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RESEARCH ARTICLE

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The effect of import competition on product diversification revisited

Manuel Becerra[1] | **Garen Markarian**[2] | **Juan Santalo**[3]

[1]Strategy and Entrepreneurship Discipline, University of Queensland Business School, Brisbane, Australia

[2]Finance and Accounting Group, WHU – Otto Beisheim School of Management, Vallendar, Germany

[3]Strategy Department, IE Business School, Madrid, Spain

Correspondence
Manuel Becerra, Strategy and Entrepreneurship Discipline, University of Queensland Business School, Brisbane, Australia.
Email: m.becerra@business.uq.edu.au

Abstract

Research summary: Bowen and Wiersema, Strategic Management Journal, 2005, 26, 1153–1171, provide empirical evidence that U.S. firms decreased their degree of product diversification as a response to the increase in import competition in their 1985–1994 study. After replicating their study, we expand it with alternative econometric analyses and a larger data set. While we obtain nearly identical results using their Tobit regressions, the negative impact of imports on diversification disappears when we control for firm fixed-effects. Furthermore, using tariffs as instrument for imports, we find that import competition may even lead domestic firms to increase their diversification. The negative relationship between import penetration and diversification seems to result from the endogeneity of imports, which grew more in industries dominated by firms with low diversification at the turn of the previous century.

Managerial summary: Previous research by Bowen and Wiersema, Strategic Management Journal, 2005, 26, 1153–1171 showed that when import penetration grew in the 1985–1994 period in the U.S., firms seemed to reduce their diversification across industries and refocus on their core business, presumably to increase their competitiveness against foreign imports. We replicate their study and reach the opposite conclusion regarding firms' response to greater pressure from imports, using enhanced statistical methods and also a larger database. We conclude that diversified firms are

more likely to switch their focus to other industries when import competition increases in their main line of business, and this greater flexibility of switching industries seems to give them an advantage over specialized firms.

KEYWORDS

competition, diversification, imports, replication

The reasons why firms diversify into new businesses and its implications for competitive advantage have been at the core of research on corporate strategy since the seminal work of Rumelt (1974). Some scholars argue that diversification dilutes managerial attention among different businesses and it may be driven by empire-building motivation and managerial risk reduction, which may reduce firm performance (Berger & Ofek, 1995). In contrast, other scholars highlight the economies of scope and potential to transfer core competences between related industries as the basis for the advantages of diversified corporations, which can redeploy their resources among their businesses in ways that are not possible for specialized firms (Sakhartov & Folta, 2014). Though Palich, Cardinal, and Miller's (2000) meta-analysis suggests that an inverted curvilinear relationship between diversification and performance may help reconcile both perspectives, the accumulated empirical evidence regarding the implications of diversification for competitive advantage does not seem to be sufficiently robust to settle the question. For instance, abundant research in finance obtained before 2000 found evidence in favor of a diversification discount (Berger & Ofek, 1995; Lang & Stulz, 1994), but the negative performance consequences of diversification seem to disappear after the endogeneity of the diversification decision is taken into account (Campa & Kedia, 2002; Villalonga, 2004). Ultimately, it is not clear whether firms increase or decrease their competitiveness by changing their degree of diversification.

In a key paper that investigates foreign competition and firm diversification strategy, Bowen and Wiersema (2005), thereafter BW, analyze a Compustat sample of 1,127 U.S. firms from 1985 to 1994, and conclude that these firms reduced their product diversification as a response to the increase in foreign imports. They further argue that this was done in order to refocus their attention on their core businesses, which presumably increases their efficiency and potential to become "world-class" (Bowen & Wiersema, 2005, p. 1154). Indeed, U.S. imports rose from $22 billion to $2.7 trillion over the period 1960–2015 according to theU.S. Census Bureau, while it seems that firms have become somewhat less diversified, as least in the last two decades of the 20th century (D'Aveni and Thomas, 2009). However, correlation does not necessarily indicate a causal relationship, which is particularly critical in the analysis of diversification and performance, as finance research in this topic has shown since 2000.

Given the importance of conducting replications to enhance knowledge accumulation and its robustness across methods, time, and data sources (Bettis, Helfat, and Shaver, 2016; Hubbard, Vetter, and Little, 1998; Mezias and Regnier, 2007), we first replicate BW's analysis of diversification and import competition obtaining very similar results. We also conduct several additional analyses, also including a bigger and comprehensive database. Our empirical analyses with firm fixed effects and using tariffs as instrument for import competition suggest that

the negative correlation that BW find is probably not driven by within-firm changes in firm scope, but it seems to be due to omitted variable bias and self-selection issues in their Tobit regression analysis. Consistent with recent literature on resource redeployment in diversified firms (Helfat and Eisenhardt, 2004; Sakhartov & Folta, 2014; Wu, 2013), we conclude from our replication that firms seem to be more likely to increase their diversification as a reaction to greater import competition, once we control for unobservable effects and potential endogeneity of import penetration and diversification.

