

Trade and Productivity: Buyer Quality and Efficiency in the Bangladesh RMG Sector

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(Joint with Rocco Machiavello, Warwick, and perhaps others)

IGC Growth Week
24 September 2014



Exporting and productivity



- Does trade induce learning by exporting firms and, if so, through what channels?
- A large literature looking at the relationship between productivity, learning and international trade.
- Trade and productivity
 - De Loecker (2007); Van Biesebroeck (2006); Aw, Chung and Roberts (2000)
- Trade and upgrading
 - Verhoogan (2008); Lileeva and Trefler (2010); Bustos (2011); Kugler and Verhoogan (2012); Bastos, Silva and Verhoogan (2014)

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 - allow a very detailed measure of productivity at the sub-factory (production line) level.
 - Come from a large number of factories, and are comparable across factories.

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- Gather data from garment factories in Bangladesh (and ongoing, other countries). The factories are:
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- The data:
 - allow a very detailed measure of productivity at the sub-factory (production line) level.
 - Come from a large number of factories, and are comparable across factories.
- We use the data:
 - to demonstrate substantial heterogeneity in productivity across lines within plants.
 - Then ask: Does the identity of the buyer account for at least part of that dispersion?

Productivity dispersion



- Dispersion of productivity across production units, higher in lower-income countries
 - Hsieh Klenow (2009), Syverson et al (various), Bloom et al (various); Foster and Rosenzweig (2010)
- But also within firms
 - Chew, Clark and Bresnahan (1990)

Productivity and learning



- Data from internal records of firms in the ready-made garment (RMG) sector, in Bangladesh. We focus on the sewing operations.
- Data have been collected in the context of projects on management training in the RMG sector in Bangladesh
 - Female operators-to-supervisors (60 + 20 factories)
 - Existing supervisors (26 factories)
- Production line level data on efficiency at the line level
- Why do we think these data are particularly interesting to address these questions?

Measuring productivity



- The data allow us to compare physical output across production lines and across factories, even when the lines / factories are producing different products.
 - Foster, Haltiwanger and Syverson (2008) – Q , with very homogeneous goods
 - Many studies – R with multiproduct firms
 - RMG: multiproduct firms, but we think we can get very close to Q , at least for the sewing operations.
- Standard Minute Values (SMVs): An international standard for how long it should take to sew a given stitch.

Within firm administrative data



- We also have the transaction-level customs data that give us unit cost information + the identity of the seller and the buyer.
 - From NBR, 2005 – 2012
 - In theory, the factories in our sample can be matched to the customs data.
 - In practice, this match is difficult because factories may export through others (groups, etc.)
 - Instead, we will use measures of buyer ‘quality’ from the customs data, matched to the within-firm, production line data on the buyer of the item being produced.

Within firm administrative data



NBR Customs records:
Transaction-level, including
identity of the seller the
buyer.

Factory data:
Line-level production data
(more detail soon), including
buyers in a subset of the
factories.

Within firm administrative data



NBR Customs records:
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Measure of buyer
quality.

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Measure of line-
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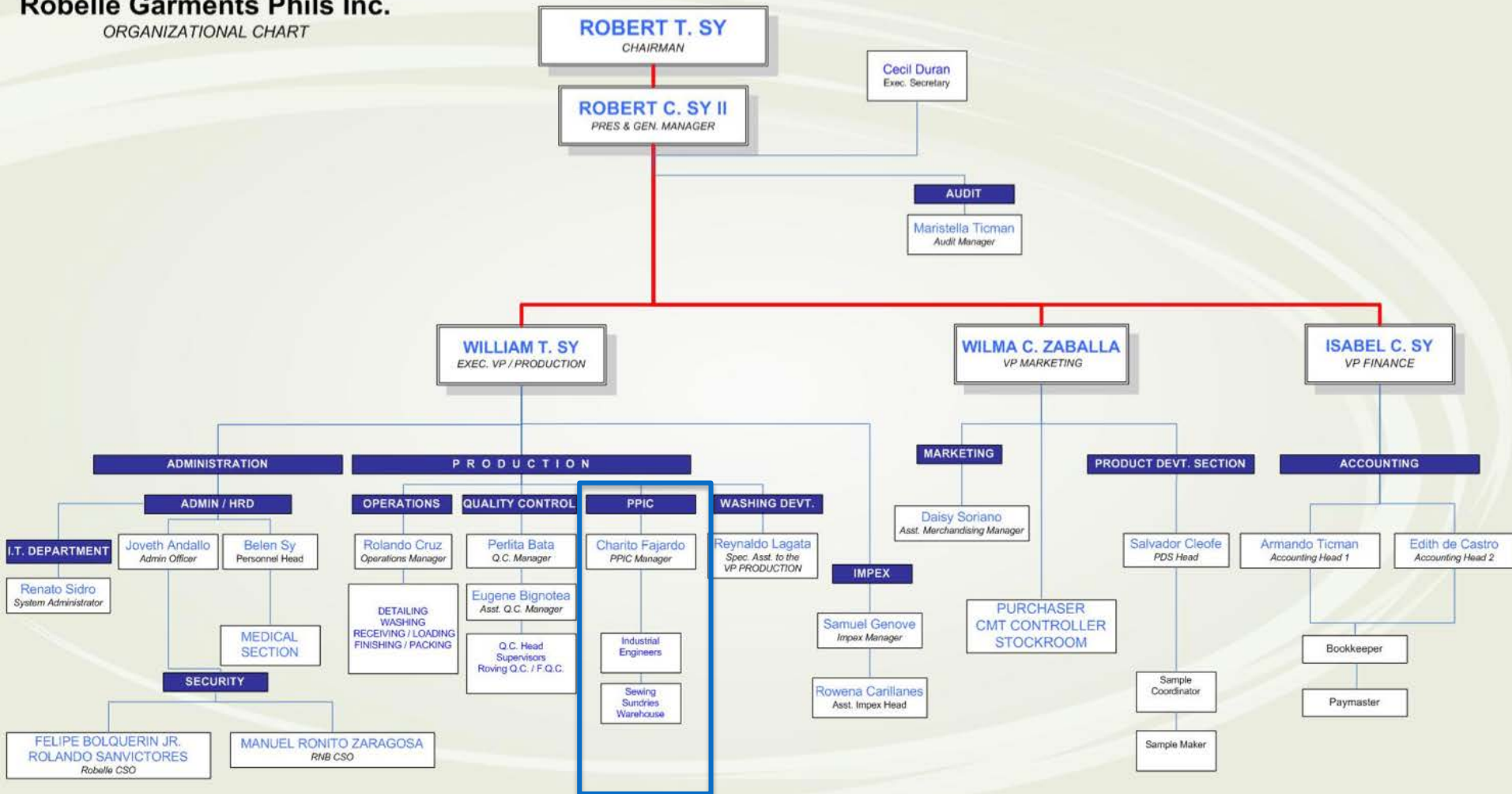
Measure of line-
level productivity

