

# The Changing Firm and Country Boundaries of US Manufacturers in Global Value Chains

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**Online Appendix (Not for Publication)**

## A Statistics on US Firms with In-house Manufacturing Plants

Table A.1: MNE Sample Shares of Aggregate Employment, Sales, and Trade Flows

Firm Type	M Plants in	Firms	Total		Manuf		Merchandise Goods	
			Emp	Sales	Emp	Sales	Imports	Exports
Panel A: In Sample								
Domestic	US	242,000	0.10	0.09	0.58	0.35	0.09	0.12
US MNE	US	350	0.04	0.05	0.03	0.03	0.03	0.02
US MNE	Foreign	150	0.00	0.01	0.00	0.00	0.01	0.00
US MNE	US & Foreign	1,200	0.06	0.14	0.27	0.40	0.29	0.44
Total in Sample		243,700	0.20	0.29	0.88	0.78	0.42	0.58
Panel B: Outside Sample								
Foreign	US	2,200	0.03	0.10	0.12	0.22	0.26	0.21
Foreign	None in US	5,400	0.03	0.04			0.07	0.03
US MNE	None	1,100	0.09	0.11			0.04	0.02
Domestic	None	4,312,000	0.65	0.46			0.22	0.15
Total Outside Sample		4,320,700	0.80	0.71	0.12	0.22	0.59	0.41

*Source:* 2007 Longitudinal Business Database, Economic Censuses, Longitudinal Firm Trade Transactions Database, BEA inward and outward surveys. Table presents total number of firms and their share of aggregate and manufacturing employment and sales and merchandise good trade flows by firm type and manufacturing plant locations. Panel A corresponds to the sample in the paper: all US firms with one or more majority-owned manufacturing plants anywhere in the world. Panel B is all other firms with US establishments.

Tables [A.2](#) provides statistics for US firms that manufacture anywhere in the world.

Table A.2: Sales, employment, and trade flows for all US firms that manufacture in-house

Firm Type:	(1)	(2)	(3)	(4)	(5)
Majority-Owned Manufacturing Plants in:	Domestic	MNE	MNE	MNE	Total
	US Only	US Only	US & Foreign	Foreign Only	
Firms	242,000	350	1,200	150	243,700
Panel A: Firm Sales (\$billions)					
Global Sales	2,629	1,695	6,710	345	11,379
Sales by US Estabs	2,629	1,446	3,853	173	8,101
Manufacturing	1,819	175	2,096	-	4,091
Non-Manufacturing	809	1,271	1,757	173	4,010
Sales by Foreign Affiliates	-	249	2,857	172	3,278
Manufacturing	-	-	1,708	24	1,732
Non-Manufacturing	-	249	1,149	149	1,546
Panel B: Firm Employment (thousands)					
Global Employment	11,059	5,338	11,883	732	29,012
Employment in US Estabs	11,059	4,349	6,556	361	22,325
Manufacturing	7,644	333	3,601	-	11,578
Non-Manufacturing	3,415	4,016	2,955	361	10,748
Management & Professional	359	432	1,250	54	2,094
Other	3,056	3,585	1,705	308	8,654
Employment in Foreign Affiliates	-	989	5,327	371	6,687
Manufacturing	-	-	4,203	78	4,281
Non-Manufacturing	-	989	1,124	292	2,405
Panel C: Firm Trade Flows (\$billions)					
Imports	126	39	410	12	587
Arm's-Length	89	33	160	6	287
Related-Party	37	7	250	6	300
Exports	123	22	437	3	585
Arm's-Length	103	16	253	2	375
Related-Party	19	5	184	1	209

*Source:* 2007 Longitudinal Business Database, Economic Censuses, Longitudinal Firm Trade Transactions Database, BEA inward and outward surveys. Sample is all US firms with one or more majority-owned manufacturing plants anywhere in the world. Table presents total number of firms and their global sales, global employment, and US merchandise good trade flows by firm type and manufacturing plant locations. Sample is all US firms with one or more majority-owned manufacturing plants anywhere in the world.

Table A.3: US manufacturers' trade intensity and related-party trade shares

	(1)	(2)	(3)	(4)
Firm Type:	Domestic	MNE	MNE	MNE
Majority-Owned Manufacturing Plants In:	US Only	US Only	US & Foreign	Foreign Only
Panel A: Trade Intensity				
Imports/Sales	0.05	0.03	0.11	0.07
Exports/Sales	0.05	0.01	0.11	0.02
Panel B: Related-Party Trade Shares				
Related-Party Imports/Total Imports	0.29	0.17	0.61	0.52
Related-Party Exports/Total Exports	0.16	0.25	0.42	0.22

*Source:* 2007 Longitudinal Business Database, Economic Censuses, Longitudinal Firm Trade Transactions Database, BEA inward and outward surveys. Table presents share of firm sales and employment in manufacturing versus non-manufacturing establishments. Sample is all US firms with one or more majority-owned manufacturing plants anywhere in the world.

