Testing Heterogeneous Currency Exchange Rate Pass-through: Evidence from Firm-Level Cotton Yarn Export Data

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SWET

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1-1. Introduction: "Pass-through 101"

- Currency exchange rate ⇒ export price measured in ***X*** (e.g., ***yen***)

E.g.,

$$\log(\textit{yen export price}) = \alpha + \beta \log(\textit{yen/USD}) + \varepsilon$$

or

$$\triangle\log(\textit{yen export price}) = \alpha + \beta \triangle \log(\textit{yen/USD}) + \varepsilon$$

⇒ $\beta \fallingdotseq 0$: Only the export price measured in local-(i.e., destination-)currency fluctuates (i.e., complete pass-through)

⇒ $\beta \fallingdotseq 1$: Only the export price measured in home-currency fluctuates (⇒ profit margin is altered if production cost is not altered)

- "Incomplete" pass-through: $\beta \neq 0$
  - Implication: Export dynamics (e.g., disconnect puzzle: macro), market structure (industry), and firms' pricing behavior (micro)

Note: “Pass-through” on export price measured in local-currency

In this specification, again, β’ accounts for pass-through
(i.e., smalle β’ ⇔ lower pass-through)

E.g.,

$\log(\textbf{\textit{USD export price}}) = \alpha' + \beta' \log(\textbf{\textit{yen/USD}}) + \varepsilon$

or

$\triangle\log(\textbf{\textit{USD export price}}) = \alpha' + \beta' \triangle \log(\textbf{\textit{yen/USD}}) + \varepsilon$

1-2. Introduction: Background issues

- Well known **"incomplete"** pass-through phenomenon
  - Gopinath et al. (AER 2010), Nakamura & Steinsson (AER 2012)

    ⇒ **Note**: Some mechanism seems to be there but exactly what?

- Potentially many firm-level **"heterogeneity"**
  - Melitz & Ottaviano (RES 2008): Price
  - Atkeson & Burstein (AER 2008): Market share
  - Baldwin & Harrigan (AEJ-Micro 2011): Product quality
  - Amiti et al. (AER 2014): Import intensity & market share

    ⇒ **Note**: Many potentially important factors but separately examined…

- **"Far less than ideal"** data
  - Aggregate data or unit value computed from custom data are used…
  - Exception? Goldberg & Verboven (RES 2001): Automobile, Nakamura & Zerom (RES 2010): Coffee, Fitzgerald & Haller (RES 2014): "Plant-product"

    ⇒ **Note**: Still coarse & not interacted with firm-level heterogeneity

2. This paper

In practice, different counts are considered as different products
(e.g., In modern clothing, dress shirt: 40-120 count, casual shirt: 20-80 count)

☐ Ideal data

- Highly homogenous product (cotton yarn in a specific count: "16-bante")
  - ⇒ Even better than Fitzgerald & Haller (2014): SIC 8 digit-level
    (E.g., 22810302: COTTON YARN, SPUN)
  - ⇒ Exported to a specific (Shanghai) market
- High frequency (monthly) firm-level export price data
  - ⇒ Allows panel estimation to control for many unobservable factors
- Exogenous currency exchange rate dynamics under the gold standard in Japan and the silver standard in China (i.e., destination country)

☐ Comprehensive analysis of firm heterogeneity

- Accompanied by comprehensive firm characteristics
  - ⇒ Explicitly study multiple factors

⇔ **Historical but unparalleled data** (Braguinsky et al. AER 2015)

3. Key takeaways

- Low unconditional pass-through rate (⇔Fitzgerald & Haller 2014)
- Large firm-level heterogeneity is masked in this unconditional estimation, and pass-through turns out to depend on…
  - TFP, firm size, import intensity★ as in the extant studies

- Pass-through also depends on …
  - Labor skill★ (⇔Product quality),
  - Inventory turnover★ (⇔Financial constraint)
  - Aggregate-level funding rate★ (bit puzzling direction though…)
  - "★" are fairly robust to the inclusion of (i) timing of entry to export market, (ii) geographical location, and (iii) other currency exchange rate dynamics etc.

Access to major ports, cities, labor pool etc.

⇒ **First analysis** employing **extremely precise price data** to uncover how **multiple** firm heterogeneities affect pass-through

4-1. Literature: “Mark-up” channel

- Larger β (⇔lower pass-through) when…
  - Higher productivity (Lower price: Melitz & Ottaviano RES 2008)
  - Higher market share (Atkeson & Burstein AER 2008)
  - Higher product quality (Baldwin & Harrigan AEJ-Micro 2011)

← Lower price elasticity of **demand**

⇔ Higher mark-up dynamics ⇔ Lower pass-through

4-2. Literature: "Marginal cost" channel

- Larger β (⇔lower pass-through) when…
  - Higher import intensity of intermediate goods (Amiti et al. AER 2014)
  - Central product (Chatterjee et al. AEJ-Policy 2013)
  - Higher local distribution cost share (Corsetti & Dedola JIE 2005)
  - Higher productivity