1 | THE RELATIONSHIP BETWEEN IMPORT COMPETITION AND FIRM DIVERSIFICATION

A voluminous and long-standing empirical literature from economics, finance, and strategy has already established that competition leads to lower profitability, including import competition (DeRosa & Goldstein, 1981; Djankov & Hoekman, 1998; Katics & Petersen, 1994). More recently, the literature has begun to examine domestic firms' reactions to such changes in foreign competition. For example, Flammer (2015) and Fernandez-Kranz and Santalo (2010) show how domestic firms increase their attention to corporate social responsibility as a reaction to higher levels of international competition. Bernard, Jensen, and Schott (2006) also provide evidence that firms switch towards using more capital-intensive technologies as a response to foreign competition, while Wiersema and Bowen (2008) report an increase in their extent of internationalization.

It is in this context that BW investigate the response of U.S. listed firms to import competition in their product diversification strategy. BW argue that firms refocus on their core businesses when higher competition puts greater pressure on scarce resources, particularly managerial attention, which can be dedicated more effectively when competing in fewer industries (Hill & Hoskisson, 1987). From a transactions cost perspective, BW also claim that competition is negatively related to diversification because increased competition leads to increased marginal costs of complexity (Bergh & Lawless, 1998). This is consistent with Liebeskind and Opler (1994), who had argued that the availability of new markets has heightened global competition, prompting firms to refocus on their core businesses, so that they can be more competitive in the global arena.

The above arguments notwithstanding, other studies point to greater competition inducing firms to increase their product diversification rather than reduce it. For instance, Campa and Kedia (2002) show that poorly performing firms are more likely to diversify their line of businesses, since a harsher environment may compromise their existing competitive advantages (Bartlett & Ghoshal, 2002; Chung, 2001). Hitt, Hoskisson, and Ireland (1994) also suggest that poorly performing firms choose to diversify to protect their capital in the face of increasing competition in their core business; hence, they may choose to use their strengths in other markets. This literature generally suggests that diversification ultimately offers financial insurance in the face of competitive threats, including the possibility of cross-subsidization (Bolton & Scharfstein, 1990; Fresard, 2010).

Greater import competition may increase the potential positive effects of diversification because only diversified firms can benefit from switching resources across different industries depending on market conditions (Levinthal & Wu, 2010; Sakhartov & Folta, 2014). Wu (2013) shows how diversified firm can redeploy resources from markets with declining demand towards markets niches with better growth opportunities. Similarly, Kaul (2012) stresses how

technological innovations prompt an overall redeployment of resources towards new related sectors and away from marginal businesses, where either firm innovation does not occur, or rivals have the upper hand.

Overall, whether firms decide to refocus in their core or diversify to new businesses as a response to greater import competition is ultimately an empirical question that we tackle in the next pages.

2 | DATA

2.1 | Sample selection

To replicate BW as closely as possible, we rely primarily on the Compustat segment data to construct the measures of diversification and industry concentration, using annual data for several control variables (such as firm size and profitability). Following BW, we also use other data sources to construct the same variables in their 1985–1994 analysis. To facilitate comparison with the original study, we standardize all variables, and descriptive statistics are shown in Table 1 alongside the values reported by BW. As expected, there are only minor differences for the means and standard deviations of all the variables in the two samples.

We end up with a larger sample size of 11,071 firm/year observations in our sample versus the 8,961 observations that they obtain. The difference is likely due to the fact that the Compustat database is continuously updated, even for previously reported years (see Sibilkov, 2009). Note that the number of firms in our sample increases from 1,001 in 1985 to 1,202 in 1994, in contrast to the increase from 770 to 1,127 firms reported by BW, though descriptive statistics for all variables are very similar in both samples.

We further expand the original BW sample in two ways. First, we add data on international trade by industry, obtained from Peter Schott's website,[1] in order to use trade tariffs as an instrument for import competition. Second, we redo the BW analysis using the NETS database, which is much larger and free of the strategic disclosure bias inherent in Compustat Segment data, as we discuss later on.[2]

2.2 | Variable construction

Following BW, we calculate three different measures of diversification: the internal entropy of a firm's activities, a Herfindahl-based index of concentration (inverse measure, to facilitate interpretation and comparison with BW), and the count of distinct business segments, all constructed from Compustat's segment database. Our first variable, *Entropy*, is an entropy measure that captures the diversity of a firm's business activities (e.g., Palepu, 1985). It is calculated as $\sum Sales*\log(1/Sales)$, where *Sales* is a firm's sales across the business units in which it operates. We also calculate *Herfindahl* as $\sum(Sales/Total\ Sales)^2$ summed across a firm's business units,

[1]We thank Peter Schott for making his trade data publicly available, used frequently by researchers in international economics (http://faculty.som.yale.edu/peterschott/sub_international.htm).

[2]Denis, Denis, and Sarin (1997) and Hyland and Diltz (2002) find that about 25% of all changes in firms' number of segments in Compustat are purely accounting reporting changes, as opposed to real changes in firm scope. Davis and Duhaime (1992) report that firms had grouped into one-segment activities that were completely unrelated in 5–10% of cases.