## B Factoryless Goods Producer Statistics

This section provides additional facts about factoryless goods producers.

### B.1 Definition of wholesale establishments

Wholesale establishments sell goods to other firms (as opposed to consumers) and generally fall under five broad categories: merchant wholesalers, manufacturers' sales branch, agent/broker, electronic market, or other broker/agent. A merchant wholesaler is a 'company or establishment engaged in buying merchandise on its own account produced by other firms and selling them using the wholesale method.' A manufacturers' sale branch is an establishment that sells goods manufactured by other establishments of the firm. An agent/broker is a establishment that buys and sells merchandise on a commission basis, rather than on its own account. An electronic market is an electronic platform that facilitates sales between businesses on a commission or fee basis.

Although wholesale establishments generally operate from a warehouse or office, they are not classified as 'warehouses.' Instead, a warehouse (NAICS 493) is simply a facility for storing goods and keeping them secure. Warehouses do not buy and sell goods, though they may provide logistical support in the distribution of goods, such as labeling, breaking bulk, inventory control and management, light assembly, order entry and fulfillment, packaging, pick and pack, price marking and ticketing, and transportation arrangements.

### B.2 EC form question

### B.3 2017 Census of Wholesale forms

I use the 2017 Census of Wholesale 'Special Inquiry' questions to identify factoryless goods producers.

**2017 Economic Census**  
WH-42311 - Motor Vehicles

Do Not Mail - Report Online

Item 27: Manufacturing Activities - Manufacturing at This Location

EIN:  
Store / Plant:  
CFN:

**ITEM 27: MANUFACTURING ACTIVITIES - MANUFACTURING AT THIS LOCATION**

In 2017, did this establishment manufacture any products or produce any goods at this location?

Yes  
 No

(1)

**2017 Economic Census**  
WH-42311 - Motor Vehicles

Do Not Mail - Report Online

Item 27: Manufacturing Activities - Manufacturing by Other Company Locations Inside the U.S.

EIN:  
Store / Plant:  
CFN:

**ITEM 27: MANUFACTURING ACTIVITIES - MANUFACTURING BY OTHER COMPANY LOCATIONS INSIDE THE U.S.**

In 2017, did this establishment have any manufacturing done on its behalf by any other locations of your company **inside the U.S.**?

Yes  
 No

(2)

## 2017 Economic Census

WH-42311 - Motor Vehicles

Item 27: Manufacturing Activities - Manufacturing by Affiliated Companies Inside the U.S.

EIN:  
Store / Plant:  
CFN:

**ITEM 27: MANUFACTURING ACTIVITIES - MANUFACTURING BY AFFILIATED COMPANIES INSIDE THE U.S.**

In 2017, did this establishment have any manufacturing done on its behalf by any **affiliated** companies **inside** the U.S.?

Yes

No

(3)

Do Not Mail - Report Online

## 2017 Economic Census

WH-42311 - Motor Vehicles

Item 27: Manufacturing Activities - Manufacturing by Unaffiliated Companies Inside the U.S.

EIN:  
Store / Plant:  
CFN:

**ITEM 27: MANUFACTURING ACTIVITIES - MANUFACTURING BY UNAFFILIATED COMPANIES INSIDE THE U.S.**

In 2017, did this establishment have any manufacturing done on its behalf by any **unaffiliated** companies **inside** the U.S.?

Yes

No

(4)

Do Not Mail - Report Online

## 2017 Economic Census

WH-42311 - Motor Vehicles

Item 27: Manufacturing Activities - Manufacturing Done Outside the U.S.

EIN:  
Store / Plant:  
CFN:

**ITEM 27: MANUFACTURING ACTIVITIES - MANUFACTURING DONE OUTSIDE THE U.S.**

In 2017, did this establishment have any manufacturing done on its behalf **outside** the U.S.?

*Include manufacturing done outside the U.S. by both affiliated and unaffiliated companies.*

Yes

No

(5)

Do Not Mail - Report Online

## 2017 Economic Census

WH-42311 - Motor Vehicles

Item 27: Manufacturing Activities - Design or Specification for Products Manufactured on Its Behalf

EIN:  
Store / Plant:  
CFN:

**ITEM 27: MANUFACTURING ACTIVITIES - DESIGN OR SPECIFICATION FOR PRODUCTS MANUFACTURED ON ITS BEHALF**

In 2017, did this establishment determine the design or specifications for any of the products that were manufactured on its behalf?