**Is within-factory productivity
related to buyer quality?**

Measuring productivity in the RMG sector



Robelle Garments Phils Inc. ORGANIZATIONAL CHART



Line-level productivity



<http://static.guim.co.uk/sys-images/Environment/Pix/pictures>

Outline of the project:

Characteristics of factories



Table 1: Factory-Level Summary Statistics

	Mean	Median
Number of sewing lines	19	14
Number of employees, total	2116	2000
Number of employees, Sewing Operators per sewing line	1171	1000
	48	47
Number of sewing supervisors	48	36
Percentage female supervisors	10.8%	5.6%
Percent conducting training	68.1%	NA
Percent training outside factory	8.9%	NA
Year factory established	1999	2001

Outline for talk

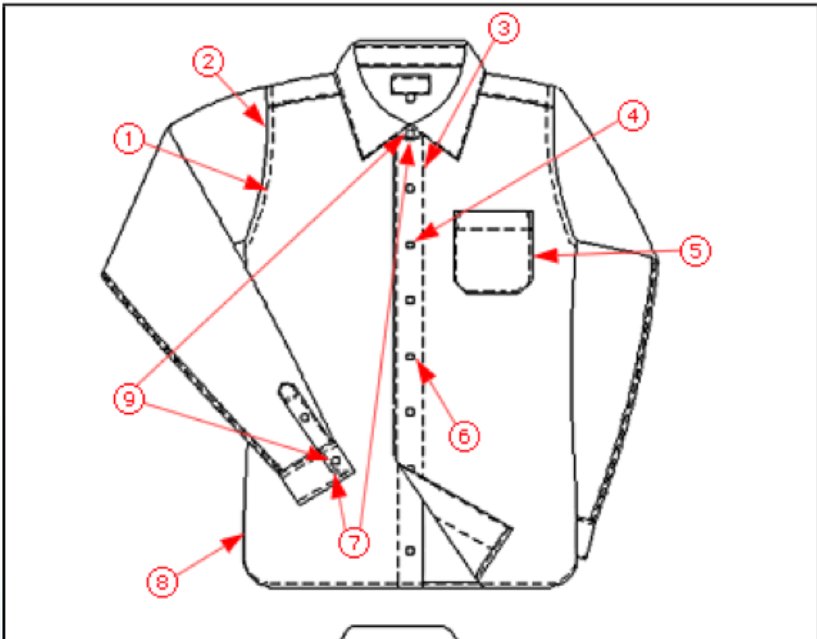


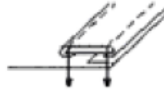
- Motivation
- **Measuring productivity in RMG sewing**
- Productivity dispersion and persistence
- Is productivity related to buyer quality?

Defining productivity



Shirt



①	Counterstich sleeve		DDL-8700 DDL-8700-7 DDL-9000BDS DDL-9000BSS DLU-5490N-7 MH-380 MH-481-5
②	Attach sleeve		MO-6716D MO-6716S MO-6916S
③	Sew front fly to left front		LH-3528A LH-3528A-7 LH-4128-7
			LK-1903A LK-1903A/BR35 MB-1070

Defining productivity



WORKSTUDY DEPARTMENT OPERATION BREAKDOWN SHEET

STYLE #	TUEB-2368	Print Emb	No		No	Machine Summery		Manpower Summery	
BUYER		TGT 100%		2157		SN	6	OPERATORS	15
COLOUR	AOP	Planned eff%		60%		OL	6	HELPERS	1
Des	Kids Basic Buttom	Planned Tgt/10Hrs		1300		FL	2	Total manpower	16
		Total SMV		4.45		Others		Initial date	2-Sep-12
TGT/HR	1	TGT/8HR		6		Total	88	Working hour	10
		TGT/HR		130		Total	14	Revised date	
TGT/HR	0	TGT/HR		4	TGT/HR			5	
Sample Reference: Seal Sample.									
#	Operation	M/C	EST. SMV	ETS. TGT.	Hour Req	Req. Man	Actual MC	Actual helper	Remark's
1	Join front rise	OL	0.30	200	#DIV/0!	0.02	1		
2	Join Back rise	OL	0.30	200	0.0	0.02	1		
3	Tack Care label	SN	0.19	316	#DIV/0!	0.01	1		
4	Join side seam	OL	0.60	100	0.0	0.04	2		
5	Join Inseam	OL	0.56	107	0.0	0.04	2		
6	Mark & cut elastic	Helper	0.25	240	#DIV/0!	0.02		1	
7	Tack Elastic & Mark	SN	0.28	214	0.0	0.02	1		
8	Attach elastic At waist	OL	0.30	200	0.0	0.02	1		
9	Main Label Tack	SN	0.19	316	0.0	0.01	1		
10	Fold & tack at waist	SN	0.35	171	0.0	0.02	1		
11	T/st At Waist	FL	0.26	231	0.0	0.02	1		
12	Hem bottom	FL	0.28	214	0.0	0.02	1		
13	Tack At Inseam & waist (3 Tacks)	SN	0.30	200	0.0	0.02	1		
14	Tack At Bottom hem (4 Tacks)	SN	0.34	176	#DIV/0!	0.02	1		
TOTAL			4.45				15	1	

Measuring productivity



- Construct a measure which is essentially Q / L , where both are measured in minutes:
 - Output minutes / input minutes
$$[\# \text{ pieces} * \text{SMV}] / [\# \text{ operators} * \text{runtime in minutes}]$$
- Typical factories in Bangladesh have efficiency levels of 35- 40 percent by this measure; best factories ~ 60 percent
 - In Sri Lanka, 70 – 80 percent
- Notes:
 - We focus on measures of efficiency in sewing only, since the training we conduct focuses on the sewing line. We generally ignore cutting, etc.
 - Capital obviously matters (though in sewing does not vary much within factory, typically); quality may as well (Hugo Boss vs. Walmart)
 - Several other outcomes of the training are of interest – quality defects, absenteeism. But all of these are important because they affect productivity.