TABLE 1 Descriptive statistics

	Sample		BW 2005	
Compustat database	**Mean**	***SD***	**Mean**	***SD***
Entropy	0.310	0.443	0.322	0.453
Herfindahl	0.437	0.756	0.456	0.794
Number of segments	0.791	1.234	0.847	1.309
Import penetration	0.218	0.437	0.163	0.178
Industry growth	0.049	0.103	0.041	0.095
Industry profitability	0.047	0.083	0.089	0.128
Core business profitability	0.087	0.098	0.082	0.175
Firm performance	0.145	0.098	0.115	0.124
Industry concentration	0.392	0.187	0.371	0.170
Industry R&D intensity	0.037	0.123	0.044	0.055
Industry capital intensity	114.762	135.615	124.207	160.710
Export penetration	0.143	0.177	0.139	0.132
Size	5.937	1.507	5.950	1.774
N	11,071		8,961	

	Sample	
NETS database	**Mean**	***SD***
Entropy	0.038	0.192
Herfindahl	1.052	0.370
Number of segments	0.198	2.038
Import penetration	0.324	1.138
Industry growth	0.037	0.094
Industry profitability	−0.099	0.269
Industry concentration	30.466	21.192
R&D intensity	0.041	0.099
Capital intensity	64.627	77.050
Export penetration	0.143	0.299
Size	13.006	1.779
N	6,474,177	

where *Total Sales* is the total sales of the firm; we further compute the inverse measure of this variable (1/[H-1]) to use it in our regressions, as BW do. Finally, we use *Number of SIC*s, which is the number of business units in which a firm has reported a positive sales figure; as BW do, we subtract one from this variable so that specialized firms have a value of zero. For all our calculations, we use SIC codes at the 4-digit level to identify the core business of each firm, defined by BW as the segment with the largest revenue among the firm's portfolio of businesses in 1985. Although BW do not specify how they define the core industry of firms that enter Compustat

after 1985, we use as core industry the largest SIC code in terms of sales the year the firm enters into the sample.

We next add the same control variables as in BW, constructed using identical methods: *Core Industry Growth*, *Core Industry Profitability*, *Core Business Profitability*, *Firm Performance*, *Industry Concentration*, *Industry R&D Intensity*, *Industry Capital Intensity*, *Export Penetration*, and *Size*. These variables are extracted from the same sources described in BW: the U.S. Census of Manufacturers, National Science Foundation's report on R&D expenditures, NBER's Productivity Database, and Compustat. We calculate imports as the ratio of foreign imports to domestic sales (plus foreign imports) in the core industry. As the only new variable in extending the replication for our 2SLS analysis, we use *ad valorem* import tariffs as an exogenous instrument for foreign imports (lagged by 1 year), which we calculate for each four-digit SIC and year as the ratio between the duties collected by U.S. customs and the free-on-board value of imports.

2.3 | Identification strategy

As indicated earlier, import penetration cannot be regarded as an exogenous variable in our analysis, and there may be unobserved firm characteristics that simultaneously determine the extent of import competition in a given industry and the diversification strategy of domestic firms in such an industry. A number of observable and unobservable factors may influence both importers' strategic choices and the diversification strategies of domestic firms in those markets. Diversified firms tend to have higher quality managers (Bertrand & Schoar, 2003), can better leverage resources (Montgomery & Wernerfelt, 1988), have better access to capital markets (Ahn, Denis, & Denis, 2006), and strategic assets (Markides & Williamson, 1996), and are better prepared for sustaining external shocks (Matvos & Seru, 2014).

Given the systematic differences between industries dominated by diversifiers versus specialists that seem to exist (Santalo & Becerra, 2008), it is reasonable to expect the decision to enter and exit any particular industry may be endogenously determined for both importers and domestic players. Specifically, we could expect that importers may be inclined to avoid industries dominated by diversified firms, as they generally operate in markets that are more saturated (Lambkin, 1988) and competitive (Hill, 1988). In our sample, diversifiers are actually four times larger than focused firms, so that it could be reasonable for foreign importers to avoid such competitors. Similarly, foreign firms may simply find it easier to grow in industries that are populated by smaller, specialized firms. If this is indeed the case, then the reported prior negative association between import penetration and firm diversification could be the result of an omitted variable bias as well as the self-selection of importers' growth in markets dominated by smaller, non-diversified firms.

Following BW, we first estimate the following linear model:

$$Div_{it} = \alpha_0 + \alpha_1 Import\ Competition_{it} + Controls + w_{it} \quad (1)$$

where Div_{it} measures the degree of product diversification of firm i at time t, $Import\ Competition_{it}$ represents the level of import penetration faced by firm i at time t in its core industry, and w_{it} is the error term. We can decompose this error term as follows:

$$w_{it} = \varepsilon_i + \nu_t + e_{it} \quad (2)$$

An Ordinary Least Square regression of (1) will provide a biased estimate of α_1 if $E[w_{it}/Import\ Competition_{it}] \neq 0$. First, $E[\varepsilon_i/Import\ Competition_{it}] \neq 0$ if any omitted factor simultaneously determines firm diversification strategies and the likelihood that the sector is targeted by foreign competitors, as we discuss above. Additionally, $E[e_{it}/Import\ Competition_{it}] \neq 0$ if for example, the level of foreign competition affects firm-level characteristics (such as changes to top management, financing, and profitability) that cause changes in firm diversification strategies. To reduce this type of omitted variable bias, we utilize firm fixed effects that accounts for the correlation between time invariant unobservable firm characteristics with both the degree of import penetration and firm diversification strategies. Using firm fixed effects helps us capture how import competition influences changes in diversification *within* the firm, that is, the firms' reaction to a change in the amount of import competition that the firm faces.

