Effects of International Competition on Small Wholesale and Retail Trade Firms

by

Robert M. Feinberg
Washington, D.C. 20016

for

SBA
Office of Advocacy
www.sba.gov/advo

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Introduction

In a previous report for the U.S. Small Business Administration (Feinberg 2008), the author found that the smallest firms were most vulnerable to international competition, as measured by exchange rate fluctuations and import shares. However, that study, along with most earlier empirical literature on determinants of exit or firm survival, focused entirely on the manufacturing sector of the economy. This study examines firms further down the distribution chain—small wholesalers and retailers—over the 1989-2005 period. The primary focus is on the reaction of domestic firms to foreign competition, with real exchange rate movements as a proxy.

Annual data for 1989-1998 for 58 SIC-based wholesale and retail sectors and for 1998-2005 for 48 comparable NAICS-based sectors[1] from the Statistics of U.S. Businesses (SUSB), available from the U.S. Small Business Administration (in collaboration with the U.S. Census Bureau), are analyzed in this report. The study examines small firm exit rates in several employment size categories—firms with fewer than 10 employees, 10-19 employees, 20-99 employees, and 100-499 employees—using industry data and international and macroeconomic determinants as explanatory variables, with additional data sources including the Census of Manufactures, the Annual Survey of Manufactures, the Bureau of Labor Statistics, and the Federal Reserve Board.

Literature Review and Theoretical Motivation

A large number of empirical studies have investigated the determinants of new entry; these are surveyed in Geroski (1995) and Siegried and Evans (1994). The focus on determinants of firm survival or exit has increased in recent years. Pakes and Ericson (1998) develop two theoretical models of firm "learning" about economic conditions—"passive" and "active." They note that "learning is passive in the sense that information is obtained as a costless byproduct of operating. One possible analogy is to the operation of a retail outlet which learns whether its neighborhood

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[1] Restaurants and bars were included as "retail" in the SIC system, but as "services" in the NAICS system. This sector is included in the analysis below. One would expect, however, that firm survival in these sectors will be less closely related to fluctuations in exchange rates than would be the case in sectors involving the sale of goods (some of which may be imported).

will support its product and, if so, at what scale of operation." This suggests that there should be a fairly quick response by retailers to changes in economic conditions.

On the empirical side, Khemani and Shapiro (1987) find that high market concentration acts as a deterrent to entry, and (surprisingly) that high profit industries experience more exits; the latter effect is explained as high profits attracting more entrants who then displace some incumbents. Dunne et al. (1988) provide a detailed descriptive analysis of patterns of entry, exit, and growth in U.S. manufacturing over the 1963-82 period. They find small, relatively new firms to have the highest failure rates, though survival probabilities seem to depend on how firms originally entered the market – most successful are firms diversifying from other manufacturing industries through new-plant construction. Phillips and Kirchhoff (1989) provide evidence that survival rates of new firms are higher than previously thought, with almost half of all new manufacturing firms surviving at least six years. Survival chances are still higher for those new firms showing growth in the early years.

Audretsch (1994), for U.S. data, and Wagner (1994), in a similar German study, investigate the link between firm start-up size and subsequent exit rates. Their results are somewhat mixed. Audretsch, examining data (obtained from the U.S. Small Business Administration) on more than 12,000 U.S. manufacturing plants established in 1976, finds that establishments larger on entry had a lower chance of exit over the next 10 years, while Wagner observes no clear link between start-up size and exit rates; he does, however, confirm for German firms the Phillips and Kirchhoff (1989) finding that surviving firms are more likely to have experienced high rates of growth in their early years. Audretsch and Mahmood (1995) took a further look into the SBA dataset utilized in Audretsch (1994), with similar findings. They also note that an economic expansion leads to reduced exit rates, though no investigation of the role of international factors is undertaken.

Little previous work has examined international effects on survival/exit rates. DeBacker and Sleuwagen (2003) analyze data on Belgian manufacturing industries to determine the impact of foreign competition (both through imports and inbound foreign direct investment, FDI) on entry and exit rates of domestic entrepreneurs. They find that this international competition does increase domestic exit rates, though firms may be able to respond strategically to FDI in ways that lessen its impact.

In my previous SBA study, Feinberg (2008), I found that international pressures, in the form of import-share-weighted exchange-rate appreciation, lead to increased rates of *smallest-firm* exit in manufacturing, though the magnitudes of these effects are smaller than sometimes discussed. Very importantly, though, there is the strong suggestion that high-tech industries may have been able to avoid much of this impact during the appreciation of the dollar (though may also not gain much from depreciation). While the exact cause of this relationship cannot be pinpointed, patents and a reputation for innovation may shield a small firm somewhat from lower-priced foreign competitors. Another result of interest is that consumer goods industries – perhaps due to the cost and risk associated with establishing and maintaining brand loyalty – have higher rates of small-firm exit than do others. In the current project I turn to wholesalers and retailers and see if the patterns of response to international competition, separated out by firm size, are similar to what was observed for manufacturing firms.

Several authors have noted that determinants of survival or exit may differ between retail (and wholesale) establishments and manufacturing firms. Petrunia (2007) notes, consistent with Pakes and Ericson (1998), that retailer size and survival seem more dependent on initial conditions of entry than is the case for manufacturers; while for both retailers and manufacturers smaller firms are more likely to fail, "the stochastic process determining the growth of manufacturing firms is different from that of retail firms (p. 878)."[2] Eckert and West (2008), studying privatized liquor stores in Canada, find that (not surprisingly) older firms are more likely to survive, geographic location is important in determining survival probabilities, and more generally firm-level heterogeneity is important to consider.