← Higher sensitivity of **production/supply** cost to exchange rate

⇔ Higher sensitivity of home currency-measured price

⇔ Lower pass-through

4-3. Literature: Empirical

- Firm heterogeneity & pass-through
  - Berman et al. (QJE 2012): Firms w/ higher TFP shows larger mark-up dynamics (⇔lower pass-through)
  - Amiti, et al. (AER 2014): (i) Firms w/ larger market share and/or (ii) firms w/ higher import intensity shows larger mark-up dynamics (⇔ lower pass-through)

⇒ Gopinath (JME 2013): "***Need to incorporate multiple factors at once***" (Against somewhat sloppy analysis in Strasser JME 2013)

5-1. Data: Firm-month export price

- Hand-collected from industry report (Geppo: 大日本紡績連合会月報)
- Monthly frequency firm-level export price data
- 1897/5～1898/6, 1901/10, 1902/4～1903/12, 1911/6～1914/12
  - ⇒ Note: The gold standard was introduced in 1897
  - ⇒ Note: Periods associated with major events (e.g., The Boxer Rebellion, Japan-Russo war) are exluded
- Firm ID, count-level (e.g., 16, 20, etc.) export price
  - For each firm × count, we have max (highest reported prices), min (lowest), avr (average price over month)
  - Mainly 16 and 20 count data are available (also 10, 12, and 14)
  - Price information from China and Indian producers are also available
- Domestic price (製糸十六番手一梱平均代価)
- Export quantity (16 and 20 count: converted to 梱数)
- Many missing data on export quantity (even when prices are reported)
- Mumbai price is also partially available

Note: 22, 23, 24, 30, 32, 40, 41, 42, 60, and 80 counts were actually produced

雲龍魁玉の類には一匁高を以て當地紡績筋に數千俵先物約定出來たる爲め各銘物にも一般一二匁高直相場を示し從て實棉も五匁方騰貴を見るに至れり通州物南北雜牌類にも一般在荷薄の事なれは氣配强氣を含み尚一段上進もせさらん現況なり

今本日の出來直を上れは左の如し

品銘		出來直	品銘		出來直
通州器械繰別上		一七、二〇	上海器械繰上長崎向六片入		一六、二〇
仝	上等	一七、〇〇	仝	中等仝	一六、二〇
仝	中等	一六、八〇	上海製通州器械繰上等		一七、〇〇
仝	下等	一六、六〇	仝	中等	一六、八〇
上海器械繰雲錦		—	寧波器械繰バース附上等		一六、八〇
仝	雲龍	一七、一〇	仝	中等	一六、五〇
仝	錦玉	一六、八〇	仝	下等	一六、三〇
仝	白雪	一六、六〇	通州實綿	一號	六、四〇
仝	魁玉	一七、〇〇	仝	二號	六、四〇
仝	雪錦	一六、八〇	上海仝女姑	一號	六、四〇
仝	上一品	一六、八〇	仝	二號	六、三〇
仝南北雜牌別上		一六、八〇	仝	高庄	六、三〇
仝	上等	一六、四〇	仝	抄庄	六、一〇
仝	中等	一六、二〇	寧波仝	一號	六、三〇
仝	下等	一六、〇〇	仝	二號	六、一〇

次に本週中に於ける取組高を上れは左の如し

通州器械繰別上	三五〇	上海器械繰南北雜牌別上
上海器械繰雲龍	二〇〇	仝　上等

仝　魁五　五〇〇　寧波器械繰バース附　二〇〇
仝　上一品　一、三〇

○其三　（六月十日報）

本週に於ける棉花市況は前報の如く當地紡績筋の當用口の望取にして買進まさるも賣人筋には在荷薄且つ實綿高直引締め居相場保合居るも需用筋には一般相場不引合を唱へて望取薄昨今の氣配稍や引緩み茲或は下落を見るやも不斗景況にして本週の取組は當地紡績筋及び儘々の牛耳筋の手合とす

今日の出來直は前報と仝樣に附き省略す而して本週間に於ける取組高を上れは左の如し

上海器械繰雲龍	六五〇	
仝　雪錦	二〇〇	
仝南北雜牌上等	三〇〇	
仝　中等	一〇〇	
寧波器械繰バース附中等	一〇〇	
仝　下等	一〇〇	

上海綿糸商況　申興洋行報

○其一　（四月廿二日報）

本週中本邦糸の商況は前週に於て天津其他北淸筋の望取ありし爲め多少の氣配も見直し居りしも其後は各當用筋共更に買進まん模樣もなく依然少數の手合に止ま

り買人筋は安附口の儘見送りの姿にて氣配も頓と引立ち兼品に依り二匁五分乃至五匁安にて手合出來居れり尚引續き需用薄には多少の下押は有之るが如き現況にて本週の取組高は二百三十餘俵にして在荷高は六千〇六十餘俵とす其相場は左の如し