To deal with endogeneity concerns, we also utilize exogenous changes in import penetration driven by variation in import tariffs, since changes in import tariffs have a direct effect on the cost of entering U.S. product markets, and therefore have a direct impact on the prevalence of imports in a given sector. To the extent that tariffs are exogenously determined by federal policy or international trade negotiations (Xu, 2012), they should be unrelated to firm diversification policies, that is $E[e_{it}/Import\ Tariffs_{it}] = 0$. Consequently, we use 2SLS to isolate the causal effect of imports on firm diversification in which import tariffs instrument import penetration. A similar approach has been used by Cuñat and Guadalupe (2009), Flammer (2015), and Fresard (2010).

In our expansion of BW empirical analyses reported in the next section, we thus control for firm fixed effects and isolate exogenous variance in import competition (through tariffs) to better measure the firms' reaction to changes in import competition. Otherwise, the results could also be capturing other factors, such as the overlap in the trends of import competition and diversification in the U.S. Indeed, as Figure 1 included in our online Appendix S1 shows, diversification decreased (i.e., concentration increased) from 1980 until 1997, when it reached a more or less constant level after segment reporting requirements changed in 1997, while import penetration substantially increased as well. These time trends could produce a negative correlation between diversification and import competition even if there was no causal relationship among them.

3 | RESULTS

3.1 | Empirical analysis using the original compustat sample in BW

Table 2 shows the correlation table for the variables in our empirical analysis. At the univariate level, we note that the three measures of diversification have a negative correlation with the import penetration variable (between −0.09 and − 0.11), which are very similar to those reported by BW (between −0.11 and − 0.13).

We start by replicating the main analysis in BW (Table 2 in their paper) using the same time period (1985–94), variables (dependent, independent, and controls based on each firm's core industry), and statistical method (Tobit). Table 3 presents our results, which are near identical to those reported by BW. We find a highly significant negative effect of Import competition (lagged by 1 year) over the three measures of diversification (Entropy, Herfindahl, and Number of SICs), using the same set of control variables, with and without the interactions with Import

TABLE 2 Correlation table, Compustat sample 1985–1994

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Entropy (1)	1.00											
Herfindahl (2)	0.95	1.00										
Number of SICs (3)	0.94	0.89	1.00									
Import penetration (4)	−0.11	−0.09	−0.10	1.00								
Industry growth (5)	−0.05	−0.05	−0.05	−0.02	1.00							
Industry profitability (6)	0.05	0.07	0.04	−0.02	−0.03	1.00						
Core business profitability (7)	0.08	0.08	0.08	−0.04	0.08	0.11	1.00					
Firm performance (8)	−0.07	−0.06	−0.07	−0.02	0.10	0.11	0.70	1.00				
Industry concentration (9)	0.03	0.03	0.06	0.05	−0.02	−0.03	0.02	0.03	1.00			
Industry R&D Intensity (10)	0.02	0.02	0.01	0.00	−0.01	−0.06	0.02	0.01	0.10	1.00		
Industry capital intensity (11)	0.09	0.07	0.14	−0.06	−0.11	−0.12	−0.01	−0.02	0.14	−0.06	1.00	
Export penetration (12)	−0.07	−0.06	−0.08	0.30	0.02	−0.12	−0.08	−0.08	0.08	0.06	−0.01	1.00
Size (13)	0.40	0.37	0.43	−0.05	−0.05	−0.06	0.12	0.07	0.25	0.00	0.34	−0.08

$N = 11{,}071$.

TABLE 3 Tobit analysis, replication of BW 2005, Compustat 1985–1994

	Entropy		Herfindahl		Number of SICs	
Industry import penetration (lagged)	−0.150	−0.156	−0.248	−0.253	−0.384	−0.401
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry growth	−0.018	−0.017	−0.038	−0.037	−0.039	−0.034
	(0.068)	(0.090)	(0.022)	(0.027)	(0.142)	(0.198)
Industry profitability	0.065	0.066	0.136	0.137	0.170	0.171
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Core business profitability	0.195	0.197	0.331	0.328	0.547	0.556
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm performance	−0.269	−0.271	−0.451	−0.449	−0.763	−0.771
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry concentration	−0.066	−0.065	−0.108	−0.107	−0.151	−0.148
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industry R&D intensity	0.026	0.025	0.043	0.042	0.060	0.059
	(0.003)	(0.004)	(0.003)	(0.004)	(0.011)	(0.014)
Industry capital intensity	−0.040	−0.041	−0.075	−0.076	−0.042	−0.043
	(0.000)	(0.009)	(0.000)	(0.000)	(0.081)	(0.071)
Industry export intensity	0.025	0.028	0.051	0.053	0.053	0.061
	(0.001)	(0.006)	(0.003)	(0.002)	(0.051)	(0.027)
Firm size	0.406	0.407	0.675	0.676	1.146	1.150
	(0.000)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)
Industry growth × Industry import penetration		−0.006		−0.007		−0.029
		(0.577)		(0.692)		(0.310)
Industry profitability × industry import penetration		0.015		0.019		0.042
		(0.088)		(0.223)		(0.082)
Core business profitability x industry import penetration		0.021		−0.011		0.085
		(0.381)		(0.770)		(0.194)
Firm performance × Industry import penetration		−0.009		0.019		−0.038
		(0.642)		(0.591)		(0.497)
Constant	0.096	0.089	0.040	0.041	0.220	0.222
	(0.002)	(0.002)	(0.390)	(0.385)	(0.004)	(0.004)
Year dummies	YES	YES	YES	YES	YES	YES
N	11,071	11,071	11,071	11,071	11,071	11,071
Log-likelihood	−8,708	−8,705	−10,717	−10,716	−12,879	−12,876
Pseudo-R^2	0.133	0.134	0.111	0.110	0.103	0.103

Note: p-values below the coefficients in parentheses.

penetration. The import penetration coefficient for the three diversification regressions are −0.150, −0.248, and − 0.384, while BW obtained −0.121, −0.145, and − 0.277, which are highly significant in both studies. Hence, using a Tobit analysis, we reach the same conclusions as BW regarding the negative relationship between import competition and diversification.

