Online Appendix for "Invoicing and Pricing-to-market: Evidence on international pricing by UK exporters"*

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1 Construction of Estimation Samples

We describe the construction of the estimation samples, "Extra-EU exports excluding the US," used in table 5 (conditional on a price change) and appendix table B1 (not conditioned on a price change), in detail. Construction of other estimation samples follows a similar algorithm.

0. Starting from the universe of HMRC extra-EU trade transactions, 2010-2017:

    - Transactions are aggregated at the firm-product-destination-supplementary unit-invoicing currency-time level, where product is measured at the 8-digit CN code; destination refers to the final destination of the shipment; supplementary unit reports the measurement unit of quantity; invoicing currency refers to the reported currency for each transaction; and time refers to the period over which transactions are aggregated, i.e., annually/quarterly/monthly/weekly.

1. Drop US from the estimation sample (to avoid the ambiguity associated with classification of US export transaction invoiced in US dollar as vehicle currency pricing or local currency pricing).

2. Match with the country concordance tables

    - HMRC uses its internal country coding system which is different from the ISO standard adopted by most international organizations. To import external macroeconomic series (such as exchange rates, CPI, etc.), we match the internal coding system of HMRC with international standard country codes by creating a concordance table matching strings of country names between these two coding systems.

3. Merge with series of bilateral exchange rates (defined as LCU per sterling)

    - In the matching process, 29 destinations are not matched: Ceuta and Mellila[1], Vatican City (code 45), Western Sahara (code 206, affected years 2013-2017), South Sudan (code 225, affected years 2013-2017), Ivory Coast

[1]No match is found from the ISO coding system. In addition, the internal code for these two destinations has changed in the year 1999. Ceuta and Mellila shared the same code (21) during the period 1996-1998. From 1999 onwards, the internal code of Ceuta and Mellila is 22 and 23 respectively.

(code 272, affected years 1996-2017), St Helena (code 329, affected years 1996-2017), Mayotte (code 377, affected years 1996-2013), Bonaire (code 475, affected years 2013-2017), Curacao (code 476, affected years 2013-2017), Saint Maarten (477, affected years 2013-2017), Saint Bartholomew (478 and 479, affected years 1996-2017), Timur-Leste (code 699, affected years 2001-2017), Austral Oceania (code 802, affected years 1996-2000), US Oceania (code 810, affected years 1996-2000), French Polynesia (code 822, affected years 1996-2017), Guam (code 831, affected years 2001-2017), US Minor Islands (code 832, affected years 2001-2017), Heard & McDonald (code 835, affected years 2001-2017), Polar Regions (code 890, affected years 1997-2000), Antarctica (code 891, affected years 2001-2017), Bouvet Island (code 892, affected years 2001-2017), South Georgia Island (code 893, affected years 2001-2012), French Southern Territory (code 894, affected years 2001-2017), Abu Dhabi (code 914, affected years 1996-2017), Dubai (code 917, affected years 1996-2017), Sharjah Etc (code 920, affected years 1996-2017), Niue Island (code 923, affected years 2001-2017), Cook Islands (code 926), Stores & Provis. (code 951 and 952, affected years 2015-2017).

4. Merge with other macro variables, e.g., CPI, real GDP and import-to-GDP ratio; Correct formats of comcodes (i.e., product codes used in HMRC trade data).

    - The comcodes in earlier years are reported with 8-digits and those in later years are reported with 15-digits. The 15-digit codes do not contain more information on the substance of the product, but merely add details on the tax and tariff codes of the related product. We use 8-digit measures throughout our analysis.
    - Some datasets report comcodes as a numeric variable, while others report comcodes at a string variable. We use string formats and add a zero in front of the numeric variables if necessary.

5. Convert concordance tables

    - There were major changes in the product definitions of CN codes in the years 2012 and 2017, and some minor changes in other years during our

sampling period. We wrote an algorithm to covert product classifications according to the official concordance tables and keep the maximum number of intertemporally-consistent product definitions.

6. Check and drop observations with obvious entry errors; import and integrate exchange rates of the reported invoicing currency for each transaction; Allocate transactions into bins of invoicing currency schemes (discussed in the main text).

7. Drop duplicates at the firm-comcode-country-invoicing scheme-time level.

8. Drop the observation if its unit value or associated bilateral exchange rates or CPI is missing.

9. Drop firm-comcode-destination-invoicing scheme quartets that do not survive for at least two time periods.

10. Drop extra-EU exports with no invoicing currency reported; Construct variables necessary for the TPSFE estimator. Save as the "full sample." This is the sample used in table 5 of the paper.