*"Design or specifications" refers to the function of the product, not just the appearance or its packaging.*

Yes

No

(6)

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2017 Economic Census  
WH-42311 - Motor Vehicles

Item 27: Manufacturing Activities - Percentage of Revenue for Products Manufactured on Its Behalf

EIN:  
Store / Plant:  
CFN:

ITEM 27: MANUFACTURING ACTIVITIES - PERCENTAGE OF REVENUE FOR PRODUCTS MANUFACTURED ON ITS BEHALF

What percentage of this establishment's total revenue in 2017 was from the sale of products that were manufactured on its behalf, per this establishment's design or specifications?

*Estimates are acceptable.*

0%

1-25%

26-50%

51-75%

76-99%

100%

(7)

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Do Not

2017 Economic Census  
WH-42311 - Motor Vehicles

Item 27: Manufacturing Activities - U.S. Company as a Whole - Manufacturing Done Outside the U.S.

EIN:  
Store / Plant:  
CFN:

ITEM 27: MANUFACTURING ACTIVITIES - U.S. COMPANY AS A WHOLE - MANUFACTURING DONE OUTSIDE THE U.S.

In 2017, was your U.S. company as a whole responsible for the design of any products that were manufactured outside the U.S.?

Yes

No

(8)

Do Not Mail - Report Online

## B.4 Sample for the Factoryless Goods Producer Analysis

Table B.1 presents statistics on the subset of wholesale firms that do not have manufacturing plants based on whether they are in the factoryless goods producer sample (because they answered the special inquiry questions) or not. The total firms and wholesale employment at the firms in Table B.1 correspond to 89 percent of the total 2017 published number of wholesale firms and 68 percent of their wholesale employment (available here <https://data.census.gov/table?q=EC1742BASIC&tid=ECNBASIC2017.EC1742BASIC&hidePreview=true>).

A factoryless goods producer is defined as a firm with a 'Yes' response to one or more of questions (3), (4), and (5) by at least one establishment. A traditional merchant wholesaler has at least one establishment with a 'No' response to these questions, in addition to zero establishments with 'Yes' responses. We do not use responses to question (2), but note that it strongly correlates with firms having a US manufacturing plant (and these firms are excluded from the sample in the paper by definition).

We define an establishment's design status using question (6). Firm design is 'Yes' for firms with at least one establishment that designs, or 'No' for firms with at least one establishment that does not design and none that do. We leave questions (7) and (8) for future work. Note that the last question is only asked for multi-unit firm establishments.

Table B.1: Sample Statistics for 2017 Factoryless Goods Producers and Merchant Wholesalers

	Firms (000s)	Emp (millions)	Share of Total				
			Firms	Emp	Sales	Imports	Exports
Firms Outside Sample	129	5,012	0.49	0.50	0.39	0.45	0.37
Firms In Sample	137	5,069	0.51	0.50	0.61	0.55	0.63
FGPs	37.3	960	0.14	0.10	0.13	0.32	0.20
Non-FGPs	99.5	4,109	0.37	0.41	0.49	0.24	0.43
Total	266	10,081	1.00	1.00	1.00	1.00	1.00

*Source:* 2017 LBD, Longitudinal Firm Trade Transactions Database, and Economic Censuses. Firms in table are the universe of firms with one or more wholesale estabs and no manufacturing plants in 2017. ‘Firms in Sample’ are those with at least one establishment in the 2017 Census of Wholesale that respond to questions 3, 4, or 5.

Table B.2: Trade Participation of 2017 FGPs Alive in 1992, by Year

	$\frac{Imports}{Sales}$	$\frac{RPIImports}{Imports}$	$\frac{ChinaImports}{Imports}$	Num. country-products	
				Imports	Exports
FGP Firms in 2017					
1992	0.15	0.57	0.08	14.28	7.79
1997	0.20	0.57	0.11	17.74	10.77
2002	0.20	0.56	0.15	17.39	11.49
2007	0.23	0.54	0.29	21.10	11.88
2012	0.22	0.58	0.34	20.06	13.25
2017	0.25	0.63	0.37	20.68	13.07
Non-FGP Firms in 2017					
1992	0.04	0.43	0.06	8.28	7.78
1997	0.04	0.44	0.11	9.07	10.02
2002	0.03	0.40	0.18	8.53	9.96
2007	0.04	0.29	0.23	9.55	8.65
2012	0.04	0.25	0.23	9.96	10.86
2017	0.03	0.25	0.25	10.50	10.83

Approximately 7,700 FGPs and 27,000 Non-FGP wholesale firms are alive from 1992-2017.