Tobit regression is an appropriate methodology when the sample is censored, as it is usually the case in the analysis of diversification. In our sample, 61% of the firm-year

TABLE 4 OLS regression coefficients for diversification, with and without firm fixed effects

	OLS without firm fixed effects			OLS with firm fixed effects		
Sample	**Entropy**	**Herfindahl**	**Number of SICs**	**Entropy**	**Herfindahl**	**Number of SICs**
1985–1994	−0.033	−0.050	−0.076	0.002	−0.001	0.017
$N = 11{,}071$	(0.000)	(0.000)	(0.000)	(0.682)	(0.950)	(0.656)
1985–1989	−0.047	−0.067	−0.104	0.001	−0.007	0.000
$N = 5{,}164$	(0.001)	(0.003)	(0.002)	(0.765)	(0.754)	(0.990)
1990–1994	−0.028	−0.045	−0.066	0.020	0.051	0.118
$N = 5{,}907$	(0.006)	(0.000)	(0.015)	(0.096)	(0.071)	(0.136)
Exist in 1985	−0.042	−0.062	−0.096	0.005	0.002	0.016
$N = 6{,}353$	(0.001)	(0.002)	(0.003)	(0.511)	(0.841)	(0.442)
Enter after 1985	−0.024	−0.040	−0.058	−0.002	−0.006	−0.010
$N = 4{,}718$	(0.001)	(0.001)	(0.003)	(0.474)	(0.348)	(0.380)
Balanced sample	−0.028	−0.041	−0.055	0.002	0.001	0.013
$N = 3{,}280$	(0.002)	(0.002)	(0.005)	(0.736)	(0.975)	(0.568)
Without zeros[a]	−0.058	−0.081	−0.058	0.023	0.025	0.072
$N = 5{,}431$	(0.000)	(0.003)	(0.000)	(0.025)	(0.092)	(0.005)
Firms that changed diversification	−0.051	−0.082	−0.110	0.030	0.030	0.081
$N = 6{,}006$	(0.000)	(0.001)	(0.002)	(0.013)	(0.123)	(0.003)

Note: *p*-values below the coefficients in parentheses.
[a]Subsample excluding firms always specialized in 1985–1994 period.

observations show no diversification at all. Without a Tobit estimation, the coefficient for Import penetration would be biased, overestimated or underestimated depending if all the zero diversification observations are included in the analysis or not. Unfortunately, Tobit estimation is not possible with firm fixed effects, which would provide inconsistent estimates (Greene, 2004). Thus, the BW analysis cannot be interpreted as within-firm reactions to changes in Import competition. These coefficients are also subject to the endogeneity problems discussed earlier, particularly those dealing with unobservable effects and self-selection. To investigate the robustness of the Tobit results, we examine several alternative models, which are reported in Table 4.

The first three columns in Table 4 show the results for OLS without firm fixed effects for the three diversification measures as dependent variables, while the models with firm fixed effects are reported later.[3] Only the coefficients for the Import penetration variable for each model are reported, although all regressions include the entire set of controls and year effects as in Table 3. We always have clustered standard errors at the firm level throughout our analyses, except in the Tobit regressions reported above where we replicate the methodology used by BW. First, we run OLS in the 10-year sample and also in two subsamples of 5-year periods to check whether the results are constant through time. These OLS regressions without firm fixed effects produce negative and highly significant coefficients, consistent with the Tobit regressions in Table 3.

[3]We also conduct Poisson regressions for the Number of SICs, which are appropriate for count data, with very similar results.

However, once we add firm fixed effect most coefficients report high *p*-values, and most frequently they take positive values. The high *p*-values suggest that we cannot reject the hypothesis that the impact of foreign competition on firm scope is zero, although the impact of Import penetration has somewhat low *p*-values in the 1990–1994 sub-sample (now with a positive coefficient). When we split the sample into firms that were already in the sample in 1985 and those that entered later, we still reach the same conclusion: the negative effect of Import penetration on the diversification measures seems to disappear once we include firm fixed effects. The same conclusion is obtained from a balanced subsample ($N = 3{,}280$), which only uses firms that report data for the entire decade.

Unfortunately, OLS regressions produce biased results for censored data, generating values that may be overestimated or underestimated depending on whether the censored observations (in our case those with zero diversification) are dropped or not from the analysis. However, we know that the unbiased coefficients should be between the two values estimated with and without the censored observations, that is, full sample for 1985–1994 ($N = 11{,}071$) versus sample without nondiversified firms ($N = 5{,}431$, excluding firms that are in only one SIC through the period 1985–94). These two coefficients are always negative and highly significant for OLS estimation without firm fixed effects, consistent with the Tobit analysis reported earlier. More importantly, however, the results change substantially when firm fixed effects are added. The unbiased effect of Import penetration on Entropy controlling for fixed effects should be between 0.002 and 0.023, while it should be between −0.001 and 0.025 for Herfindahl, and 0.017 and 0.072 for the Number of SICs. Given the large number of non-diversified firms, OLS should generally not be used to test whether the unbiased coefficient for Import penetration is significantly different from zero, but we can be reasonably sure that its sign is positive, and not negative like we obtain in the Tobit regressions, because the sign is generally positive in both samples, with and without diversified firms (with the only exception of the Herfindahl full sample, which is −.001).