11. Starting from stage 9, filter out absolute price changes that are less than 5% at the firm-comcode-destination-invoicing scheme level.

12. Drop extra-EU exports with no invoicing currency reported; construct variables necessary for the TPSFE estimator. Save as "the sample conditional on price changes." This is the sample used in appendix table B1.

1.1 Note on the observations in each stage of the data cleaning process

Table 1: Extra-EU exports – annual sample

Stage	Observations	Trade Value (million £)	Firms	Products	Countries	Currencies	Years
0	9,144,028	1,297,646	172,194	10,699		137	8
1	7,777,932	964,740	155,060	10,621		133	8
2	7,745,492	963,056	154,832	10,611	189	133	8
3	7,726,667	962,225	154,628	10,608	172	131	8
4	7,726,667	962,225	154,628	10,527	172	131	8
5	7,607,344	940,492	153,952	9,025	172	129	8
6	7,607,344	940,492	153,952	9,025	172	128	8
7	7,518,511	900,512	153,919	9,025	172	122	8
8	7,121,270	881,556	150,307	9,007	151	121	8
9	3,953,627	785,444	63,251	8,178	151	86	8
10	2,603,787	706,879	52,946	7,918	151	86	8
11	3,757,166	674,232	63,251	8,178	151	86	8
12	2,407,326	595,667	52,946	7,918	151	86	8

Table 2: Extra-EU exports – quarterly sample

Stage	Observations	Trade Value (million £)	Firms	Products	Countries	Currencies	Years
0	13,732,689	1,297,646	172,194	10,699		137	8
1	11,569,030	964,740	155,060	10,621		133	8
2	11,525,266	963,056	154,832	10,611	189	133	8
3	11,493,022	961,312	154,615	10,609	169	131	8
4	11,493,022	961,312	154,615	10,528	169	131	8
5	11,310,091	939,584	153,939	9,025	169	129	8
6	11,310,091	939,584	153,939	9,025	169	128	8
7	11,224,500	919,939	153,924	9,025	169	123	8
8	10,651,299	901,130	150,332	9,007	151	122	8
9	7,740,055	834,550	73,020	8,358	151	95	8
10	5,150,064	752,022	61,140	8,163	151	95	8
11	7,167,496	639,454	73,020	8,358	151	95	8
12	4,577,505	556,925	61,140	8,163	151	95	8

Table 3: Extra-EU exports – monthly sample

Stage	Observations	Trade Value (million £)	Firms	Products	Countries	Currencies	Years
0	18,450,503	1,297,646	172,194	10,699		137	8
1	15,341,884	964,740	155,060	10,621		133	8
2	15,287,838	963,056	154,832	10,611	189	133	8
3	15,242,341	960,943	154,572	10,609	167	131	8
4	15,242,341	960,943	154,572	10,528	167	131	8
5	14,994,860	939,217	153,895	9,025	167	129	8
6	14,994,860	939,217	153,895	9,025	167	128	8
7	14,916,434	928,177	153,890	9,025	167	127	8
8	13,160,444	873,962	144,448	8,985	143	125	8
9	10,526,190	816,248	72,867	8,389	143	100	8
10	7,087,461	738,244	61,071	8,192	143	100	8
11	9,593,621	581,421	72,867	8,389	143	100	8
12	6,154,892	503,417	61,071	8,192	143	100	8

Table 4: EU exports – annual sample

Stage	Observations	Trade Value (million £)	Firms	Products	Countries	Years
0	11,283,558	1,155,153	38,096	10,882		8
1	11,283,558	1,155,153	38,096	10,882		8
2	11,283,477	1,154,455	38,096	10,882	27	8
3	11,283,477	1,154,455	38,096	10,882	27	8
4	11,283,477	1,154,455	38,096	10,882	27	8
5	11,074,969	1,100,276	37,800	9,153	27	8
6	11,074,969	1,100,276	37,800	9,153	27	8
7	11,021,478	1,093,864	37,796	9,153	27	8
8	10,998,143	1,093,605	37,739	9,153	27	8
9	9,502,464	1,063,853	28,531	8,847	27	8
10	9,502,464	1,063,853	28,531	8,847	27	8
11	8,566,122	839,261	28,531	8,847	27	8
12	8,566,122	839,261	28,531	8,847	27	8