The impact of international competition on wholesalers and retailers is less obvious than its effect on domestic manufacturers. To the extent that dollar appreciation results in lower prices on manufactured goods which can be passed on in the distribution chain to consumers, wholesale and retail sales may increase and these firms may prosper. However, if upstream manufacturers respond by pressuring the downstream wholesalers and retailers to tighten margins the impact may not be as favorable.

There are also other issues which may be relevant. If dollar appreciation increases the need for larger scale by wholesalers (perhaps to deal with expanded volumes of imports), this

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[2] Audretsch et al. (1999) also find the dynamic patterns of post-entry growth and survival in services differ from those in the manufacturing sector.

may lead to consolidation, hence exit by some. Also, if (perhaps differing by sector) wholesalers are more closely tied to particular manufacturers or to either domestic or foreign distribution channels (but not both) there will be a negative response to dollar appreciation similar to that of domestic manufacturers. On the other hand, retailers may be more comfortable buying from the cheapest source and will do well with lower manufactured/wholesale prices as the dollar gains.

Before turning to look at the empirical evidence, however, it must be acknowledged that business closure ("exit") may not always reflect "failure"; Headd (2003) found that about a third of closed businesses regarded themselves as successful at closure.[3] This suggests that to fully explain the exit decision by small firms, one would ideally like to go beyond the industry, macroeconomic, and international influences considered in this report – and consider more idiosyncratic individual explanations for why individual firms choose to shut down. At the level of industry detail this is not possible, but we should not be surprised if expected patterns explaining small firm *failure* do not seem to well predict *closure*.

Descriptive Statistics

The SUSB data on exit by industry is actually "establishment deaths" – while this can be a firm exit it also may mean a retailer or wholesaler closing down a particular store or facility while remaining in operation. While the distinction is not made at the level of industry detail used in this study, a look at the more aggregate data for all retail and wholesale is illuminating. Tables 1a and 1b present – only for the 2004-2005 period – establishment deaths in wholesale and retail in the four size categories studied here and the extent to which these represent firm exit. We examine 40 retail industries in the 1990-1998 period, 30 in the 1999-2005 period, and 18 wholesale industry categories over the entire time period; industry titles are given in an appendix to this report.[4] One point to note in Tables 1a and 1b is the disproportionate role of *very small business*; for both the wholesale and retail sectors, there are more than twice as many

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[3] Similarly, Holmberg and Morgan (2003) caution against oversimplifying the issue as one of "survival" vs. "failure."

[4] I have dropped the retail category of "department stores" which had small numbers of establishments under 500 employees, especially in the two smallest size categories, and numbers wildly fluctuating in the SUSB data from year to year (e.g., for 1996, 1997, and 1998, the data reports 1, 52, then 6 firms for establishments under 20 employees).

establishments with under 10 employees than in the other three size categories usually regarded as small businesses (i.e., under 500 employees) combined.

Table 1a. Firm Deaths and Establishment Deaths, All Wholesale, 2004-2005

	Firm Size (number of employees)			
	1-9	10-19	20-99	100-499
Number of establishments	215,794	43,583	52,918	25,902
Firm deaths	26,219	1,767	1,201	130
Establishment deaths	26,429	1,971	1,867	1,002
Firm deaths/establishment deaths (percent)	99.2	89.6	64.3	13.0

Source: Statistics of U.S. Businesses (SUSB). U.S. Department of Commerce, Bureau of the Census, partially funded by the U.S. Small Business Administration, Office of Advocacy.

Table 1b. Firm Deaths and Establishment Deaths, All Retail, 2004-2005

	Firm Size (number of employees)			
	1-9	10-19	20-99	100-499
Number of establishments	497,100	94,002	94,625	50,396
Firm deaths	67,758	4,519	2,422	200
Establishment deaths	68,334	5,178	4,221	2,847
Firm deaths/establishment deaths (percent)	99.2	87.3	57.4	7.0

Source: Statistics of U.S. Businesses (SUSB). U.S. Department of Commerce, Bureau of the Census, partially funded by the U.S. Small Business Administration, Office of Advocacy.

Clearly, the exit of establishments in wholesale and retail firms of under 10 employees can be safely assumed to represent industry exit (as over 99 percent of establishment deaths correspond to firm death in the data). The overwhelming bulk of such exits in firms of 10-19 employees can also be seen as firm exit (with just under 90 percent of establishment deaths here corresponding to firm death). However, for firms in the 20-99 employee range, less than two-thirds of establishment exit in wholesale represents firm exit, under 60 percent in retail. In the 100-499 category it is safe to say that establishment exit for both wholesale and retail most likely involves company restructuring, with only 13 percent of wholesale establishment exits and 7 percent of retail establishment exits corresponding to firm deaths. While this study examines determinants of establishment exit in this larger size range, it would not be surprising to find differences as compared to the smaller size ranges in which industry exit is more accurately measured.

