaction share measure

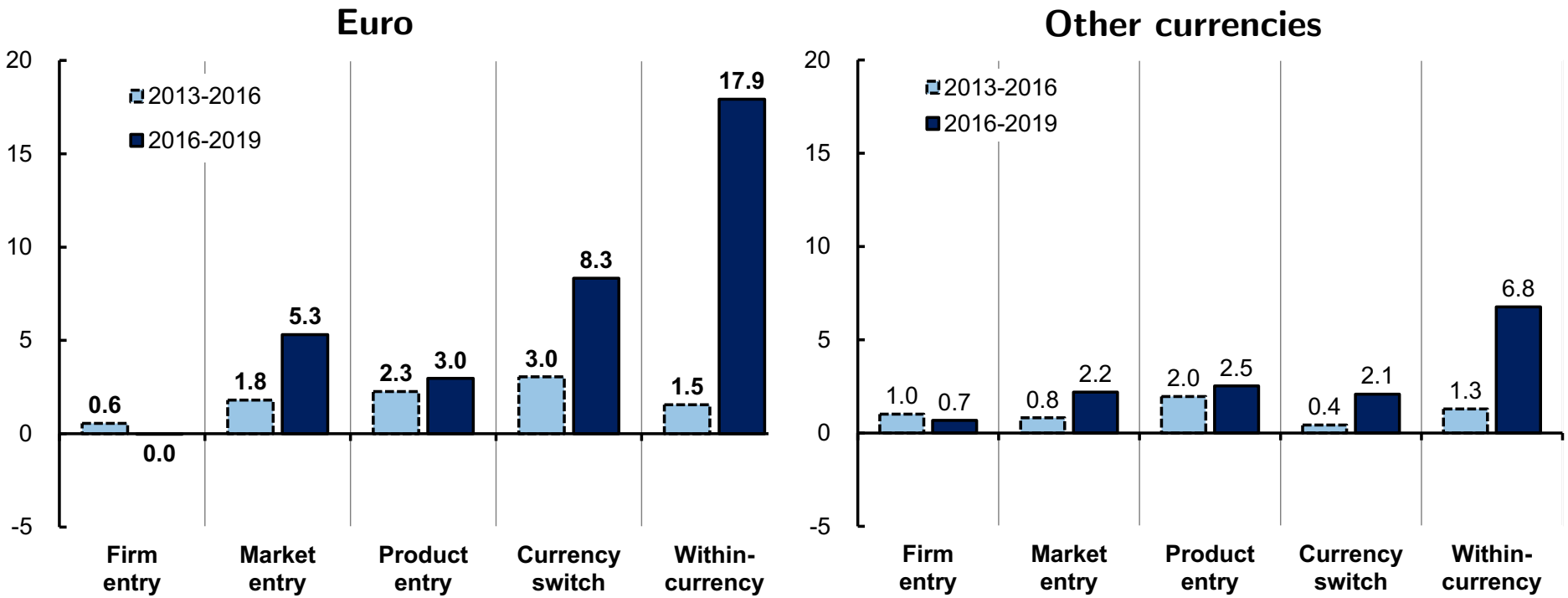




Back

Comparing contribution of micro margins

Transaction share measure



Back