It should be noted, however, that we have not yet fully accounted for the potential bias coming from the endogeneity of import penetration. To further address this concern, we instrument for changes in import penetration using exogenous variation in trade tariffs (Flammer, 2015; Fresard, 2010; Xu, 2012). We rely on the idea that tariff reductions have a direct impact on import penetration and they also satisfy the exclusion restriction; in other words, we do not expect a direct cause-effect relation between tariffs and firm scope, except through their impact on import penetration.

In Table 5 we utilize a firm-fixed effect specification with the entire of control variables and year dummies for the Compustat sample from 1985 to 1994. We see that tariffs significantly predict imports ($\beta = -0.245$; *p*-value = .039) in the first-stage of the 2SLS regression. The economic effects of tariffs are strong, since the variables in Table 5 are standardized, a one standard deviation reduction in tariffs leads to an increase of import penetration equivalent to 0.245 times the standard deviation of import penetration. A roughly 49% increase in import penetration as a total share of industry sales,[4] which ultimately reduces local incumbent firms' sales and

[4]In Table 5, the coefficient on Tariffs is −0.245, since both import penetration and import tariffs are standardized, which means that a decrease in one standard deviation of import tariffs provides an increase in import penetration equal to 0.245 times the standard deviation of import penetration. To evaluate how important is this magnitude, note that the mean and the standard deviation of import penetration (not standardized) in our sample are 0.218 and 0.437 respectively. Thus, a decrease of one standard deviation of import tariffs is associated with an increase of import penetration of 0.107 (equal to 0.245 multiplied by 0.437), which is roughly 49% of the mean import penetration in our sample.

TABLE 5 2SLS regressions with firm fixed effects, Compustat data 1985–1994

	Second stage			First stage
	Entropy	Herfindahl	Number of SICs	Import penetration
Industry import penetration (lagged)	0.010 (0.611)	0.078 (0.332)	0.058 (0.558)	
Industry import tariffs				−0.245 (0.039)
Industry growth	−0.002 (0.273)	−0.009 (0.083)	−0.005 (0.487)	0.034 (0.000)
Industry profitability	0.001 (0.622)	−0.001 (0.756)	0.004 (0.596)	0.029 (0.002)
Core business profitability	0.022 (0.003)	0.038 (0.062)	0.071 (0.018)	−0.008 (0.464)
Firm performance	−0.025 (0.000)	−0.035 (0.003)	−0.069 (0.000)	−0.047 (0.022)
Industry concentration	−0.013 (0.127)	−0.007 (0.616)	−0.038 (0.135)	0.004 (0.763)
Industry R&D intensity	0.003 (0.089)	0.006 (0.122)	0.010 (0.095)	0.007 (0.343)
Industry capital intensity	−0.049 (0.036)	−0.068 (0.145)	−0.104 (0.199)	−0.071 (0.182)
Industry export intensity	0.008 (0.155)	0.008 (0.643)	0.000 (0.997)	0.192 (0.000)
Firm size	0.174 (0.000)	0.249 (0.000)	0.567 (0.000)	0.063 (0.155)
Year dummies	YES	YES	YES	YES
Firm dummies	YES	YES	YES	YES
N	10,476	10,476	10,476	10,476
F-test	4.44 (0.000)	2.91 (0.024)	5.79 (0.000)	4.25 (0.039)
Cragg-Donald Wald F-statistic				781.66

Note: p-values below the coefficients in parentheses.

performance. Tariffs, set exogenously by the government, seems to be a good instrument for imports. The Cragg-Donald Wald F-statistic further shows no evidence of the instrument being weak.

Using import tariffs as an instrument for import competition, we re-estimate the models with firm fixed effects. The three models run a fully-fledged specification, which confirm that once we account for the endogeneity of the import penetration variable, including omitted variable bias driven by time invariant firm characteristics. The previously documented negative relation between imports and diversification actually becomes positive (0.010, 0.078, and 0.058 for the three measures of diversification), though with high *p*-values.

Though tariffs have been used as instrument for import penetration by previous researchers (e.g., Flammer, 2015), lower import tariffs could allow for easier outsourcing from third countries, which would reduce barriers to entry in the industry. If the lower barriers to entry were more beneficial for specialized firms (e.g., because they lack the financial resources to overcome these barriers), then this would imply a negative correlation between import tariffs and firm scope, hence invalidating import tariffs as an instrument in our analysis above. To rule out this possibility, we run a logistic regression in which the dependent variable is a dummy equal to one if the firm is a new entrant and the following independent variables: a dummy equal to one if the firm is diversified, the level of import tariffs, and the interaction of both variables. If the previous argument is supported, then we should observe that new entrants that are specialized should be targeting industries with lower import tariffs. In other words, while import tariff levels should have a negative impact on new entry, this negative impact should be stronger for specialized firms and, thus, the interaction between import tariffs and the dummy of diversification should have a positive sign. As reported in the online Appendix S1 in Table 1, this interaction is not significant for any year, thus not supporting the argument against import tariffs as a valid instrumental variable.