I now turn to measures of exit over time and by industry sector, for the four size categories considered here.[5] First, however, over the entire sample, note that survival in the retail sector is more difficult than in wholesale: a 14.6 percent exit rate in the under 10 employee category for retail vs. 12.4 for wholesale; 7.4 percent in the 10-19 category for retail vs. 5.4 for wholesale; 7.5 percent in the 20-99 category for retail vs. 5.2 for wholesale; and 8.9 percent in the 100-499 category for retail vs. 6.1 for wholesale. By way of comparison, exit rates in manufacturing for the same time period averaged 14.3 percent for the 1-9 employee firms, 6.6 percent for the 10-19 employee firms, and 5.2 for both the 20-99 and 100-499 employee firms. In Table 2a note the relatively little variation over the 16-year time frame in exit rates in the wholesale sector, 11.9-13.4 percent for the smallest firm size, 4.3-7.0 percent for 10-19 employee firms, 3.6-7.9 percent for the 20-99 employee firms, and 3.7-8.2 percent for the 100-499 employee firms. There does seem to be greater intertemporal variation in retail sector exit rates (Table 2b): 13.2-16.2 percent for the 1-9 employee category; 6.2-10.7 for the 10-19 employee category; 4.8-11.0 for the 20-99 category; and 5.9-12.0 for the 100-499 employee firms.

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[5] One data issue that needs to be mentioned is the change in NAICS codes effective with the 2003-04 exit data; in particular, a new category was created of wholesale trade agents and brokers (4251). These firms do not take title to the goods they sell, as opposed to other wholesalers (now referred to as "merchant wholesalers"). This means that the data on numbers of establishments and establishment deaths by wholesale industry sector is not consistent over the entire period (1999-05) of the NAICS-based sample; it is hoped that this will not bias the time series of exit rates and we will discuss this issue later in the estimation discussion.

Table 2a. Mean Values of Exit Measures by Year, Wholesale

| | Firm Size (number of employees) | | | |
	1-9	10-19	20-99	100-499
1990	12.7	5.3	5.0	6.7
1991	13.3	5.4	5.9	7.1
1992	13.4	7.0	6.8	6.8
1993	12.5	5.1	4.4	6.0
1994	12.3	5.2	4.7	5.8
1995	11.5	4.9	4.1	5.2
1996	11.9	5.4	5.4	6.1
1997	12.1	6.0	6.8	7.6
1998	12.3	5.4	4.8	6.9
1999	12.8	5.4	5.2	5.6
2000	12.4	5.0	4.8	5.6
2001	12.6	5.4	4.6	6.5
2002	13.3	6.7	7.9	8.2
2003	12.1	5.0	4.8	5.7
2004	12.0	4.3	3.8	4.5
2005	11.9	4.4	3.6	3.7

Source: Statistics of U.S. Businesses (SUSB). U.S. Department of Commerce, Bureau of the Census, partially funded by the U.S. Small Business Administration, Office of Advocacy.

Table 2b. Mean Values of Exit Measures by Year, Retail

| | Firm Size (number of employees) | | | |
	1-9	10-19	20-99	100-499
1990	14.6	7.0	7.3	9.6
1991	15.9	7.3	9.6	11.7
1992	15.5	10.7	10.4	10.1
1993	13.4	6.4	6.6	9.2
1994	14.2	7.0	7.1	7.3
1995	15.8	6.5	6.3	9.0
1996	13.4	6.7	6.8	9.1
1997	13.9	9.0	11.0	12.0
1998	16.2	8.2	6.7	8.8
1999	14.9	7.2	6.7	7.6
2000	13.2	6.3	5.5	7.6
2001	14.8	6.6	6.1	7.0
2002	14.6	8.5	9.4	9.6
2003	14.0	6.5	5.8	6.3
2004	14.2	6.4	5.5	7.1
2005	14.7	6.2	4.8	5.9

Source: Statistics of U.S. Businesses (SUSB). U.S. Department of Commerce, Bureau of the Census, partially funded by the U.S. Small Business Administration, Office of Advocacy.

Across retail and wholesale sectors (Table 3), there is considerable variation in exit rates.[6] In terms of the 1-9 employee and 10-19 employee firm exit rates, which are the most likely to measure true firm deaths (rather than the shutting down of a location of a multi-store operation), the patterns are very consistent: the highest rates of exit are found in restaurants and bars (over 17 percent per year for the very smallest firms, over 10 percent per year for the next smallest), the lowest rates for the building supply, paint, hardware, and home and garden stores (around 11 percent per year for the very smallest firms, under 5 percent for the next smallest).

Table 3. Mean Values of Exit Measures by Industry Sector

	Firm Size (number of employees)			
	1-9	10-19	20-99	100-499
SIC-basis: 1990-1998				
Wholesale durable goods	12.1	5.2	5.1	6.5
Wholesale nondurable goods	12.8	5.9	5.5	6.4
Building, hardware, paint, garden stores	11.1	4.7	4.7	6.5
Motor vehicle, auto supply, fuel, gas dealers	12.2	5.8	6.2	8.2
General merchandise stores, misc..and nonstore retailers	17.6	8.2	8.6	10.1
Food, groceries, liquor, drug stores	15.0	8.3	7.6	8.4
Clothing and shoe stores	17.3	10.4	11.9	14.2
Furniture, household appliances, computers	13.5	6.9	8.2	10.8
Eating and drinking establishments	17.6	11.0	8.5	6.3
NAICS-basis: 1999-2005				
Wholesale durable goods	12.3	5.0	4.8	5.9
Wholesale nondurable goods	12.6	5.4	5.1	5.5
Building, hardware, paint, garden stores	10.8	3.9	3.8	3.9
Motor vehicle, auto supply, fuel, gas dealers	12.6	5.8	4.9	5.7
General merchandise stores, misc. and nonstore retailers	15.1	6.8	6.5	7.7
Food, groceries, liquor, drug stores	13.5	6.5	5.9	7.3
Clothing and shoe stores	14.1	7.0	8.8	10.3
Furniture, household appliances, computers	13.4	5.7	6.3	9.2
Eating and drinking establishments	17.3	10.1	7.5	6.6

Source: Statistics of U.S. Businesses (SUSB). U.S. Department of Commerce, Bureau of the Census, partially funded by the U.S. Small Business Administration, Office of Advocacy.