Table 5: EU exports – quarterly sample

Stage	Observations	Trade Value (million £)	Firms	Products	Countries	Years
0	27,231,570	1,155,153	38,096	10,882		8
1	27,231,570	1,155,153	38,096	10,882		8
2	27,231,336	1,154,455	38,096	10,882	27	8
3	27,231,336	1,154,455	38,096	10,882	27	8
4	27,231,336	1,154,455	38,096	10,882	27	8
5	26,717,436	1,100,276	37,800	9,153	27	8
6	26,717,436	1,100,276	37,800	9,153	27	8
7	26,643,764	1,097,014	37,799	9,153	27	8
8	26,586,793	1,096,641	37,742	9,153	27	8
9	25,442,775	1,082,868	32,134	8,937	27	8
10	25,442,775	1,082,868	32,134	8,937	27	8
11	21,762,505	701,555	32,134	8,937	27	8
12	21,762,505	701,555	32,134	8,937	27	8

Table 6: EU exports – monthly sample

Stage	Observations	Trade Value (million £)	Firms	Products	Countries	Years
0	52,728,128	1,155,153	38,096	10,882		8
1	52,728,128	1,155,153	38,096	10,882		8
2	52,727,521	1,154,455	38,096	10,882	27	8
3	52,727,521	1,154,455	38,096	10,882	27	8
4	52,727,521	1,154,455	38,096	10,882	27	8
5	51,698,042	1,100,276	37,800	9,153	27	8
6	51,698,042	1,100,276	37,800	9,153	27	8
7	51,605,130	1,098,403	37,799	9,153	27	8
8	51,495,998	1,097,972	37,742	9,153	27	8
9	50,451,648	1,086,644	32,799	8,967	27	8
10	50,451,648	1,086,644	32,799	8,967	27	8
11	42,321,912	649,964	32,799	8,967	27	8
12	42,321,912	649,964	32,799	8,967	27	8

1.2 Note on constructing the weekly sample

The construction of the weekly sample used in table 4.

0. Starting from the universe of trade transactions.
1. Drop US from the estimation sample as we cannot distinguish whether an export transaction invoiced in dollar is vehicle currency pricing or local currency pricing.
2. Check and drop observations with obvious entry errors.
3. Aggregate data at the firm-product-destination-invoicing currency-week level.
4. Drop those destinations that use Dollar or Euro as their domestic currency.
5. Drop those transactions whose invoicing currency is neither sterling, nor dollar, nor euro, nor local currency.
6. Drop if the absolute price change is less than 5%.
7. Merge with series of weekly bilateral exchange rates (defined as units of local currency per sterling);[2] Drop if the weekly bilateral exchange rate of the destination is not available.

Table 7: Extra-EU Exports 2015-2017 – Weekly Sample

Stage	Observations	Trade Value (million £)	Firms	Products	Countries	Currencies
0	11,984,123	475,888	111,502	9,419	210	114
1	9,268,745	348,153	98,964	9,343	209	111
2	9,268,397	348,079	98,961	9,298	209	111
3	8,266,168	348,079	98,961	9,298	209	111
4	8,263,692	348,049	98,947	9,298	202	111
5	8,221,721	346,032	98,834	9,296	202	23
6	7,328,066	251,819	98,834	9,296	202	23
7	4,854,264	181,252	80,000	8,971	27	23

[2]Weekly exchange rates are calculated as the average of daily rates published by the Bank of England.

Table 8: Invoicing currencies in the extra-EU exports 2015-2017 weekly sample - Conditional on a Price Change

Currency	Transactions	Freq.
AUD	45,753	1.2
CAD	35,771	1.0
CHF	31,853	0.9
CNY	8,506	0.2
DKK	273	0.0
EUR	277,611	7.4
GBP	2,438,368	65.2
HKD	18,875	0.5
ILS	1,852	0.0
INR	1,373	0.0
JPY	34,088	0.9
KRW	14,440	0.4
MYR	1,426	0.0
NOK	23,569	0.6
NZD	4,912	0.1
RUB	8,497	0.2
SAR	711	0.0
SGD	6,512	0.2
THB	2,789	0.1
TRY	2,082	0.1
TWD	2,347	0.1
USD	765,993	20.5
ZAR	13,341	0.4
Total	3,740,942	100.0

Note: Statistics are calculated based on the Stage 6 sample described in Table 7. The total number of observations in the Stage 6 sample is 4,854,264 , which includes 1,113,322 observations with no invoicing currency reported.