3.2 | Empirical analysis using the NETS database

As we discussed earlier, the Compustat database has substantial limitations for its use in the panel analysis of firm diversification, which underestimates the true degree of firm diversification before the reporting changes in 1997 (Berger and Hann, 2003; Villalonga, 2004). Furthermore, the degree of discretion that managers enjoy to disclose segment information means that firms' aggregation of activities by segment differs from firm to firm (e.g., Davis and Duhaime, 1992; Denis, Denis, and Sarin, 1997; Hyland, 2002). For this reason, we also replicate the analysis using the National Establishment Time-Series (NETS) manufacturing database, which is free from errors coming from firms self-reporting their lines of business. This database is built from the Duns Marketing Information from January 1990 to January 2014, using all U.S. establishments that report operations in manufacturing (primary business or not), ranging from small businesses to the largest publicly traded U.S. firms. Because the data on trade tariffs is only available until 2005, our sample covers 16 years from 1990 to 2005 and a total number of around 6.5 million firm-year observations. Note that we are unable to control for Firm Performance and Core Business profitability because the NETS data does not provide firm accounting information. Our results for the Tobit, OLS, and 2SLS regressions are presented in Table 6.

The first three columns of Table 6 show that when we run Tobit regressions, as in the original BW study, we also find a negative and significant impact of Import penetration on firm diversification. This negative correlation seems to still be significant in the NETS sample when we add firm fixed effects in OLS regressions, probably due to the huge sample size. However, the magnitude of the negative effects with firm fixed effects is 20 to 40 times smaller. An increase in one standard deviation in the foreign competition variable leads to a decrease in firm diversification of just 0.001 (at most 0.005) of any of the three diversification variables, which is economically negligible. Though coefficients using different methods cannot be compared, the variables have been previously standardized and hence we can interpret them in terms of their relative effect on the same dependent variable.

This negative (but almost zero) within-firm correlation could still be affected by endogeneity, for example, reverse causality if importers are less likely to grow in markets where

TABLE 6 Revised empirical analysis, NETS data 1990–2005

	Tobit			OLS fixed effects			2SLS second stage			2SLS first stage
	Entropy	Herfindahl	Number of SICs	Entropy	Herfindahl	Number of SICs	Entropy	Herfindahl	Number of SICs	Import penetration
Industry import penetration (lagged)	−0.025 (0.000)	−0.046 (0.000)	−0.188 (0.000)	−0.001 (0.000)	−0.001 (0.000)	−0.005 (0.000)	0.210 (0.000)	0.267 (0.000)	0.226 (0.000)	
Industry tariffs										−0.067 (0.000)
Industry growth	−0.073 (0.000)	−0.127 (0.000)	−0.562 (0.000)	−0.001 (0.000)	−0.002 (0.000)	−0.003 (0.000)	−0.010 (0.000)	−0.0136 (0.000)	−0.013 (0.000)	0.043 (0.000)
Industry profitability	0.089 (0.000)	0.154 (0.000)	0.705 (0.000)	0.002 (0.000)	0.002 (0.000)	0.011 (0.000)	0.003 (0.000)	0.004 (0.000)	0.013 (0.000)	−0.010 (0.000)
Industry concentration	−0.248 (0.000)	−0.431 (0.000)	−2.070 (0.000)	−0.010 (0.000)	−0.014 (0.000)	−0.035 (0.000)	−0.006 (0.000)	−0.008 (0.000)	−0.030 (0.000)	−0.021 (0.000)
Industry R&D intensity	−0.004 (0.000)	−0.007 (0.000)	−0.004 (0.374)	−0.001 (0.000)	−0.001 (0.000)	0.002 (0.000)	−0.001 (0.000)	−0.001 (0.000)	0.002 (0.000)	0.001 (0.000)
Industry capital intensity	−0.064 (0.000)	−0.117 (0.000)	−0.472 (0.000)	−0.021 (0.000)	−0.033 (0.000)	−0.069 (0.000)	−0.023 (0.000)	−0.034 (0.000)	−0.070 (0.000)	0.010 (0.000)
Industry export penetration	−0.046 (0.000)	−0.072 (0.000)	−0.430 (0.000)	−0.005 (0.000)	−0.007 (0.000)	−0.011 (0.000)	−0.097 (0.000)	−0.124 (0.000)	−0.111 (0.000)	0.434 (0.000)
Firm size	0.759 (0.000)	1.373 (0.000)	7.038 (0.000)	0.057 (0.000)	0.087 (0.000)	0.423 (0.000)	0.059 (0.000)	0.090 (0.000)	0.425 (0.000)	−0.014 (0.000)
Constant	−1.993 (0.000)	−2.744 (0.000)	−18.577 (0.000)	0.030 (0.000)	1.043 (0.000)	0.183 (0.000)				0.047 (0.000)

TABLE 6 (Continued)