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[6] Given that definitions are somewhat different in the SIC and NAICS samples, results are presented separately for the two samples.

Interestingly, larger eating and drinking retailers (most likely multistore chains) are no more likely to shut establishments than are other retail firms of that size. Clothing and shoe retailers have a relatively high rate of establishment exit across all size categories (the highest for the 20-99 employee and 100-499 employee firms, second or third highest for the two smallest size categories). Wholesaler rates of exit seem not to depend in a systematic way on whether they supply durable or nondurable goods (though this will be explored again in the statistical analysis to follow). Clearly there is much cross-industry variation in exit rates to explain in the statistical analysis.

Tables 4, 5, and 6 present descriptive statistics for the variables to be used in the statistical analysis to follow, looking at the SIC and NAICS retail samples, and the full period wholesale sample. Over all industries and years, average exit rates are quite similar in the two retail samples for the two smallest size categories, about 14 percent for 1-9 employee firms, and between 6.5 percent and 7.5 percent for 10-19 employee firms. However, establishment exit for the two largest size categories seems to have declined substantially in the more recent period. These rates averaged 6.2 percent in the NAICS sample period for the 20-99 employee firms, 7.9 percent in the earlier SIC sample period, and similarly averaged 7.1 percent for the 100-499 employee firms in the more recent period, 9.6 percent in the 1990s.[7] As an indication of demand growth in the industries, one can examine the rate of net change in number of large establishments (over 500 employee firms) – this averaged a 4.1 percent annual increase in the 1990-1998 period, a much smaller 1.8 percent average increase in the 1999-2005 period.

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[7] As noted earlier, establishment exit in the 100-499 size category is overwhelmingly restructuring rather than firm exit.

Table 4. Descriptive Statistics for SIC-based Retail Study, 1990-1998

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Exit rate (<10)	360	14.29	3.03	7.76	21.81
Exit rate (10-19)	360	7.51	3.22	2.18	19.36
Exit rate (20-99)	360	7.89	3.80	1.21	28.09
Exit rate (100-499)	360	9.58	7.30	0	48.62
Large firm net change	360	4.10	32.95	-100.00	530.43
Lagged real XR change	9	1.23	4.45	-5.25	11.54
Lagged real GDP chang	9	2.89	1.32	-0.17	4.50
Lagged wage cost change	9	3.68	0.72	2.48	4.81
Prime Rate	9	7.97	1.28	6.00	10.01

Table 5. Descriptive Statistics for NAICS-based Retail Study, 1999-2005

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Exit rate (<10)	210	14.09	2.53	9.78	21.12
Exit fate (10-19)	210	6.58	2.27	3.04	13.85
Exit rate (20-99)	210	6.18	2.48	2.01	15.18
Exit rate (100-499)	210	7.12	3.64	1.47	19.19
Large firm net change	210	1.79	6.73	-31.17	22.74
Lagged real XR change	7	-0.55	4.81	-8.78	7.09
Lagged real GDP change	7	2.97	1.29	0.75	4.45
Lagged wage cost change	7	3.78	0.34	3.33	4.24
Prime rate	7	6.21	1.96	4.12	9.23

Variable definitions:
Exit rate by size = establishment deaths in size category as percentage of previous year establishments by category (Source: SBA)
Large firm net change = establishment births minus deaths, in firms with more than 500 employees as a percentage of previous year establishments of that size (Source: SBA)
Real XR change = annual percentage change in price-adjusted broad dollar index (Source: Federal Reserve Board)
Real GDP change = annual percentage change in real gross domestic product, chained 2000 dollars (Source: U.S. Department of Commerce, Bureau of Economic Analysis)
Wage cost change = annual percentage change in total labor compensation, private industry, all workers (Source: U.S. Department of Labor, Bureau of Labor Statistics)
Prime rate = Average majority prime rate charged by banks on short-term loans to business, annualized (Source: Federal Reserve Board)

For the wholesale industries (Table 6), the annual exit rate for the smallest (under 10-employee) firms – averaging 12.4 percent over the 1990-2005 period -- was twice that of any of the other size categories (with little difference on average between them, between 5.2 and 6.1 percent). On average, the number of large wholesale establishments increased by more than 3

percent per year. As noted earlier, I include several international and macroeconomic factors in the analysis – the Fed's broad real dollar index, real GDP growth, cost pressures (proxied by the aggregate employment cost index), and the prime rate (for short-term business loans).