Measuring productivity:

Sample of raw data



Line Performance Report of Units 101, 102, 103

Floor	Line	APM	Supervisor	Year	Month	Week	Date	Day	Buyer	Style No	Item	SM	Order Qty	Plan Qty Total	Input Date	First Output Date	Finish Date	Delivery date
101	1	mr. A	Mr.	2012	Jan	1	1-Jan	Tue	Belk	3575	LLS	20.67			30-Dec	31-Dec		
101	2	mr. A	Mr.	2012	Jan	1	1-Jan	Tue	Belk	3630		17.68			24-Dec	25-Dec		
101	3	mr. A	Mr.	2012	Jan	1	1-Jan	Tue	Belk	3630		17.68			25-Dec	27-Dec		
101	4	mr. A	Mr.	2012	Jan	1	1-Jan	Tue	Radhamoni	ALDI	LSS	23.43			19-Dec	20-Dec		
101	5	mr. A	Mr.	2012	Jan	1	1-Jan	Tue	Radhamoni	ALDI	LSS	23.43			14-Dec	15-Dec		
102	1	Mr. S	Mr.	2012	Jan	1	1-Jan	Tue	K. Mart	K-3626	MLS	30.08	7890	7890	15-Dec	17-Dec		
102	2	Mr. S	Mr.	2012	Jan	1	1-Jan	Tue	Celio	RAMBERT		30.02			28-Dec	29-Dec		
102	3	Mr. S	Mr.	2012	Jan	1	1-Jan	Tue	Asda	16684		19.31			30-Dec	31-Dec		
102	4	Mr. S	Mr.	2012	Jan	1	1-Jan	Tue	D/Hams	16432		21.53			30-Dec	31-Dec		
102	5	Mr. S	Mr.	2012	Jan	1	1-Jan	Tue	M.WARK	94550/91		19.71			26-Dec	28-Dec		
102	6	Mr. M	Mr.	2012	Jan	1	1-Jan	Tue	TOPMAN	16622		19.74			23-Dec	24-Dec		
102	6	Mr. M	Mr.	2012	Jan	1	1-Jan	Tue	R-ISLAND	16620		27.46			31-Dec	1-Jan		
102	7	Mr. M	Mr.	2012	Jan	1	1-Jan	Tue	Asda	16685		23.28			24-Dec	25-Dec		
102	8	Mr. M	Mr.	2012	Jan	1	1-Jan	Tue	TEMA	X-KAVI		26.35			28-Dec	29-Dec		
102	9	Mr. M	Mr.	2012	Jan	1	1-Jan	Tue	Radhamoni	ALDI(MENS)		21.72			28-Dec	29-Dec		
102	10	Mr. M	Mr.	2012	Jan	1	1-Jan	Tue	ASDA	16684	MSS	19.31			24-Dec	26-Dec		
103	1	Mr. R	Mr.	2012	Jan	1	1-Jan	Tue	WOOLWORTH	T-48367		23.72						
103	2	Mr. R	Mr.	2012	Jan	1	1-Jan	Tue	Radhamoni	SMOG		29.34						

Measuring productivity:

Sample of raw data



Line Performance Report of Units 101, 102, 103

Floor	Line	Operator 8-5	Operator 5-6	Operator 6-7	Operator 7-8	Operator 8-9	Operator 9-10	Helper 8-5	Helper 5-6	Helper 6-7	Helper 7-8	Helper 8-9	Helper 9-10	General Hour	OT Hour	EOT Hour	Input minute	Input Qty Daily	Target Qty Daily	Production general	Production OT	Production EOT	Production Qty Daily	Output Minute	Efficiency %	Variance %
101	1	42	42	42	25	25		34	34	34	18	18		8	2	2	50760		1210	730	200	270	1200	24804	48.87%	-1%
101	2	39	39	39	27	27		38	38	38	18	18		8	2	1	51600		1100	560	100	310	970	17149.6	33.24%	-12%
101	3	39	39	39	10	10		36	36	36	18	18		8	2	2	48360		1100	600	180	300	1080	19094.4	39.48%	-2%
101	4	44	44	44	25	25		41	41	41	18	18		8	2	1	56160		1210	666	224	310	1200	28116	50.06%	-1%
101	5	43	43	43	31	31		41	41	41	18	18		8	2	1	56280		1210	583	292	245	1120	26241.6	46.63%	-7%
102	1	48	48	48	25	25		44	44	44	7	7		8	2	2	59040		990	650	120	250	1020	30681.6	51.97%	3%
102	2	58	58	58	30	30		45	45	45	35	35		8	2	2	69600		1210	625	200	235	1060	31821.2	45.72%	-12%
102	3	39	39	39	30	30		35	35	35				8	2	2	48000		1100	790	240	270	1300	25103	52.30%	18%
102	4	47	47	47	27	27		40	40	40	16	16		8	2	2	57360		990	445	165	200	810	17439.3	30.40%	-18%
102	5	34	34	34	28	28		26	26	26				8	2	2	39360		880	485	100	225	810	15965.1	40.56%	-8%
102	6	45						38						6	0	0	29880		540	484	0		484	9554.16	31.98%	-10%
102	6	45	45	45	25	25		38	38	38	5	5		2	2	2	23520		450	130	130	156	416	11423.36	48.57%	-8%
102	7	41	41	41	35	35		35	35	35	5	5		8	2	2	50400		990	570	155	155	880	20486.4	40.65%	-11%
102	8	42	42	42	32	32		40	40	40	5	5		8	2	2	53640		770	510	130	60	700	18445	34.39%	-9%
102	9	41	41	41	30	30		37	37	37	5	5		8	2	2	51000		1100	460	110	230	800	17376	34.07%	-27%
102	10	37	37	37	25	25		35	35	35	5	5		8	2	2	46800		1320	670	200	280	1150	22206.5	47.45%	-13%
103	1	43	43	43	25	25	20	38	35	35	15	15	12	8	2	3	54960		990	340	180	130	650	15418	28.05%	-34%
103	2	45	45	45	20	20	15	40	38	38	17	17	10	8	2	3	56700		825	485	125	100	710	20831.4	36.74%	-14%