日本糸十六手	二十手	上海糸十四手	十六手	孟買糸	二十手
大阪象	七、三五	茂生	七、三五	上	七、三五
平野馬	七、三五	怡和	七、〇〇	中	六、九〇
堀津孔雀	七、三五	瑞記	七、〇〇	中以下	六、八五
鐘淵魚	七、三五	老公茂	七、〇〇	上	六、八五
東京牡丹	七、三五	協隆	七、〇〇	中以下	六、八五
仝金獅子	七、二五	裕源	七、〇〇	十六手	
朝日双鹿	七、二五	大純	七、〇〇	上	六、八五
岡山花蝶	七、二五	華盛	六、九五	中以下	六、八五
三池三管	七、二五	新	六、九五	十二手	
浪花塔象	七、二五			上	六、八五
泉州戎	七、二五			中	六、八五
玉島和合人	七、二五			中以下	六、八〇
金市花瓶	七、二五			十手	
備前伏龍	七、二五			上	六、八五
岸和田	七、二五			中	六、八〇
天滿	七、二五			中以下	六、八〇
尼ケ崎	七、二五				
七星	七、二五				

次に本週中取組高を上れは左の如し

日本糸十六手	二十手	上海糸十六手	二十手	孟買糸	二十手
大阪象	七、三五	茂生	七、三五	上	七、三五
平野馬	七、三五	怡和	七、三五	上	七、三五
堀津孔雀	七、三五	瑞記	七、三五	中	七、三五
鐘淵魚	七、三五	老公茂	七、〇〇	中以下	六、九五
東京牡丹	七、三五	協隆	七、〇〇	十六手	

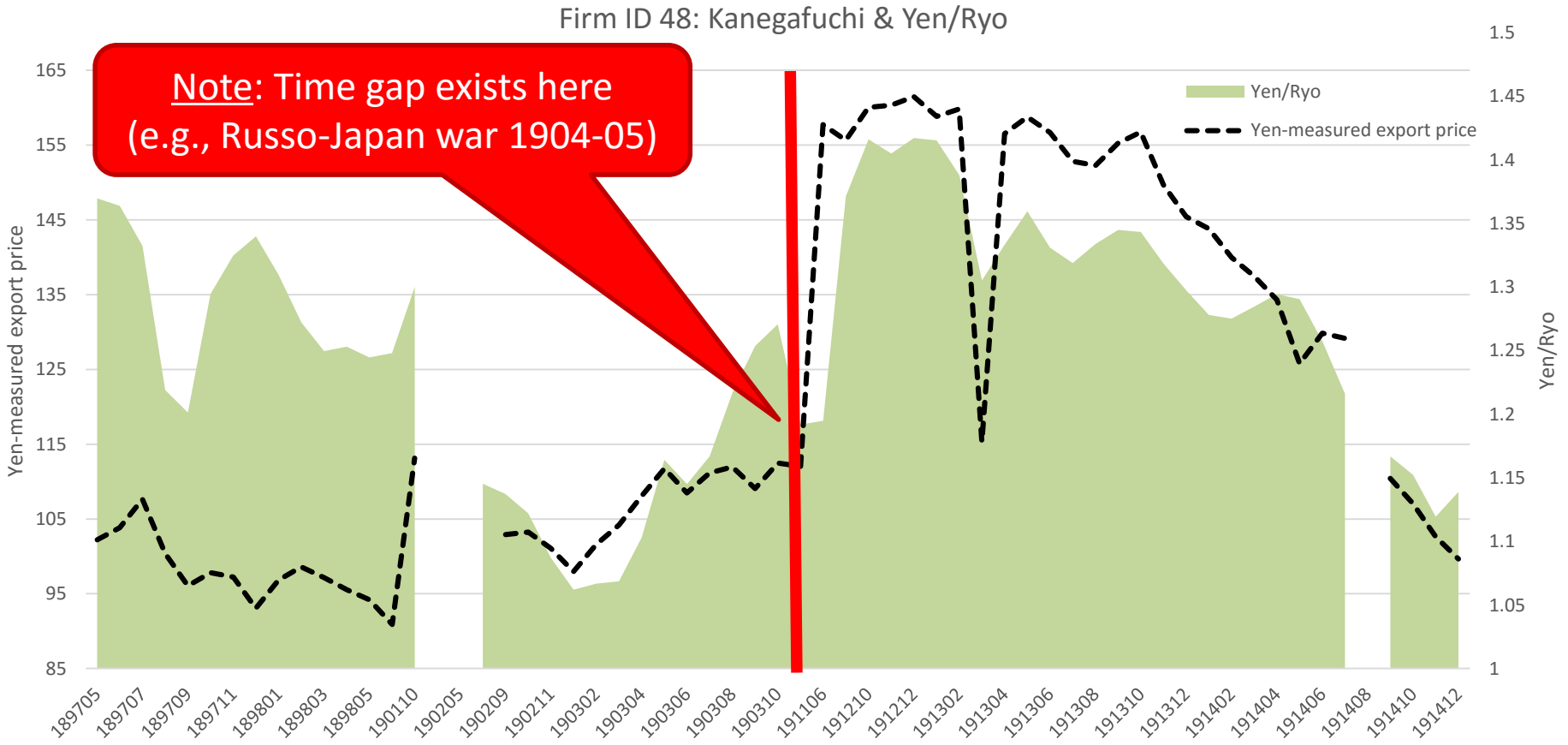
日本糸　十六手　一〇
　　二十手　九〇
孟買糸　十手　八五一
　　十六手　三五〇
　　二十手　五五五