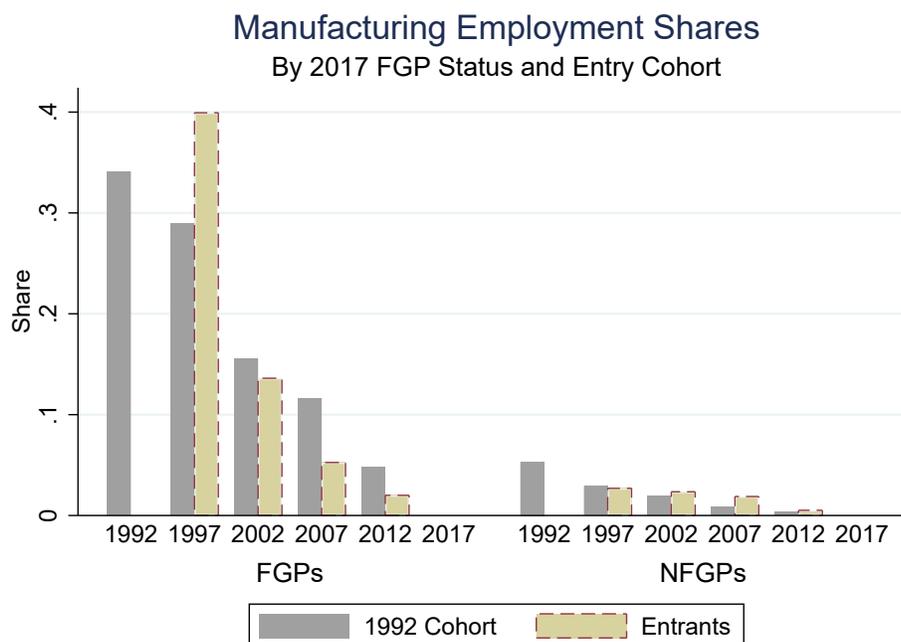
Table B.3: Sector Employment Shares of 2017 FGPs Alive in 1992, by Year

	Avg Emp	Share of Employment in			
		Manuf	Whole	Retail	Prof & Mgt
FGP Firms in 2017					
1992	39.73	0.34	0.43	0.06	0.09
1997	47.37	0.29	0.46	0.09	0.09
2002	57.89	0.16	0.51	0.14	0.12
2007	62.80	0.12	0.52	0.14	0.10
2012	64.27	0.05	0.56	0.15	0.13
2017	62.12	-	0.63	0.19	0.08
Non-FGP Firms in 2017					
1992	43.69	0.05	0.42	0.26	0.05
1997	60.79	0.03	0.36	0.35	0.07
2002	74.93	0.02	0.35	0.36	0.06
2007	88.36	0.01	0.34	0.36	0.06
2012	89.52	0.00	0.33	0.33	0.06
2017	98.71	-	0.34	0.33	0.06

Approx 7,7k FGPs and 27k Non-FGP wholesale firms alive from 1992-2017.

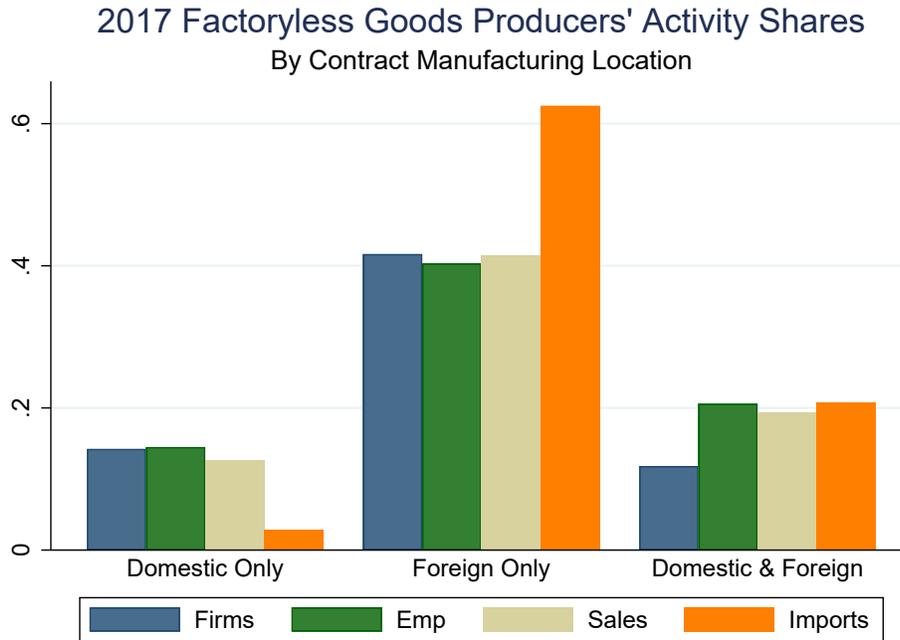
## B.5 Additional statistics on 2017 factoryless goods producers

Figure B.1: Manufacturing employment shares by entry cohort for 2017 FGP and NFGP Firms