One factory for one day... and other files on quality defects and absenteeism.

Outline for talk



- Motivation
- Measuring productivity in RMG sewing
- **Productivity dispersion and persistence**
- Is productivity related to buyer quality?

Productivity dispersion



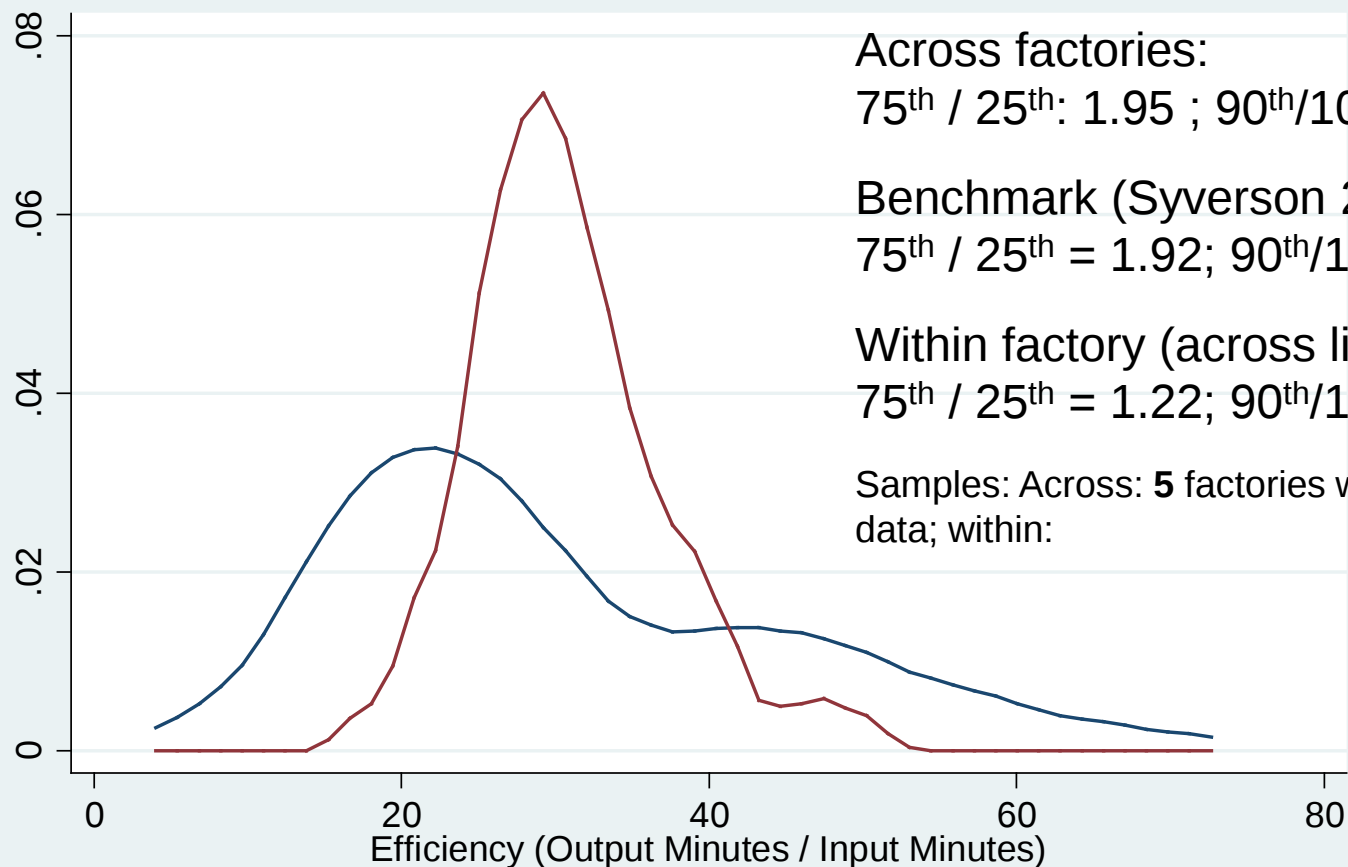
- We can measure dispersion both across factories and within factories, across lines.
 - Across factory data are not always comparable. Sometimes factories report the international SMV, and then adjust for efficiency later; sometimes adjust SMV for efficiency.
 - Factories use SMVs to set production targets. Example: 20 operators work 500 minutes each producing a shirt with an international SMV of 10 and efficiency of 50%:
 $\{ (500 \times 20) / 10 \} \times .50 = 500$ (Daily target) – SMV reported as 10; OR
 $\{ [(500 \times 20) / (10 / .5)] \} = 500$ (Daily target) – SMV reported as 20
- Within factories, the measures will generally be consistent across lines. So we can look at within-factory dispersion in a lot of factories. But we (currently) have a much smaller set of factories where we are confident that the cross-factory comparisons are valid.