○其二　（五月廿七日報）

本週中糸況は本邦糸に於ては前報仝樣引續き少數の手合に止り至て需用薄昨今の處相場亂調子とも云ふか如き傾向在りて左記相場より二匁五分乃至品に依り七匁五分方安直を以て儘少の手合を生し市勢何となく賣濁り買濁りの狀態にて相場は更に一定せす買人筋には本邦安直を氣構への向も在りて一向買進まさる等手控へ同樣の姿勢にて相場見送り居り賣人筋に於ても今後の動靜如何を氣遣ひ相場見送り居りて尚引續き不捌にて勢ひ不況を呈すべきやも不計現況なり而して其在荷は日本糸五千三百四十俵、印度糸二萬俵なり其相場は左の如し

5-2. Data: Currency exchange rate

- Data book of Japanese economic statistic (日本経済統計総観)
- Monthly frequency ***yen***/***ryo***(Chinese currency) exchange rate
  - Highest, lowest, average (used in our analysis) for each month

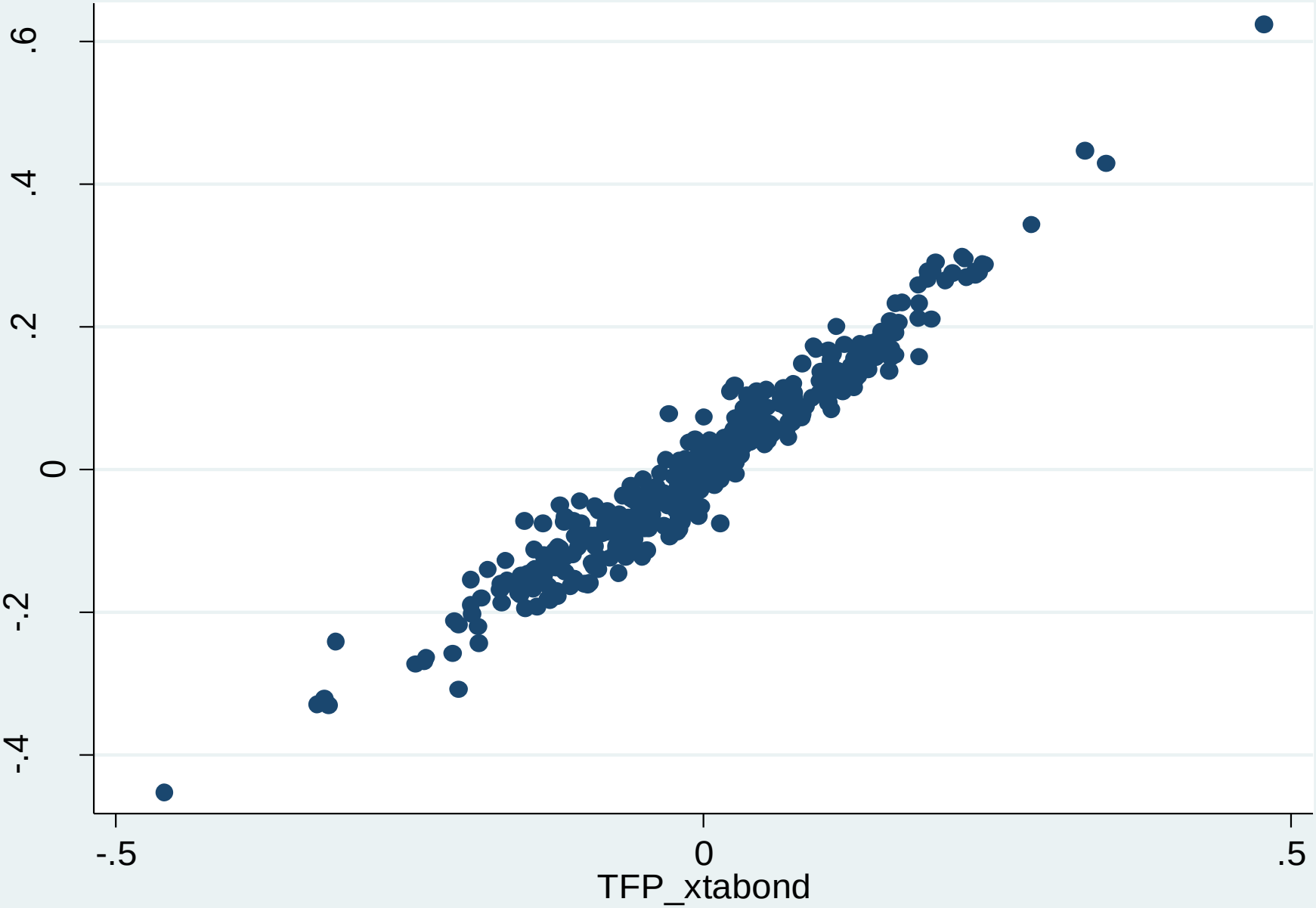


5-3. Data: Firm characteristics

Note: Production data are handled to compute TFPQ by following Braguinsly et al. (AER 2015)