Table 6. Descriptive Statistics for Wholesale Study, 1990-2005

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Exit rate (<10)	288	12.44	1.93	8.66	17.47
Exit rate (10-19)	288	5.37	1.34	2.46	9.66
Exit rate (20-99)	288	5.17	1.65	2.18	10.21
Exit rate (100-499)	288	6.13	2.36	1.73	14.48
Large firm net change	288	3.12	6.30	-10.12	46.85
Lagged real XR change	16	0.45	4.70	-8.78	11.54
Lagged real GDP change	16	2.92	1.31	-0.17	4.50
Lagged wage cost change	16	3.72	0.59	2.48	4.81
Prime rate	16	7.20	1.74	4.12	10.01
Durable	18	0.50	0.50	0	1

Variable Definitions:
Exit rate by size = establishment deaths in size category as percentage of previous year establishments by category (Source: SBA)
Large firm net change = establishment births minus deaths, in firms with more than 500 employees as a percentage of previous year establishments of that size (Source: SBA)
Real XR change = annual percentage change in price-adjusted broad dollar index (Source: Federal Reserve Board)
Real GDP change = annual percentage change in real gross domestic product, chained 2000 dollars (Source: U.S. Department of Commerce, Bureau of Economic Analysis)
Wage cost change = annual percentage change in total labor compensation, private industry, all workers (Source: U.S. Department of Labor, Bureau of Labor Statistics)
Prime rate = Average majority prime rate charged by banks on short-term loans to business, annualized (Source: Federal Reserve Board)
Durable = binary variable, 1 for wholesalers of durable goods, 0 for wholesalers of nondurables.

In the wholesaler sample, there is the advantage of being able to analyze a relatively long time period with considerable variation in macroeconomic conditions, the prime rate varying between 4 and 10 percent, annual real exchange rate changes swinging from 9 percent declines to 12 percent increases, and the real economic growth of between zero and 4.5 percent. This variation suggests an ability in the econometric work to follow the impacts of the variables on establishment exit rates.

Estimating Equation

Given problems of comparability between SIC and NAICS codes at the retail level, three separate pooled cross-section time series regression studies will be conducted, however with the same model specification. Analysis of 40 retail SIC industries for 1990-1998 yields 360 observations, while examining 30 retail NAICS industries for 1999-2005 will allow estimation on 210 observations. The wholesale sector codes were relatively unchanged in the transition from SIC to NAICS, however, and allow us to combine the NAICS and SIC data; I will thus examine 18 wholesale industries for the full 1990-2005 period, allowing estimation on 288 observations.

The basic model is the following:

*$Exit_{it}$ (**separately by employment size category – 0-9,10-19,20-99,100-499**) =*
f(growth in real GDP, employment cost changes, net change in large firm establishments,
change in the real-exchange rate, prime loan rate, number of establishments in the industry/size
category/year cell, fixed industry effects)

It seems plausible that wholesalers and retailers dealing in goods which are more heavily imported are more likely to be impacted by exchange rate movements. Unfortunately, at the level of aggregation dealt with here, manufacturing-level import shares are not reliable.[8] Therefore rather than include import shares into the regression analysis, I will instead examine those wholesale and retail industries which the analysis reveals to be most affected by exchange rate pressures and see what patterns emerge. As industries are likely to differ in the variability of exit rates, heteroscedasticity is a problem that needs to be addressed; furthermore, previous work has suggested the presence of some within-industry autocorrelation. Therefore, estimates will be obtained via Feasible Generalized Least Squares (FGLS) correcting for both issues (using the

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[8] The wholesale categories are quite broad. Consider some examples: category 4211 includes motor vehicles, but also tires and tubes, parts and supplies (car batteries, axles, auto glass); 4212 includes furniture, but also home furnishings ranging from carpeting and curtains to cookware and utensils, napkins, towels, China and flatware; 4213 includes wood construction materials, and wood cabinets, but also construction materials of brick, stone, metal, glass, roofing materials; 4214 includes film, television cameras, projectors, ATM machines, calculators, safes, computers and printers, computer software, eyeglasses, contact lenses, medical equipment, surveying equipment, restaurant and other commercial equipment. It is not possible to get meaningful import shares averaged over these disparate groups.

xtgls command in STATA). While exit rates are bounded below by zero and above by 100 percent, suggesting the need for an estimation method explicitly accommodating a limited (or censored) dependent variable, the results presented below are quite similar to those produced via a panel data Tobit estimation approach.[9]

The explanatory variables include:

(1) annual rates of change in a broad real exchange rate index –to see whether exit is induced by an *appreciating dollar*;

(2) annual changes in real GDP;

(3) annual changes in an index of aggregate labor compensation rates; this is included to account for effects on exit rates of cost trends;

(4) the prime rate on short-term business loans (as financing costs may be a major consideration for small firms needing to carry inventories);

(5) growth rates in the number of establishments in firms of over 500 employees; this variable can be interpreted as a proxy for growth potential perceived by smaller firms in the same retail or wholesale sector (though may also pick up the extent to which small firms feel threatened by large firm expansion);

(6) whether the industry sells primarily *durable vs. nondurable* goods;

(7) the number of establishments in the industry/size cell at the beginning of the year;

(8) fixed industry effects to capture other cross-sectional variation.

Timing issues are of course important to consider. The SUSB exit data are for the year ending in March, while the demand and cost proxies, real GDP and the Employment Cost Index, are changes in annual averages – therefore these will be lagged one year. Similarly, exchange rate changes are end-of-year annual changes; these will also be lagged one year in determining international pressures on exit rates.

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[9] This is likely due to the fact that there are very few observations with exit rates at either extreme (i.e., at either zero or one hundred).