Productivity data



- A potential sample of 60 factories. But in this analysis we use a sample of 24 factories for which we have buyer data + efficiency data.
- Data:
 - At the day- line level.
 - Typically every other month in these data.
 - Measures of number of workers present / absent, hours, quality defects.
 - Will use a sample of 35,000 day-line observations from 24 factories.
 - Measure of efficiency: $[\text{SMV} * \text{output}] / [\text{mins of oper} * \# \text{ workers}]$

Dispersion: across and within



Across factories:

75th / 25th: 1.95 ; 90th/10th = 2.79

Benchmark (Syverson 2004 – VA / Hrs):

75th / 25th = 1.92; 90th/10th = 4.02

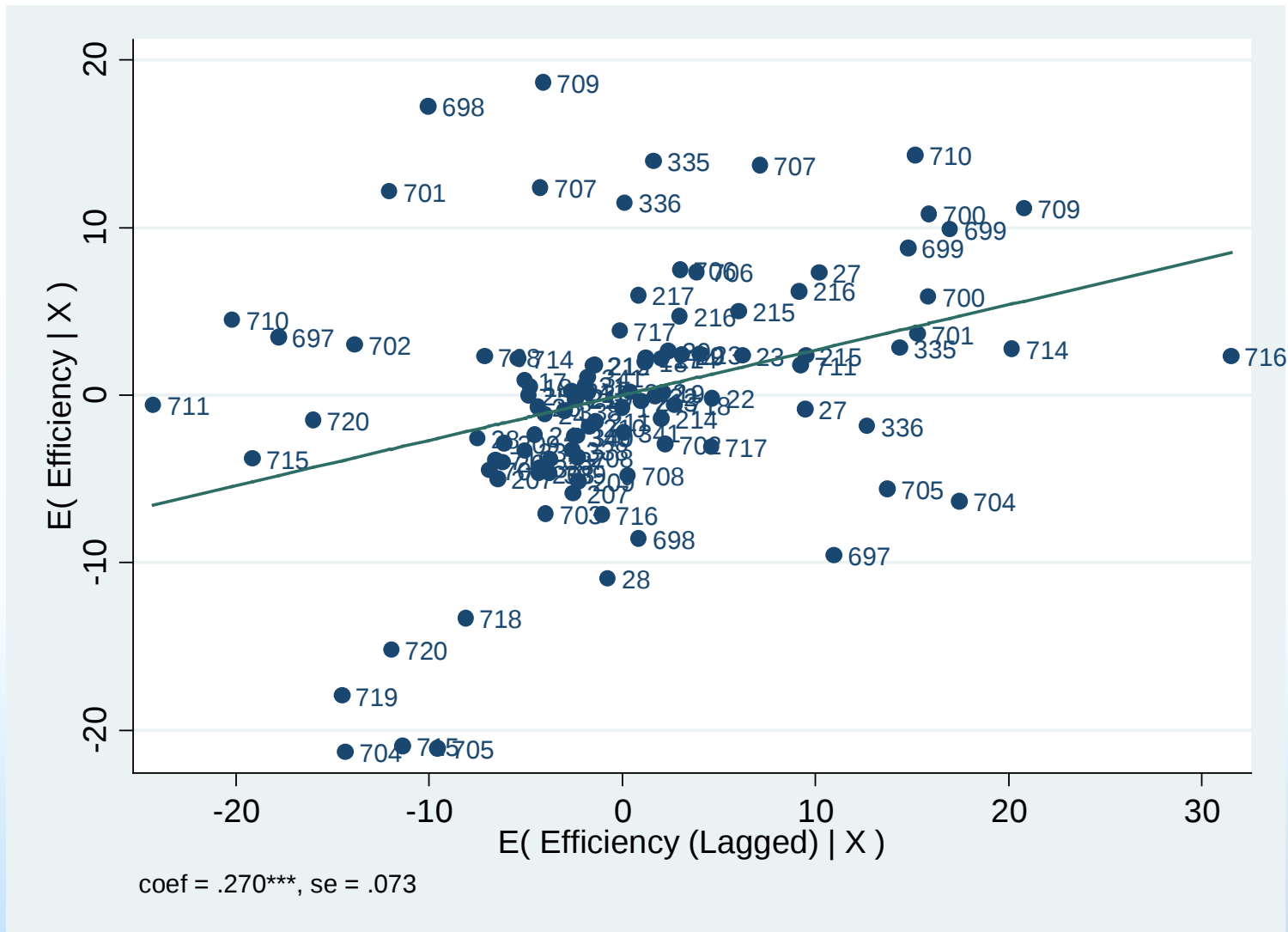
Within factory (across lines)

75th / 25th = 1.22; 90th/10th = 1.64

Samples: Across: **5** factories with most homogenous data; within:

— TFP Disp. (Across Factories) — TFP Disp. (Within Factories)

Persistence, across lines, within factories



Persistence in efficiency and buyer quality



Persistence in Efficiency and Buyer Quality

Number of Months Lagged	Efficiency	Buyer Quality	# obs Efficiency
1	0.469***	0.375***	1212
2	0.202***	0.228***	1082
3	0.057	0.146**	952
4	0.012	-0.032	823
5	0.098*	0.022	694
6	0.185***	-0.019	565
7	0.243***	-0.035	436
8	0.193***	0.047	318
9	0.234***	0.088	243
10	0.313***	-0.015	181
11	0.143	-0.172**	119
12	0.190	0.078	56