- Firm characteristics
  - *Geppo* & financial statement (考課状)
  - Items included in the data
    - Output: Measured for two-types of machinery (ring & mule)
    - Capital: Two-types of machinery, operating hours & days, power source
    - Labor: Male & female w/ wage information
    - Intermediate good: Cotton & coal
    - Cotton sources: Japan, China, India, US, HK, Vietnam, Egypt, others
    - Product composition: Share of 16 & 20 counts out of total production
    - Location: All the plants (with detailed information)
    - Almost all the P/L & B/S items (e.g., inventory, sales)
    - Firm age, board member, managers' attributes (e.g., education), plant-level attributes, entry/exit (firm & plant) ⇒ Planning to use…

⇒ At most, 32 firms × 57months (max #obs = 517 in the current analysis)


.6
.4
.2
0
-.2
-.4
-.5
0
.5
TFP_xtabond

5-4. Data: Summary stat (a) - (c)

Variable	Definition	Obs	Mean	Std. Dev	Min	Max
	Sample (a): Sample for Table 2					
P	Natural logarithm of Yen(i.e., home currency)-measured 16-bante cotton exported	436	4.67	0.16	4.05	5.08
ER	Exchange rate measured as units of yen per one ryo	436	0.21	0.08	0.06	0.35
TFP	Firm-level total factor productivity obtained from fixed-effect panel estimation	436	0.00	0.13	-0.36	0.45
	Sample(b): Sample for Table 3					
P	Natural logarithm of Yen(i.e., home currency)-measured 16-bante cotton exported	353	4.67	0.16	4.46	5.08
ER	Exchange rate measured as units of yen per one ryo	353	0.22	0.07	0.06	0.35
TFP	Firm-level total factor productivity obtained from system GMM estimation	353	0.00	0.12	-0.33	0.34
	Sample(c): Sample for Table 4					
P	Natural logarithm of Yen(i.e., home currency)-measured 16-bante cotton exported	353	4.67	0.16	4.46	5.08
ER	Exchange rate measured as units of yen per one ryo	353	0.22	0.07	0.06	0.35
TFP	Firm-level total factor productivity obtained from fixed-effect panel estimation	353	0.01	0.13	-0.33	0.45
WAGE	Natural logarithm of female worker wage	353	0.00	0.29	-0.49	0.58
SIZE	Natural logarithm of output	353	0.06	1.14	-2.48	2.68

Note: All the variables other than IMPORT is demeaned

5-5. Data: Summary stat (d)

Sample(d): Sample for Table 5						
P	Natural logarithm of Yen(i.e., home currency)-measured 16-bante cotton exported	189	4.68	0.17	4.51	5.08
ER	Exchange rate measured as units of yen per one ryo	189	0.21	0.07	0.06	0.35
TFP	Firm-level total factor productivity obtained from fixed-effect panel estimation	189	0.02	0.13	-0.31	0.43
WAGE	Natural logarithm of female worker wage	189	0.06	0.28	-0.43	0.53
SIZE	Natural logarithm of output	189	0.26	1.23	-2.48	2.68
IMPORT	Import from Ryo export source countries / Import from all the souces (Note: this variable is time-invariant and measured as of the initial appearance in the data)	189	4.46	20.60	-39.67	39.23
INVENTORY	(Inventory + Account receivable) / Sales	189	-0.01	0.08	-0.09	0.26
RATE	BOJ's discount rate	189	-0.15	0.64	-1.05	1.14
SHARE	Output share of 16 count cotton yarn	189	0.02	0.24	-0.42	0.55
CAPUTIL	Capuital utilization rate	189	-0.01	0.14	-0.41	0.51

6-1. Empirical analysis: Model

- Theoretical underpinnings (needs to be beefed up…):

$$\log(\textbf{\textit{yen export}}_{i,t}) = \log(\textbf{\textit{markup}}_{i,t}) + \log(\textbf{\textit{marginal cost}}_{i,t})$$

$$= \log(\textit{markup}_{i,t}(\textbf{\textit{yen/ryo}}_t, \textbf{\textit{F}}_{i,t})) + \log(\textit{marginal cost}_{i,t}(\textbf{\textit{yen/ryo}}_t, \textbf{\textit{F}}_{i,t}))$$