Econometric Results

To start, Table 7 presents results explaining exit rates within the four small-firm size categories for 18 wholesale industry categories over the 1990 to 2005 period. Several results stand out and are quite consistent across all four size categories of small wholesalers:

(1) aggregate demand growth in the economy reduces wholesaler exit, with a one-percentage point increase in GDP growth leading to between 0.2 and 0.9 percentage point reductions in exit rates (most important in percentage terms for wholesalers in the 20-99 employee category);[10]

(2) for all size categories increased cost pressures, either through labor compensation increases or high interest costs, increase exit rates;

(3) of most interest to this study, dollar appreciation seems to have a strong adverse impact on wholesalers (after controlling for cost trends and the state of the economy), especially in the over-10-employee firms; a ten-percentage-point appreciation leads to between an 0.8 and 1.5 percentage point increase in exit rates for these size categories, corresponding to a roughly 20 *percent* increase in exit rates.[11]

The latter impact of exchange rate changes suggests that the fortunes of small wholesalers are perhaps more tied in with manufacturers than might have been thought. As the dollar appreciates and imports of manufactured goods put pressure on producers of domestic goods, a significant share of wholesalers seem unable to survive by switching to deal in these (now lower-priced) imported goods.[12] Attempts to find wholesale-industry-varying exchange rate impacts were generally unsuccessful, however there was some suggestion that alcoholic beverage distributors may be especially strongly impacted by currency fluctuations (as either contractual or long-term relationships may tie them closely to U.S. manufacturers).

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[10] In an alternative specification, allowing the impact of GDP growth to vary across industries, the other results of interest were largely unaffected.

[11] A much smaller – though statistically significant – adverse effect is found for the 1-9 employee firms.

[12] As noted earlier, the 2004 and 2005 wholesale sector definitions were changed to exclude "wholesale trade agents and brokers"; inclusion of a dummy variable to distinguish these two years and an interaction term between this dummy variable and the exchange rate variable had little impact on results of interest. An alternative approach, dropping these last two years from the analysis also produced little change from what is reported in Table 6; the only one of interest is that the very small but statistically significant adverse exchange rate impact on the smallest wholesalers is no longer statistically significant from zero.

Table 7. Feasible Generalized Least Squares Results Explaining Small Wholesaler Exit Rates by Firm Size, 1990-2005

	Firm Size (number of employees)			
	1-9	10-19	20-99	100-499
GDP growth	-0.22***	-0.59***	-0.94***	-0.51***
	(0.03)	(0.05)	(0.07)	(0.10)
Aggregate wage growth	0.36***	-0.14**	-0.30**	0.11
	(0.07)	(0.07)	(0.10)	(0.16)
Prime rate	0.03	0.20***	0.35***	0.17**
	(0.03)	(0.03)	(0.05)	(0.07)
Real exchange rate change	0.018**	0.092***	0.113***	0.150***
	(0.008)	(0.009)	(0.013)	(0.019)
Large firm growth	-0.009	-0.017**	0.010	-0.020
	(0.006)	(0.008)	(0.012)	(0.017)
Nondurable good	2.17***	0.94***	0.30	0.91**
	(0.37)	(0.23)	(0.30)	(0.46)
Number of establishments	-0.00003	-0.00039***	-0.00035***	-0.00034
	(0.00003)	(0.00008)	(0.00010)	(0.00044)
N	288	288	288	288
Wald Chi-squared	1370.4***	889.8***	550.3***	417.4***
Rho	0.41	-0.10	-0.08	-0.03

*Significant at 10%   **Significant at 5%   ***Significant at 1%

Note: Adjusted for heteroscedasticity across industries, autocorrelation, fixed industry effects; standard errors in parentheses below estimated coefficients.

The impact of large firm growth on small wholesaler exit rates is statistically significant only for the 10-19 employee size category. In addition, the relationship between large firm growth and exit rates for wholesalers with 10-19 employees is negative, rejecting a crowding-out effect. It does appear that patterns of exit differ depending on whether the goods dealt in are

durable or nondurables,[13] with nondurables showing higher rates of exit *ceteris paribus* –

statistically significant for 3 of the 4 size categories (perhaps the greater perishability of the

goods involved places these wholesalers in more of a risky situation). In addition, the number of

establishments in each size/industry category is a useful control for exit rates, smaller groups

implying higher exit rates *ceteris paribus*, though only statistically significant for the two

medium-sized categories of wholesalers.[14]

Tables 8 and 9 examine the same issues for retailers for the decades of the 1990s and

2000s, respectively, using the SIC-based and NAICS-based samples separately (differences in

retail industry classifications made the construction of a combined retailer dataset impossible).

For both time periods, it is quite clear that domestic macroeconomic conditions are the primary

force driving retailer survival – GDP growth reduces exit rates in all 8 regressions (statistically

significant in all but one case), employee compensation rate growth and interest rates increase

exit rates in 15 of 16 cases (statistically significant in 14 of these).

Large retailer growth within each industry sector, in contrast, has mixed and generally

weak impacts on small-retailer exit rates, with the exception of the very smallest (1-9 employee)

categories which seem to be crowded out by the success of the over 500-employee retailers.

This latter result is suggestive of a "big box store" effect changing the competitive environment

for independent, single-store, retailers. Of course, this issue is not the primary focus of this

report and further study would be required to make any more definitive claims.

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[13] However, in results not presented here, there was no statistically significant difference in *exchange rate responses* for durable vs. nondurable goods wholesalers, except in the over-100-employee firms for which nondurable goods wholesalers seemed more adversely affected by exchange rate pressures.

[14] Results for the main variables of interest (especially the exchange rate) are generally unaffected by the inclusion of the number of establishments in the regression equation. This holds true for the retail regressions discussed below, as well.