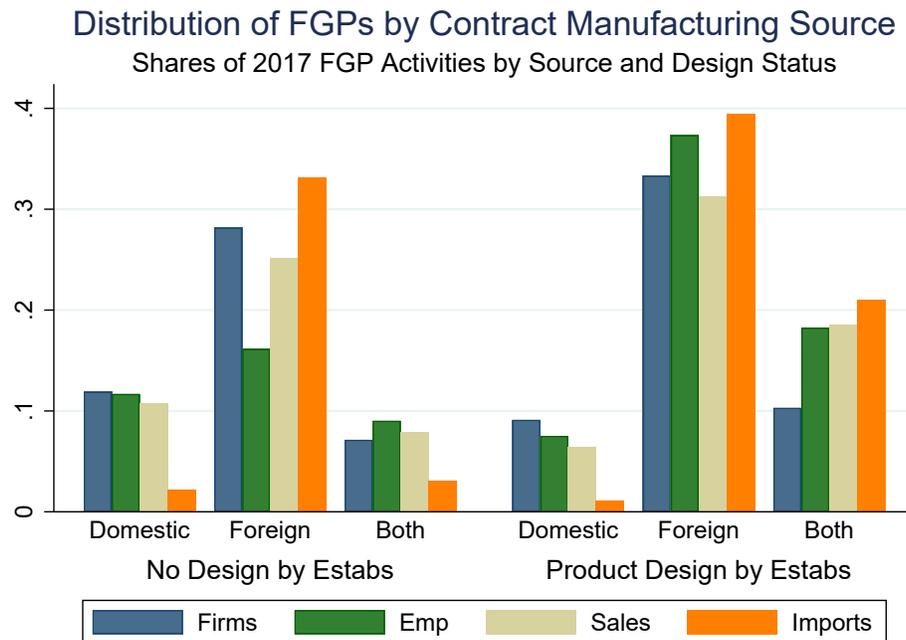
Source: 2017 CWH, LFFTD, LBD. Figure plots weighted employment shares by sector for FGPs and non-FGPs. FGPs are firms with one or more wholesale estabs that contract for manufacturing services in 2017. NFGPs are firms with at least one estab that reports not contracting for manufacturing and none that do. Sample is all firms with at least one wholesale estab that responds to the 2017 CMS question and with no manufacturing plants in 2017.

Figure B.2: Share of 2017 Factoryless Goods Producers' Activities by Contract Manufacturing Source



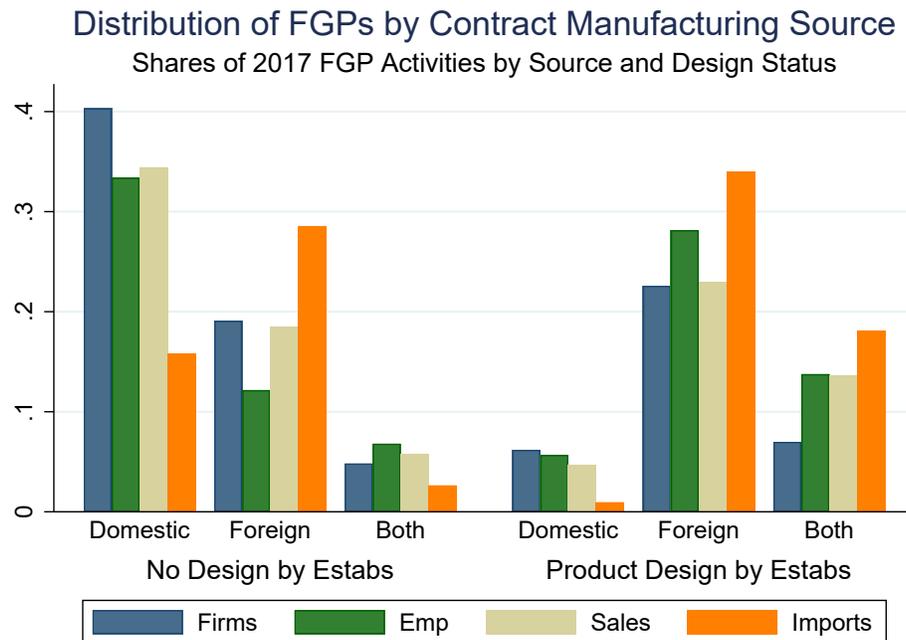
Source: 2017 Longitudinal Business Database, Longitudinal Firm Trade Transactions Database, Economic Census, Special Inquiry data from the Census of Wholesale Trade. Figure displays the share of firms, employment, sales, and imports accounted for by factoryless goods producers that contract for manufacturing services from suppliers in the United States (Domestic Only), suppliers in foreign countries (Foreign Only), or both domestic and foreign suppliers (Domestic & Foreign). Figure contains 25,200 factoryless goods producers for which the question about whether they designed their products is not missing. Shares of each activity sum to the total amount of that activity covered by firms without missing data.