⇒Interested in the cross derivative of $\textit{markup}_{i,t}$ & $\textit{marginal cost}_{i,t}$

- Fixed-effect panel estimation

$$\log(\textbf{\textit{yen export}}_{i,t}) = \alpha + \beta\log(\textbf{\textit{yen/ryo}}_t) + \gamma\textbf{\textit{F}}_{i,t} + \delta\log(\textbf{\textit{yen/ryo}}_t) \times \textbf{\textit{F}}_{i,t} + fe_i$$

Focus on the observation with some price change (⇔ Nakamura & Steinsson 2012)

6-1. Empirical analysis: Model

- Allison's hybrid random-effect estimation (Allison 2009)

$$\log(\textbf{\textit{yen export}}_{i,t}) = \alpha + \beta\log(\textbf{\textit{yen/ryo}}_{t}) + \gamma_1(\boldsymbol{F}_{i,t} - \boldsymbol{F}_{i,t\_avr}) + \gamma_2 \boldsymbol{F}_{i,t\_avr}$$
$$+ \delta_1[\{\log(\textbf{\textit{yen/ryo}}_{t}) \times \boldsymbol{F}_{i,t}\} - \{\log(\textbf{\textit{yen/ryo}}_{t}) \times \boldsymbol{F}_{i,t}\}_{\_avr}]$$
$$+ \delta_2 \{\log(\textbf{\textit{yen/ryo}}_{t}) \times \boldsymbol{F}_{i,t}\}_{\_avr} + re_i$$

- Correlated coefficient random-effect estimation (Wooldridge 2010)

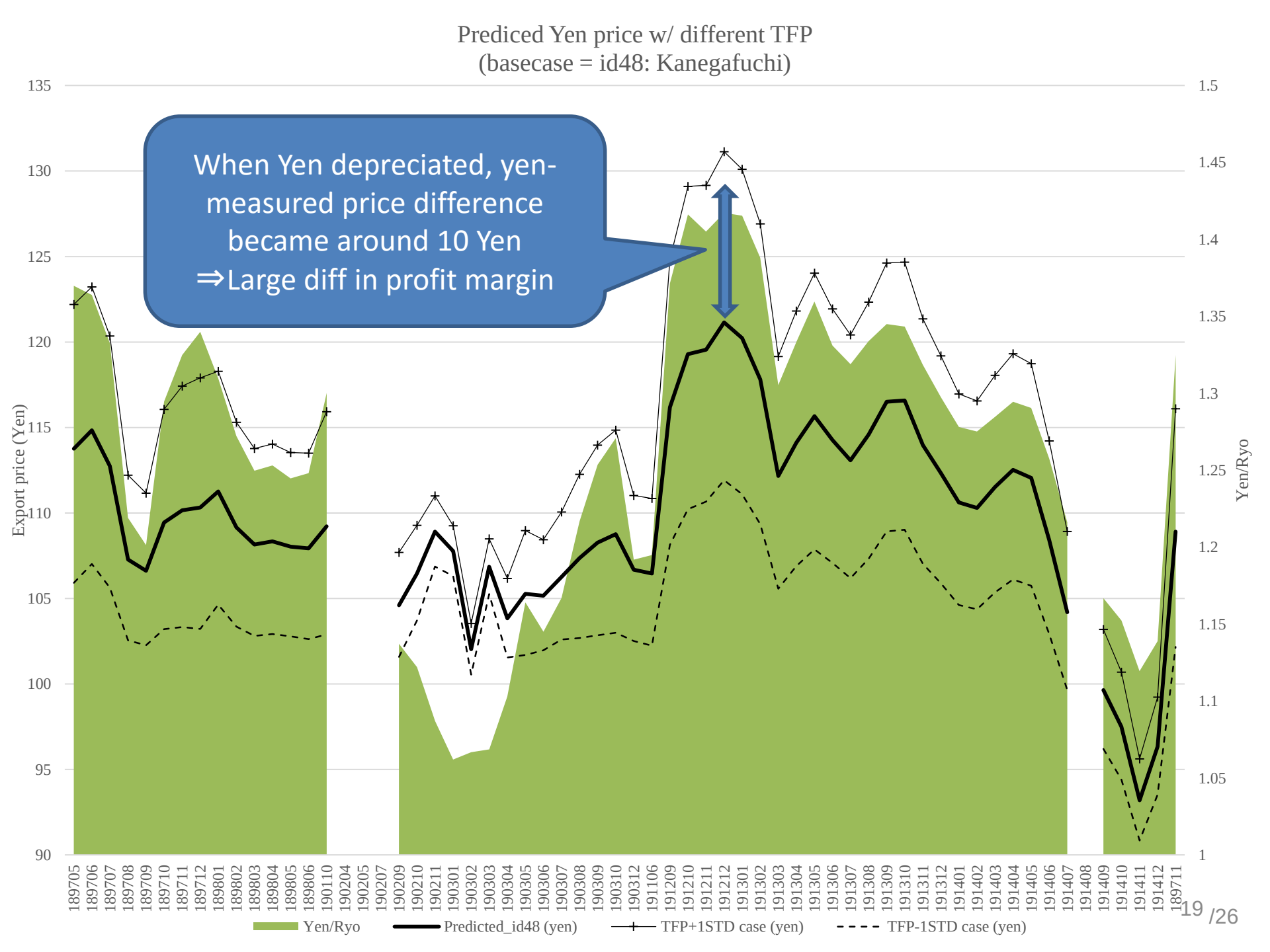
$$\log(\textbf{\textit{yen export}}_{i,t}) = \alpha + \beta\log(\textbf{\textit{yen/ryo}}_{t}) + \gamma_1 \boldsymbol{F}_{i,t} + \gamma_2 \boldsymbol{F}_{i,t\_avr}$$
$$+\delta_1\log(\textbf{\textit{yen/ryo}}_{t}) \times \boldsymbol{F}_{i,t} + \delta_2 \{\log(\textbf{\textit{yen/ryo}}_{t}) \times \boldsymbol{F}_{i,t}\}_{\_avr} + re_i$$