Table 8. Feasible Generalized Least Squares Results Explaining Small-Retailer Exit Rates by Firm Size, SIC-based sample, 1990-1998

	Firm Size (number of employees)			
	1-9	10-19	20-99	100-499
GDP growth	-0.23***	-1.00***	-0.70***	-0.14
	(0.04)	(0.10)	(0.11)	(0.14)
Aggregate wage growth	0.57***	-0.28***	0.16	0.38**
	(0.06)	(0.10)	(0.14)	(0.18)
Prime rate	0.16***	0.20***	0.27***	0.04**
	(0.04)	(0.07)	(0.09)	(0.07)
Real exchange rate change	0.005	0.158***	0.022	-0.023
	(0.009)	(0.021)	(0.026)	(0.032)
Large firm growth	0.006***	0.002	-0.010*	-0.012*
	(0.001)	(0.004)	(0.005)	(0.007)
Number of establishments	0.00003*	-0.00008	0.00001	-0.00028*
	(0.00002)	(0.00010)	(0.00009)	(0.00015)
N	360	360	360	360
Wald Chi-squared	4125.6***	1750.6***	765.4***	452.4***
Rho	0.25	-0.25	-0.01	0.05

*Significant at 10%   **Significant at 5%   ***Significant at 1%
Note: Adjusted for heteroscedasticity across industries, autocorrelation, fixed industry effects; standard errors in parentheses below estimated coefficients.

The international considerations of primary interest to this study, perhaps not surprisingly, have much less impact on the retail sector than on wholesalers. While the estimated effect of dollar appreciation is to increase exit rates in 7 of the 8 cases, these effects are only consistently significant for the 10-19 employee firms and quite small for the other retailer size categories (only statistically significant for one of those 6 cases). The only impact which is both statistically significant and of economic importance is the exchange rate impact for the 10-19 employee firms during the 1990-1998 period, where a 10 percentage point appreciation leads to a 1.6 percentage point increase in exit rates (which is however a more than 20 percent increase over the mean value).

Table 9. Feasible Generalized Least Squares Results Explaining Small-Retailer Exit Rates by Firm Size, NAICS-based sample, 1999-2005.

	Firm Size (number of employees)			
	1-9	10-19	20-99	100-499
GDP growth	-0.21***	-1.02***	-2.02***	-1.33***
	(0.06)	(0.09)	(0.12)	(0.17)
Aggregate wage growth	0.43***	0.48***	0.92***	0.61**
	(0.11)	(0.15)	(0.22)	(0.30)
Prime rate	0.14***	0.53***	1.17***	0.83***
	(0.05)	(0.07)	(0.10)	(0.14)
Real exchange rate change	0.016	0.024*	0.014	0.045*
	(0.010)	(0.014)	(0.020)	(0.028)
Large firm growth	0.014**	0.003	-0.0005	0.076***
	(0.006)	(0.007)	(0.014)	(0.023)
Number of establishments	0.00011***	-0.00014	-0.00001	0.00057*
	(0.00003)	(0.00013)	(0.00016)	(0.00030)
N	210	210	210	210
Wald Chi-squared	123820.1***	2232.9***	988.2***	758.6***
Rho	0.20	-0.05	0.04	-0.02

*Significant at 10%   **Significant at 5%   ***Significant at 1%
Note: adjusted for heteroscedasticity across industries, autocorrelation, fixed industry effects; standard errors in parentheses below estimated coefficients.

If one looks at exchange rate impacts varying by type of retail establishment, some interesting patterns emerge. The relevant exchange rate effects are reported in Table 10 (other estimated coefficients are available on request from the author).   A surprisingly strong adverse impact of dollar appreciation on 10-19 employee retailers seems to hold across all sectors in the 1990-1998 period. However, the only retail sector in which this impact is statistically significant for all three of the under-100 employee size categories in that time period is that involving auto-related dealers. The latter would seem to be a category of retailer closely identified with domestic manufacturers – to the extent a stronger dollar weakens the latter it would put pressure on their dealers (especially smaller ones who may not be diversified into broader product lines

including imports).[15] In contrast, there are a number of negative coefficients (suggesting less exit with a stronger dollar) – though only some statistically significant -- for hardware, paint and garden stores, clothing stores, furniture dealers, and eating and drinking establishments. These latter types of retailers might be expected to gain from a stronger dollar in being able to obtain cheaper imported goods.

Table 10. Exchange-rate Effects on Small-Retailer Exit Rates by Firm Size and Retailer Type

SIC-based sample—1990-1998:

	Firm Size (number of employees)			
	1-9	10-19	20-99	100-499
Building, hardware, paint, garden stores	-0.04**	0.11***	0.02	-0.08
Motor vehicle, auto supply, fuel, gas	0.04**	0.16***	0.09**	-0.02
General merchandise stores, misc.	0.03	0.18***	-0.04	0.07
Food, groceries, liquor, drug stores	0.04**	0.20***	0.03	0.01
Clothing and shoe stores	-0.06***	0.13**	-0.07	-0.05
Furniture, household appliances, computers	0.01	0.12**	-0.08	-0.34***
Eating and drinking establishments	0.00	0.22**	0.08	0.04

*Significant at 10%   **Significant at 5%   ***Significant at 1%

NAICS-based sample—1999-2005:

	Firm Size (number of employees)			
	1-9	10-19	20-99	100-499
Building, hardware, paint, garden stores	0.04***	-0.00	0.03	0.07*
Motor vehicle, auto supply, fuel, gas	0.04**	0.00	-0.01	-0.00
General merchandise stores, misc.	0.02	0.03	0.06**	0.04
Food, groceries, liquor, drug stores	-0.02	0.01	-0.09**	0.05
Clothing and shoe stores	-0.04	0.11**	0.28**	0.07
Furniture, household appliances, computers	-0.02	0.08***	0.04	-0.21
Eating and drinking establishments	-0.06**	-0.03	-0.07	0.08

*Significant at 10%   **Significant at 5%   ***Significant at 1%

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[15] The fact that this seems to be less of an issue (in this sample only for the very smallest dealers) in the 1999-2005 period may be attributed to a more recent trend of multiple car-line dealers who should be less affected by currency fluctuations, as well as to the increasing tendency of domestic auto manufacturers to produce cars abroad.