Figure B.3: Shares of FGP activity by source of contract manufacturing services and design status



Source: 2017 Economic Censuses, LFFTD, and LBD. Figure displays the share of firms, employment, sales, and imports accounted for by factoryless goods producers (FGPs), based on whether firms purchase contract manufacturing services from suppliers in the United States (Domestic Only), suppliers in foreign countries (Foreign Only), or both domestic and foreign suppliers (Domestic & Foreign). Sample contains all FGPs, including 12,000 firms for which their design status is missing. I impute those firms as purchasing CMS domestically only and performing no design.

Figure B.4: Shares of FGP activity by source of contract manufacturing services and design status



Source: 2017 Economic Censuses, LFFTD, and LBD. Figure displays the share of firms, employment, sales, and imports accounted for by factoryless goods producers (FGPs), based on whether firms purchase contract manufacturing services from suppliers in the United States (Domestic Only), suppliers in foreign countries (Foreign Only), or both domestic and foreign suppliers (Domestic & Foreign). Sample contains all FGPs, including 12,000 firms for which their design status is missing. I impute those firms as purchasing CMS domestically only and performing no design.

## C Statistics for 2007 Wholesale and Manufacturing Establishments

This section presents statistics for 2007 manufacturing and wholesale establishments using work from ?, Bernard and Fort (2015), and Bernard and Fort (2017).

### C.1 2007 Census of Wholesale Forms

Figure C.1: Questions used to identify wholesale factoryless goods producer establishments

The image shows a portion of a survey form titled "SPECIAL INQUIRIES - Continued". It contains three numbered questions (1, 2, and 3) with multiple-choice options. Question 1 asks if the establishment designs, engineers, or formulates products. Question 2 asks for the primary activity, with options for contract manufacturing, transforming raw materials, reselling goods, and other. Question 3 asks if the establishment purchases contract manufacturing services from other companies, with options for within the 50 states, outside the 50 states, or no.

m WH-42301 (12/04/2006) f

SPECIAL INQUIRIES - Continued

**C. OTHER ESTABLISHMENT ACTIVITIES**

**1.** Did this establishment design, engineer, or formulate the manufactured products that it sold, produced, or shipped?

0318  Yes

0319  No

**2.** Which of the following best describes this establishment's primary activity? (Mark "X" only ONE box.)

0362  Providing contract manufacturing services for others

0363  Transforming raw materials or components into new products that this establishment owns or controls

0364  Reselling goods manufactured by others (with or without minor final assembly)

0365  Other - Specify *z*

0366

**3.** Did this establishment purchase contract manufacturing services from other companies or other establishments of your company to process materials or components that this establishment owns or controls?

0496  Yes, primarily with establishments WITHIN the 50 States and the District of Columbia

0497  Yes, primarily with establishments OUTSIDE of the 50 States and the District of Columbia

0498  No

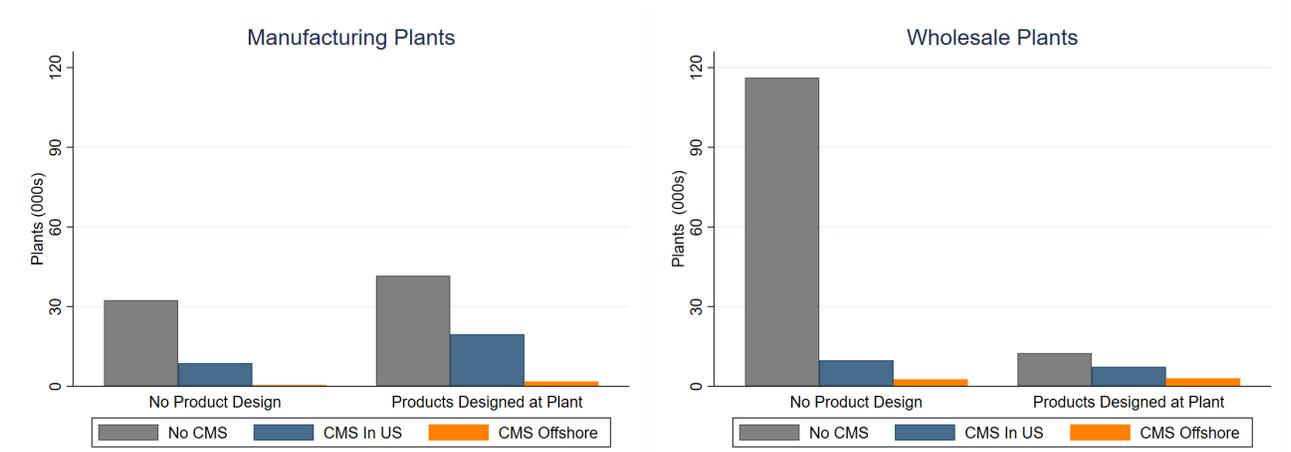
Source: 2007 Census of Wholesale form questions.