6-2. Empirical analysis: TFP

Dependent variable: *P*										
	Fixed-effect model			Fixed-effect model			Allison (2009) Hybrid random-effect model			Correlated random-effects model		
Independent Variables	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
ER	1.067	0.070	***	1.024	0.068	***				1.019	0.068	***
TFP				-0.400	0.150	***				-0.407	0.149	***
ER×TFP				1.748	0.629	***				1.786	0.628	***
ER - ER_AVR							1.019	0.068	***			
TFP - TFP_AVR							-0.407	0.149	***			
ER×TFP - ER×TFP_AVR							1.786	0.628	***			
ER_AVR							-0.118	0.346		-1.137	0.352	***
TFP_AVR							-0.131	0.628		0.276	0.640	
ER×TFP_AVR							0.486	2.788		-1.300	2.831	
constant	4.462	0.016	***	4.451	0.015	***	4.643	0.072	***	4.643	0.072	***
No. of Obs.	517			436			436			436		
No. of Groups	32			30			30			30		
Observation per group												
min	1			1			1			1		
avr	16.2			14.5			14.5			14.5		
max	57			57			57			57		
F or Wald chi2	231.55			76.79			227.30			227.30		
Prob > F or chi2	0.0000			0.0000			0.0000			0.0000		
R-sq												
within	0.3236			0.3637			0.3637			0.3637		
between	0.0047			0.0044			0.0136			0.0136		
overall	0.2074			0.1767			0.1791			0.1791		
corr(u_i, xb)	-0.0870			-0.1267			0 (assumed)			0 (assumed)		
F test that all u_i=0												
F	12.93			18.61			n.a.			n.a.		
Prob>F	0.0000			0.0000			n.a.			n.a.		

Almost same magnitude reported in Fitzgerald & Haller (2014) i.e., β=1.01 (std. 0.090)***

Fitzgerald & Haller (2014) × Berman et al. (2012) i.e., depends on firm characteristics


Prediced Yen price w/ different TFP
(basecase = id48: Kanegafuchi)
When Yen depreciated, yen-measured price difference became around 10 Yen
⇒Large diff in profit margin
Export price (Yen)
Yen/Ryo
135
130
125
120
115
110
105
100
95
90
1.5
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
189705
189706
189707
189708
189709
189710
189711
189712
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191209
191210
191211
191212
191301
191302
191303
191304
191305
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191401
191402
191403
191404
191405
191406
191407
191408
191409
191410
191411
191412
189711
Yen/Ryo
Predicted_id48 (yen)
TFP+1STD case (yen)
TFP-1STD case (yen)

6-3. Empirical analysis: Another TFP measure

- Robust to alternative TFP computation

Dependent variable: *P*									
	Fixed-effect model			Allison (2009) Hybrid random-effect model			Correlated random-effects model		
Independent Variables	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
ER	1.016	0.076	***				1.012	0.076	***
TFP	-0.469	0.187	**				-0.480	0.187	***
ER×TFP	2.529	0.789	***				2.573	0.791	***
ER - ER_AVR				1.012	0.076	***			
TFP - TFP_AVR				-0.480	0.187	***			
ER×TFP - ER×TFP_AVR				2.573	0.791	***			
ER_AVR				-0.321	0.495		-1.333	0.501	***
TFP_AVR				-0.280	1.103		0.200	1.116	
ER×TFP_AVR				1.690	4.827		-0.883	4.881	
constant	4.449	0.017	***	4.686	0.106	***	4.686	0.106	***

6-4. Empirical analysis: Full model

① Female wage (⇔quality)
② Import intensity
③ Inventory turnover
④ BOJ discount rate (sign???)