Conclusions

While these research results are not completely consistent across time periods (for the retail sector) and across the various small firm size categories, certain findings seem reasonably robust. One is that international pressures, in the form of real exchange rate appreciation, lead to significantly increased rates of small firm exit in the wholesale sector. These effects are similar to those previously found for manufacturing, particularly in the over-10 employee size category, where a 10 percent real dollar appreciation leads to an increase of roughly 20 percent in exits. This suggests that a substantial share of domestic wholesalers, rather than taking advantage of lower import prices to lower their costs in the distribution chain, are tied fairly closely to domestic manufacturers – with the result that economic woes encountered by manufacturers during dollar appreciation are passed downstream.

One might expect retailers to gain from dollar appreciation by lowering the prices of goods they sell. Here, though, one finds at best no impact *on average.* However, effects vary by retail sector—auto dealers, not surprisingly, share the pain experienced by domestic manufacturers under these circumstances. Stores that generally sell a mix (and easily changing mix) of imports and domestic goods (hardware, paint and garden stores, clothing stores, furniture dealers, and eating and drinking establishments) are benefited in terms of reduced exit when the dollar appreciates.

Other results of interest are that wholesalers in nondurable goods industries—perhaps because of risk associated with the products' greater perishability—have higher rates of small-firm exit than others. Not surprisingly, both wholesale and retail sector exits respond as one would expect to business cycle and cost factors. Stronger growth reduces exit rates and cost increases put greater pressure on small firms. Future work should examine in more detail the dynamics of small firm exit and entry within the entire distribution chain, from manufacturing to retail, and the extent to which international shocks affect these relationships.

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Appendix

Retail industries—1990-1998 (40)

1. Lumber and other bldg materials
2. Paint, glass, and wallpaper stores
3. Hardware stores
4. Retail nurseries and garden stores
5. Mobile home dealers
    ----
6. Variety stores
7. Misc. general merchandise stores
8. Grocery stores
9. Meat and fish markets
10. Fruit and vegetable markets
    ----
11. Candy, nut, and confectionery stores
12. Dairy products stores
13. Retail bakeries
14. Miscellaneous food stores
15. New and used car dealers
    ----
16. Used car dealers
17. Auto and home supply stores
18. Gasoline service stations
19. Boat dealers
20. Recreational vehicle dealers
    ----
21. Motorcycle dealers
22. Automotive dealers, nec
23. Men's and boys' clothing stores
24. Women's clothing stores
25. Women's accessory and spclty strs
    ----
26. Children's and infants' wear stores
27. Family clothing stores
28. Shoes stores
29. Misc. apparel and accessory strs
30. Furniture and homefurnishings stores
    ----
31. Household appliance stores
32. Radio, television, computer stores
33. Eating and drinking places
34. Drug and proprietary stores
35. Liquor stores
    ----

36.   Used merchandise stores
37.   Miscellaneous shopping goods stores
38.   Nonstore retailers
39.   Fuel dealers
40.   Retail stores, nec
        +------------------------------------+

Retail industries—1999-2005 (30)

1.   Automobile dealers
2.   Other motor vehicle dealers
3.   Automotive parts, accessories, and tire stores
4.   Furniture stores
5.   Home furnishings stores
        ----
6.   Electronics and appliance stores
7.   Building material and supplies dealers
8.   Lawn and garden equipment and supplies stores
9.   Grocery stores
10.   Specialty food stores
        ----
11.   Beer, wine, and liquor stores
12.   Health and personal care stores
13.   Gasoline stations
14.   Clothing stores
15.   Shoe stores
        ----
16.   Jewelry, luggage, and leather goods stores
17.   Sporting goods, hobby, and musical instrument stores
18.   Book, periodical, and music stores
19.   Other general merchandise stores
20.   Florists
        ----
21.   Office supplies, stationery, and gift stores
22.   Used merchandise stores
23.   Other miscellaneous store retailers
24.   Electronic shopping and mail-order houses
25.   Vending machine operators
        ----
26.   Direct selling establishments
27.   Full-service restaurants
28.   Limited-service eating places
29.   Special foodservices
30.   Drinking places (alcoholic beverages)

Wholesale industries—1990-2005 (18)

1.   Motor vehicles, parts, and supplies
2.   Furniture and home furnishings
3.   Lumber and construction materials
4.   Professional and commercial equipment
5.   Metals and minerals, except petroleum
     ----
6.   Electrical goods
7.   Hardware, plumbing and heat equipment
8.   Machinery, equipment and supplies
9.   Miscellaneous durable goods
10. Paper and paper products
     ----
11. Drugs, proprietaries, and sundries
12. Apparel, piece goods, and notions
13. Groceries and related products
14. Farm-product raw materials
15. Chemicals and allied products
     ----
16. Petroleum and petroleum products
17. Beer, wine, and distilled beverages
18. Misc. nondurable goods