### C.2 factoryless goods producer stats from 2007 data

In Figure C.2, I compare 2007 manufacturing plants that purchase CMS to wholesale establishments that purchase them. Most notably, although a much smaller number (and share) of wholesale plants design products at their establishment (Figure C.2), those that do are considerably more likely to purchase CMS than manufacturing plants. Figure C.3 indicates that just over 30 percent of manufacturing plants that design goods purchase CMS, with less than 5 percent purchasing them offshore. By contrast, approximately 45 percent of wholesale establishments that design their products purchase CMS, with more than 10 percent purchasing them offshore.

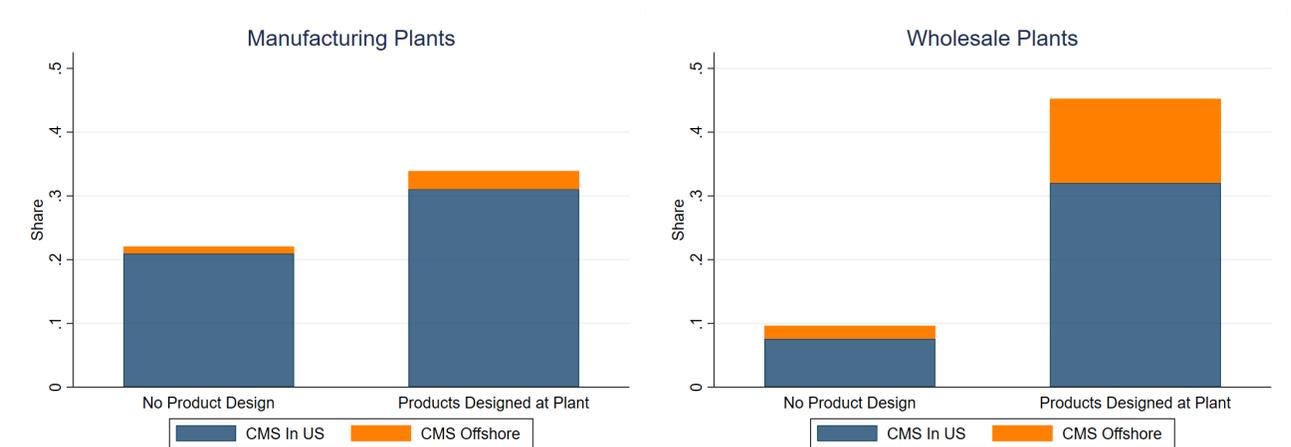
Figure 3 shows that factoryless goods producers have higher shares of Management (NAICS 55) and Professional, Scientific, and Technical Services (NAICS 54) employment relative to non-factoryless goods producers. In 2007, factoryless goods producers had 6.2 percent of their employment in establishments in these sectors, whereas non-factoryless goods producers had only 4.8 percent. Figure 3 also displays these 2007 wholesale firms' past employment shares in these knowledge activities and also in manufacturing.

Figure C.2: Counts of Establishments that purchase CMS and Design Products in 2007, by CMS Purchase Location and Sector



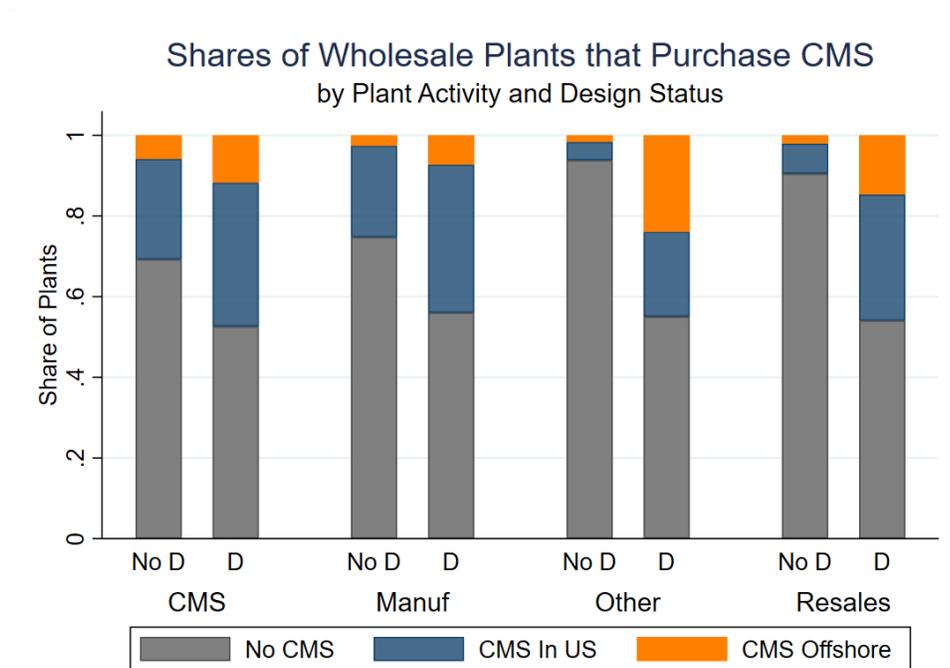
Notes: Figure presents the count of establishments by plant contract manufacturing services (CMS) purchase location and design status. Left panel presents manufacturing plant counts and right panel presents wholesale establishment counts. 'Products Designed at Plant' corresponds to an establishment reporting that it did 'design, engineer, or formulate the manufactured products that it sold, produced, or shipped'. 'In US' identifies plants that primarily purchase CMS in the United States, while 'Offshore' corresponds to plants that primarily purchase CMS from foreign countries.