Dispersion and persistence: very micro



Line				date		buyer	Style	Item	Description	Color	SMV	Ord Q	Output	Plan	Effic.	Avg Eff
102	1	Mr. S	Mr.	2012	1-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	700	12600	37%	
102	1	Mr. S	Mr.	2012	2-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	800	14400	54%	
102	1	Mr. S	Mr.	2012	3-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	550	9900	35%	
102	1	Mr. S	Mr.	2012	4-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	900	16200	58%	
102	1	Mr. S	Mr.	2012	5-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	800	14400	45%	
102	1	Mr. S	Mr.	2012	7-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	700	12600	41%	
102	1	Mr. S	Mr.	2012	8-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	600	10800	30%	
102	1	Mr. S	Mr.	2012	9-Sep	Tesco Uni	1863635 / 1863622	LLS	EMB + Non-Wash	Blue Solid	18	710	350	6300	28%	
102	1	Mr. S	Mr.	2012	9-Sep	Tesco Uni	1863635 / 1863622	LLS	EMB + Non-Wash	Red Solid	18	710	150	2700	31%	
102	1	Mr. S	Mr.	2012	10-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	1536	674	12132	59%	
102	1	Mr. S	Mr.	2012	10-Sep	Tesco Uni	1863635 / 1863622	LLS	EMB + Non-Wash	Red Solid	18	710	176	3168	28%	
102	1	Mr. S	Mr.	2012	11-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	1536	800	14400	41%	
102	1	Mr. S	Mr.	2012	12-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	1536	62	1116	25%	39%
102	7	Mr. M	Mr.	2012	1-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	860	15480	49%	
102	7	Mr. M	Mr.	2012	2-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	850	15300	52%	
102	7	Mr. M	Mr.	2012	3-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	880	15840	55%	
102	7	Mr. M	Mr.	2012	4-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	880	15840	52%	
102	7	Mr. M	Mr.	2012	5-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	860	15480	47%	
102	7	Mr. M	Mr.	2012	7-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	900	16200	54%	
102	7	Mr. M	Mr.	2012	8-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Blue Solid	18	17248	1000	18000	60%	
102	7	Mr. M	Mr.	2012	9-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	17248	950	17100	57%	
102	7	Mr. M	Mr.	2012	10-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	17248	950	17100	56%	
102	7	Mr. M	Mr.	2012	11-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	17248	1140	20520	53%	
102	7	Mr. M	Mr.	2012	12-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	17248	1100	19800	56%	
102	7	Mr. M	Mr.	2012	14-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	17248	900	16200	50%	
102	7	Mr. M	Mr.	2012	15-Sep	Tesco Uni	1863635 / 1863622	LSS	EMB + Non-Wash	Red Solid	18	17248	900	16200	48%	53%

Outline for talk



- Motivation
- Measuring productivity in RMG sewing
- Productivity dispersion and persistence
- **Is productivity related to buyer quality?**

Measuring buyer quality



- Can any of the dispersion be explained by buyer quality?
- Use the customs data to run a regression of the form:

$$P_{ijt} = \sum_{n=1}^3 \sum_{h=6101}^{6217} HS4_h * q_{ij}^n + \sum_{n=1}^3 \sum_{t=2005}^{2012} year_t * q_{ij}^n$$

- For the buyers identified in our factory sample, 1.2 million transactions over 8 years.
- Our measure of buyer quality is the average of the residuals across all product categories in which the buyer is active.
 - Note that we know which HS codes our factories produce, but we have not used this in estimating the residual yet.

Measuring buyer quality



➤ This appears to produce reasonable values:

Sample residual unit prices

High end

Polo	720
Lands End	719
Espirit	596
Tommy Hilfinger	387

Middle

Macys	149
Zara	98
H&M	86

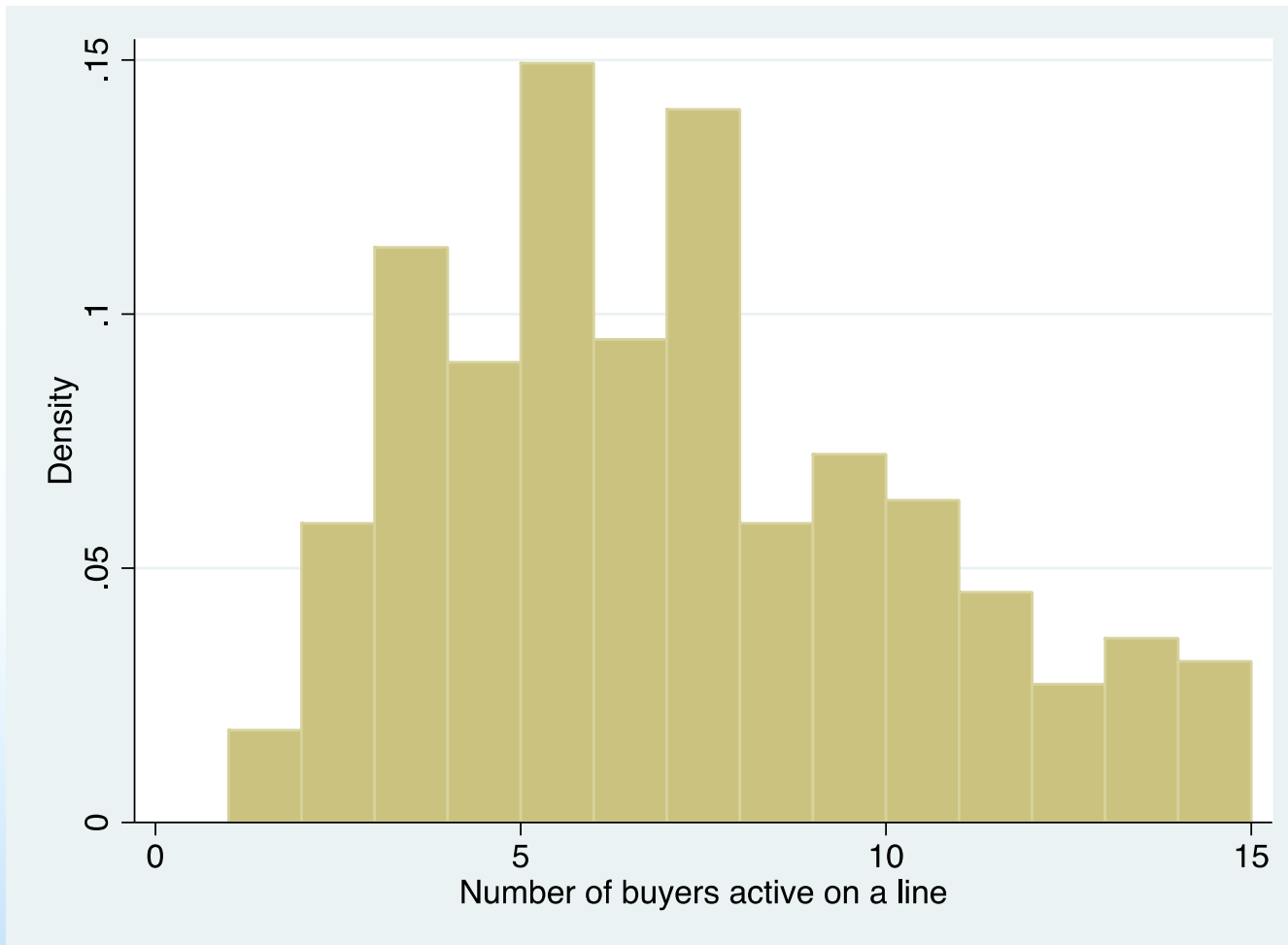
Low

Walmart	-35
Sainsbury's	-131
Woolworths	-150
Lidl	-169

How Specialized are Lines?