Dependent variable: *P*									
	Fixed-effect model								
Independent Variables	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
ER	0.272	0.090	***	0.691	0.065	***	1.078	0.127	***
TFP	-0.166	0.142		-0.079	0.108		-0.035	0.122	
ER×TFP	0.200	0.686		-0.482	0.480		-0.144	0.585	
WAGE	-0.219	0.079	***	-0.315	0.068	***	-0.045	0.072	
ER×WAGE	1.511	0.384	***	2.149	0.328	***	1.067	0.339	***
SIZE	0.037	0.019	*	0.058	0.017	***	0.071	0.017	***
ER×SIZE	0.174	0.081	**	0.108	0.073		0.033	0.071	
ER×IMPORT	0.018	0.003	***	0.015	0.003	***	0.010	0.003	***
INVENTORY	0.985	0.376	***				0.728	0.322	**
ER×INVENTORY	-7.053	1.682	***				-4.604	1.467	***
RATE				-0.072	0.015	***	-0.191	0.024	***
ER×RATE				0.324	0.073	***	0.777	0.109	***
constant	4.575	0.018	***	4.497	0.014	***	4.392	0.028	***

6-5. Empirical analysis: Robustness

Dependent variable: *P*									
Independent Variables	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
ER	1.033	0.134	***	0.724	0.144	***	0.720	0.156	***
TFP	-0.078	0.131		-0.022	0.121		-0.068	0.128	
ER×TFP	0.171	0.615		-0.412	0.575		-0.136	0.601	
WAGE	-0.010	0.079		-0.042	0.070		-0.025	0.078	
ER×WAGE	0.818	0.372	**	1.061	0.340	***	0.883	0.378	**
SIZE	0.058	0.030	*	0.073	0.017	***	0.086	0.032	***
ER×SIZE	0.061	0.078		0.071	0.072		0.070	0.079	
ER×IMPORT	0.012	0.003	***	0.014	0.003	***	0.014	0.004	***
INVENTORY	0.669	0.328	**	0.882	0.322	***	0.891	0.336	***
ER×INVENTORY	-4.350	1.502	***	-5.796	1.524	***	-5.397	1.593	***
RATE	-0.186	0.026	***	-0.186	0.024	***	-0.182	0.026	***
ER×RATE	0.752	0.112	***	0.647	0.111	***	0.652	0.115	***
ER_R				0.211	0.616		0.078	0.648	
ER_R×IMPORT_R				-0.025	0.030		-0.035	0.037	
ER_D				7.407	1.630	***	6.965	1.687	***
ER_D×IMPORT_D				0.131	0.071	*	0.150	0.081	*
ER_S				-5.082	1.383	***	-5.043	1.432	***
ER_S×IMPORT_S				-0.705	0.694		-0.610	0.704	
constant	0.273	2.282		-3.808	1.991	*	-6.384	2.883	**
Prefecture control		yes			no			yes	
Other currency exchange rates		no			yes			yes	

6-6. Empirical analysis: Something more

- Incorporate and consider additional factors:
  - Interaction b/w exchange rate & centrality of 16 count: (+/-) but insig
    - ⇔ Chatterjee et al. (2013): Pass-through rate for non-centered product is high (i.e., central product shows larger β)
    - ⇔ Also, "urgency" channel (i.e., products associated w/ less efficient/flexible production (e.g., non-central)⇔ high pass-through
  - Interaction b/w exchange rate & **1**(early entry to export market): (+) but insig
    - ⇔ Early entrant has some market power
  - Interaction b/w exchange rate & **1**(headquartered in Tokyo): (+) but insig
    - ⇔ Distribution cost as in Berstein & Jaimovich (2012)?
  - Exclude the periods for WWI (July 1914～)

⇒ Results in "full model" are robust to the inclusion of these items

7. Some preliminary results & discussion

- 20 counts? Only female wage matters…
- Management quality?
  - Capacity utilization: Insignificant…
  - Inventor management: Better measures?
  - Labor management: “Sotan”?
- Human network: Financial linkage to bank owner & “fixer”?
- More detailed information on the structure of production cost?
- Dumping behavior?
- Choice of invoice currency?

8. Things to be done

- Data description: E.g., attrition (and the reason) etc.

- Further precise picture:
  - Financial friction proxied for by “network w/funding sources” information and/or “Leverage × BOJ rate” etc.
  - Use domestic price (exporter and non-exporter firms) as a benchmark
  - Export quantity: Extensive margin (i.e., truncated data structure ⇔ selection), residual demand faced by individual firms

- Some additional robustness checks:
  - Asymmetry b/w appreciation and depreciation?
  - Dynamic (time-variant) aspect of incomplete pass-through

9. Conclusion

- Use the ideal data and confirm heterogeneous pass-through in a comprehensive way: Product quality, import, financial factor etc.

- Hopefully, go deeper into financial/management aspects…

- Other projects using this data

  - Pre-export investment (i.e., tangibles & borad intangibles)

  - Pre-export & post-export productivity/profitability dynamics

  - Utilizing network information more intensively

Thank you and comments are welcome!

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