Figure C.3: Shares of Establishments that Purchase CMS and Design in 2007, by CMS Purchase Location



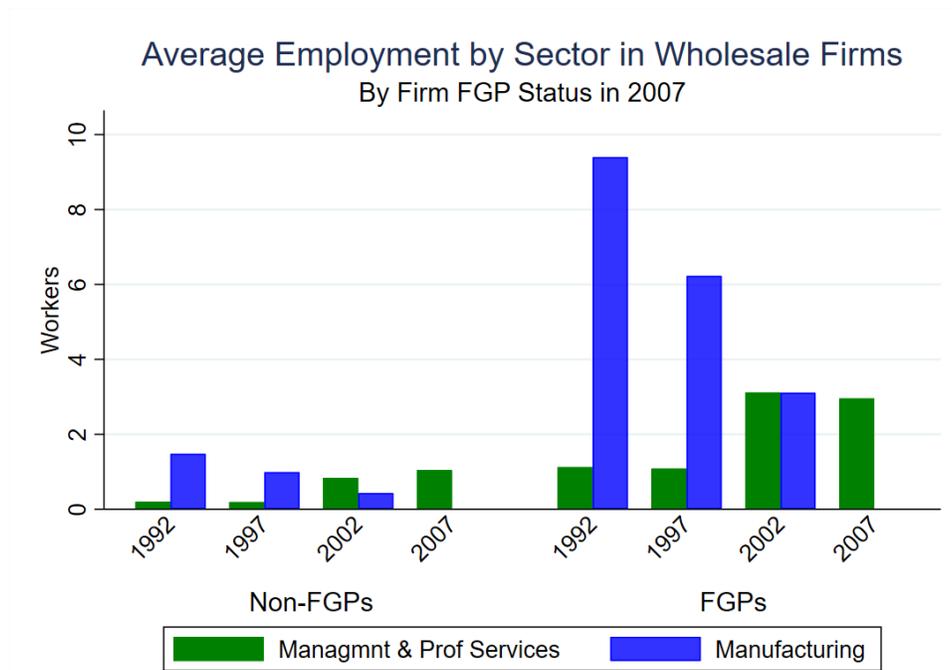
Notes: Left panel presents the count of wholesale establishments by plant contract manufacturing services (CMS) CMS purchase location and design status. Right panel presents the share of plants within each product design category that purchase CMS primarily in the US or from foreign countries. 'Products Designed at Plant' corresponds to an establishment reporting that it did 'design, engineer, or formulate the manufactured products that it sold, produced, or shipped'.

Figure C.4: Shares of wholesale plants that purchase CMS by plant's primary, self-reported activity and design status in 2007



Source: Figure presents share of establishments that purchase CMS within each category of plants' self-reported primary activity and design status. Plants designate their primary activity as: 'CMS' - provide contract manufacturing services to others (3.0% of plants); 'Manuf' - Transforming raw materials or components into new products that this establishment owns or controls (7.2% of plants); 'Other' (14.6% of plants); 'Resales' - Reselling goods manufactured by others (with our without final assembly) (75.3% of plants). 'D' corresponds to an establishment that reports that it did 'design, engineer, or formulate the manufactured products that it sold, produced, or shipped'.

Figure C.5: Average professional and manufacturing employment at wholesale firms in 2007



Source: Figure presents average employment in Manufacturing (NAICS 3), Management (NAICS 55) and Professional, Scientific, and Technical Services (NAICS 54), and Wholesale (NAICS 42) establishments for firms with one or more wholesale establishments but no manufacturing plants in 2007. factoryless goods producer firms in this figure defined as those with wholesale establishments that design goods and are involved in manufacturing, either through purchases of contract manufacturing services or because the establishment itself considers its primary activity to be manufacturing.