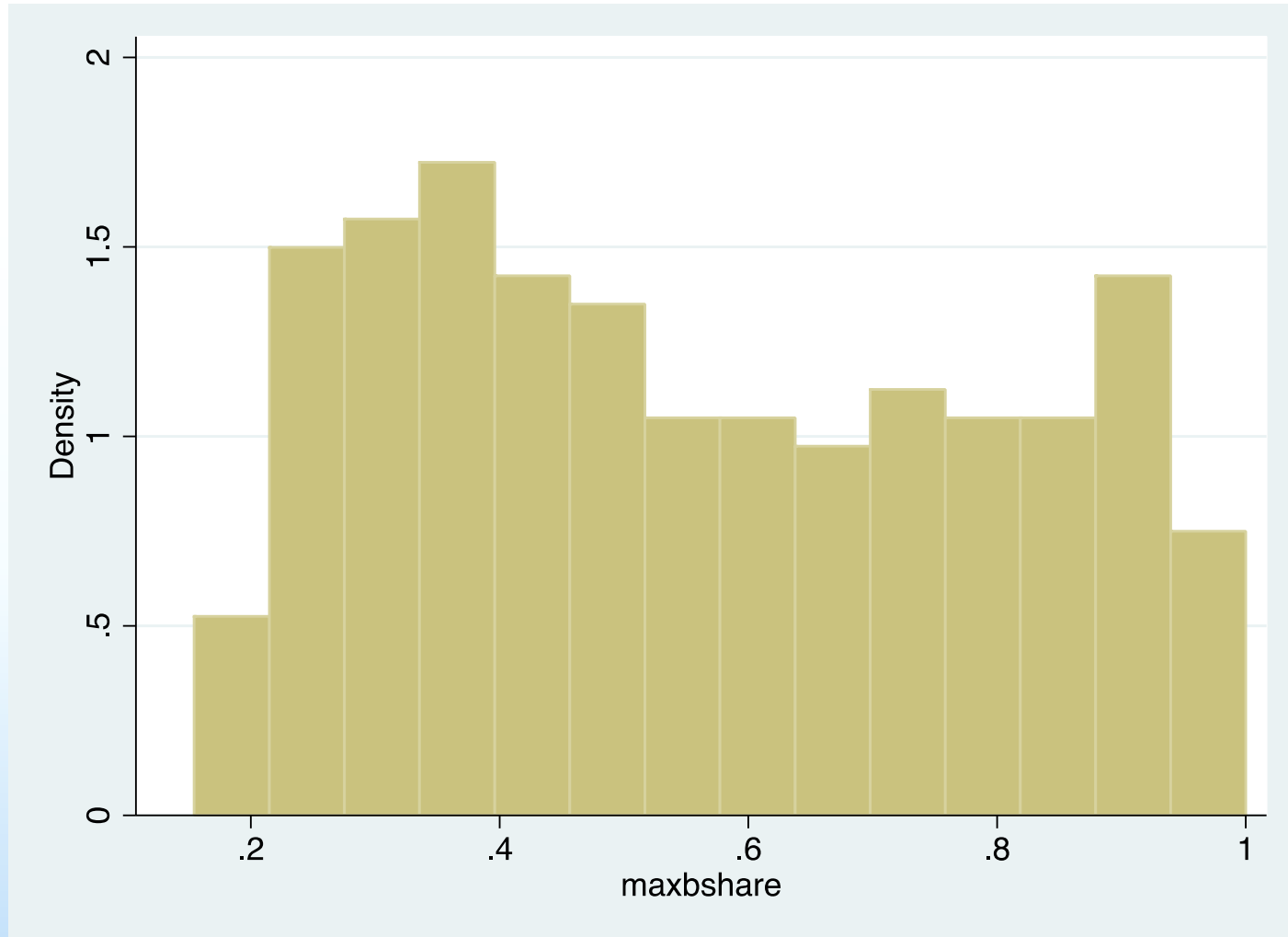
Distribution of number of buyers on each line, over the sample period.



How Specialized are Lines?



Largest share of production days on a line allocated to a single buyer.



How Specialized are Factories?



10th and 90th percentile buyer quality, by factory

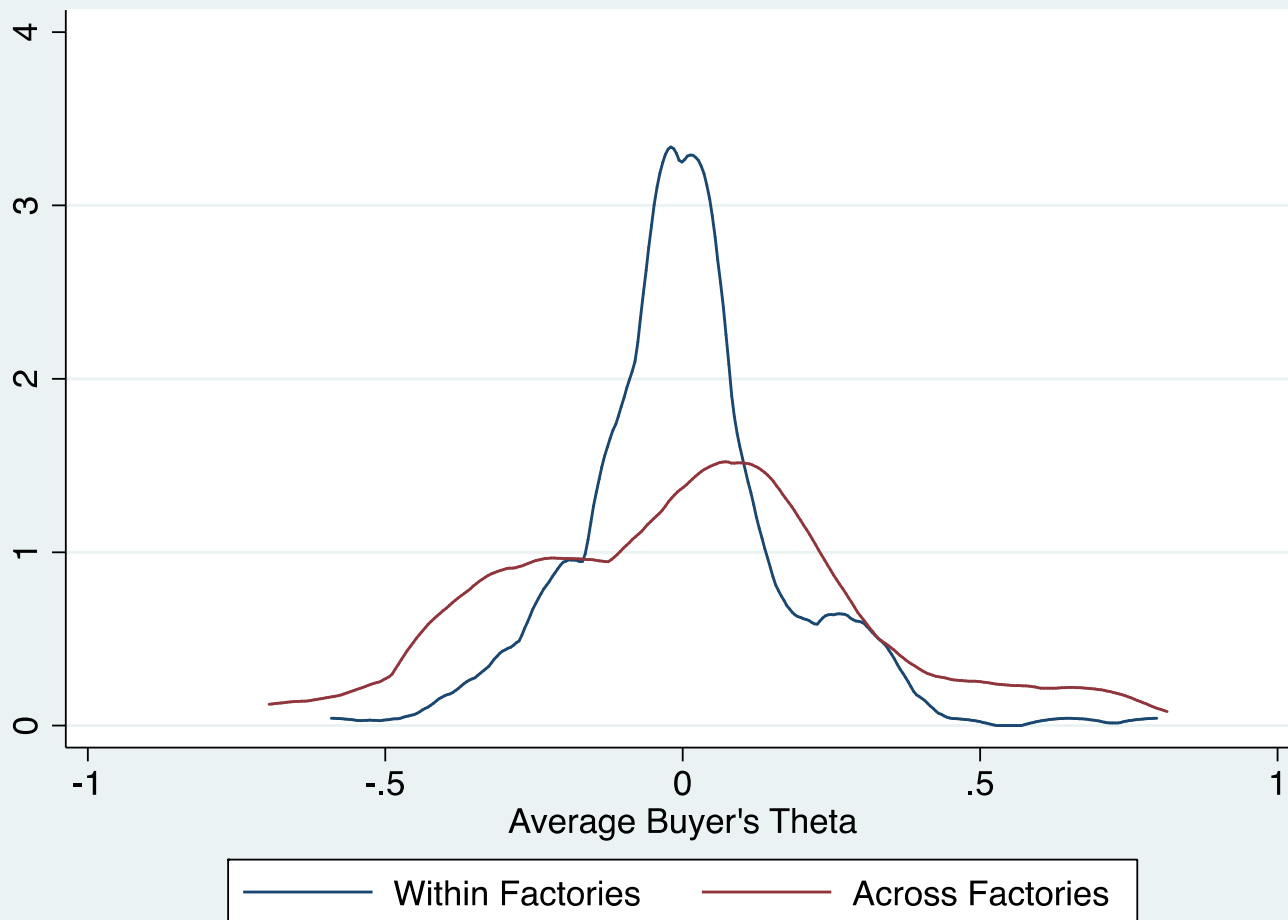
Variation in buyer quality with factory

Factory ID	10th Percentile	90th Percentile
1-2-0200	-164	108
2-4-0403	-18	99
3-1-0157	131	387
3-2-0073	-78	86
3-4-0140	86	86
3-4-0402	-95	709
3-8-0091	-121	32
4-2-0072	-121	54
4-4-0405	-35	129
4-4-0530	-68	720
4-7-0462	86	141
5-1-0100	-150	141
5-2-0410	-191	-139
5-4-0404	-95	129
6-2-0330	-170	103
6-3-0260	-82	109
6-4-0481	-41	99

How Specialized are Factories and lines?



Distribution of buyer quality across and within factories.



Buyer quality and productivity



Is Efficiency Related to Buyer Quality?

Outcome Variable	Log Efficiency				Efficiency	
Log Buyer Quality measure	0.00677*** (0.00197)	0.00429*** (0.00199)	0.00561*** (0.00192)	0.00307* (0.00171)		
Above median buyer quality					0.0652* (0.0265)	0.03422* (0.0187)
Dependent Variable Mean	0.43	0.43	0.43	0.43	0.43	0.43
Factory Fixed Effects	No	Yes	Yes	Yes	No	Yes
Factory-Month Fixed Effects	No	No	Yes	Yes	No	Yes
Line fixed Effects	No	No	No	Yes	No	Yes
Number of Observations	35396	35396	35396	35396	35396	35396

Observations at the line-day level. Efficiency is a measure of labour productivity. Buyer quality measured by the residual of a regression on the unit price for buyers, controlling for 4-digit HS code. Logs are the log hyperbolic sine transformations of buyer quality and efficiency. All residuals clustered at the factory level.

Higher end buyers also have lower quality defect rates ($p=.01$) and lower absenteeism rates ($=.07$)

Buyer quality and productivity



Buyer Quality Effects y - Supervisor Training Sample

VARIABLES	(1) log efficiency	(2) log efficiency	(3) log efficiency	(4) log efficiency	(5) efficiency
October - December 2014					
Buyer quality measure	0.450*** (0.07)	0.259*** (0.09)	0.267*** (0.09)	0.387*** (0.06)	
% senior operators			0.063 (0.08)		
% automatic machines			-0.048 (0.11)		
Above median buyer quality					6.224*** (0.82)
Observations	26,129	4154	4,154	26,129	26,129
R-squared	0.084	0.1	0.101	0.136	0.216
Factory FE	Yes	Yes	Yes	No	No
Line FE	No	No	No	Yes	Yes

From a different sample. Higher quality data, but only 7 factories as of now.
Adding controls for machines and

Buyer quality and productivity



- Productivity is higher – markedly – when firms produce for higher-end buyers
 - Even on the same production line
- Is it learning? Not yet clear.
 - Better machines or workers.
 - Managers say this is not the case.
 - We have data from a new data set. Initial results indicate that controlling for these does not affect the buyer quality effects.
 - Increased managerial attention on these lines.
 - Buyer attention on these lines

Going forward



- A key question is whether the increase in productivity persists for at least some period when the line goes from high-end → low-end.
 - Even if there is real learning, reasons to think the measured effect will dissipate over time.
- Much more, and more complete, data being processed. Including measures of capital and labor quality.
- Analysis of persistence effects on the line – does producing for a high-end buyer lead to higher productivity in subsequent production for lower-end buyers?
- We are also collecting data from factories in Pakistan, and plan to do so in other countries as well.