	Tobit			OLS fixed effects			2SLS second stage			2SLS first stage
	Entropy	Herfindahl	Number of SICs	Entropy	Herfindahl	Number of SICs	Entropy	Herfindahl	Number of SICs	Import penetration
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm dummies	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES
N	6,474,177	6,474,177	6,474,177	6,474,177	6,474,177	6,474,177	6,474,177	6,474,177	6,474,177	6,474,177
R^2	0.426	0.373	0.306	0.886	0.853	0.921				.215
Rk F-statistic[a]										626.66

Note: p-values below the coefficients in parentheses. Standard errors clustered at the firm level.
[a]Kleibergen-Paap rk Wald F-statistic of 626.66 is well above the Stock-Yogo weak ID test critical values for 10% maximal IV size (16.38).

diversified firms could be becoming more prominent through time. To account for this threat of endogeneity, we also run 2SLS regressions with firm fixed effects and using industry tariffs as an instrument for import penetration in the NETS panel. As the first stage results show, greater tariffs are associated with lower import penetration (−0.067), as expected. The coefficients for Import penetration variable for the three diversification measures are all of them positive and highly significant. Since the independent variables are standardized as in the original BW study, an increase of one standard deviation in foreign competition results in an increase in the firm's entropy index, Herfindhal index, and number of SIC codes of 0.210, 0.267, and 0.226, respectively, which are quite substantial. These results are clearly consistent with the idea that when import penetration increases for exogenous reasons (i.e., import tariffs going down), then firms increase rather than decrease their own level of diversification.

3.3 | Empirical analysis of diversification relatedness

We also replicate the regression analysis in the BW paper using diversification relatedness as the dependent variable instead of the three measures of total diversification. We follow BW and compute relatedness as:

$$Resource\ based\ relatedness = \sum r_{ij}\left(P_i + P_j\right)$$

Where $r_{ij}$is the coefficient of similarity between industries i and j as estimated by Robins and Wiersema (1995) and P_i represents the proportion of firm sales in industry *i*. As in BW, we adjust for the number of industries in the firm portfolio such that this proxy of resource relatedness is in the interval (−1,1). The analysis is necessarily limited to the subsample of firms that report operations in more than one industry. Descriptive statistics of our Compustat subsample, which are quite similar to BW, and the results from our empirical analysis are shown in Tables 2 2 through 4 in the online Appendix S1. When we replicate the OLS regression done by BW, we also find that import penetration is positively associated to resource relatedness. However, when we add firm fixed effects, we find in line with our previous analyses that the coefficient on import penetration switches its sign and becomes negative, though the *p*-values are not very low (0.07 and 0.06 in the models with and without interactions, respectively). When we add tariffs as instrument for import penetration in the 2SLS analysis, the coefficient is still negative, but the large *p*-values suggest that we cannot reject the null hypothesis that the impact of import penetration of resource relatedness is equal to zero. Additional unreported analyses using alternative measures of relatedness based on Palepu (1985) and Silverman (1999) also provide insignificant results for the 2SLS regression analysis of diversification relatedness.

3.4 | What drives endogeneity?

The results of our replication of BW's study confirm that there is a cross-sectional negative relationship between the diversification of U.S. firms and import penetration in their core business during the 1985–1994 period, but this relationship seems to disappear when we control for firm fixed effects, which is evidence of endogeneity resulting from systematic unobservable differences between firms that explain at the same time foreign competition and firm scope decisions. The

TABLE 7.1 Analysis of the sources of endogeneity: Regressions of growth in imports to industry size ratio.

	Growth in imports ratio	
Market share of specialized firms in 1980	0.161 (0.005)	0.164 (0.005)
Industry size in 1980		−0.077 (0.660)
Industry size in 2005		0.008 (0.963)
R^2	0.026	0.030
N	297	297

Note: p-values are below coefficient values in parentheses. Standardized beta coefficients.

2SLS results are insignificant in the Compustat sample, but the coefficient for import penetration becomes positive and highly significant when using the NETS database. Given the lack of robust results across methods, it seems that the Tobit analysis (necessarily without firm fixed effects) may be capturing differences in sample composition and the general trends for import penetration and diversification, but it could be masking the actual response of U.S. firms to greater import penetration for the period under investigation. We have identified three potential reasons why the results change after we add firm fixed effects and run empirical specifications that try to account for the endogeneity of import penetration. The results for the analysis of potential sources of endogeneity is shown in Tables 7.1 - 7.3 and discussed below in greater detail.

3.4.1 | Import penetration systematically grows more in industries with more specialized firms

To explore the long-term trends in diversification and import penetration, we use all the data in Compustat, after merging it with the import penetration data from 1980 and 2005 in manufacturing industries (SIC codes between 2000 and 3999). For each manufacturing SIC code, we compute the percentage increase of the ratio of imports over industry size between 1980 and 2005. Consistent with the increase in import penetration that we had previously noted, the ratio of import penetration over industry sales increased in 270 of the 297 four-digit SIC industries that we have data in Compustat, while there was a decrease in the remaining 27 industries.

We want to investigate whether import penetration increased more in industries in which originally the importance of diversified firms was greater, aside from the general trend towards greater import penetration at the end of the previous century. Previous research has already shown that there is a large number of four-digit SIC industries that are populated exclusively by diversified firms (Santalo & Becerra, 2008). In the Compustat database, 114 of the 297 industries only had diversified firms and no single-business firms in 1980. To make possible the analysis, we divide the industries with some presence of specialized firms based on the percentage of activity (sales) that single business account for in the industry. Thus, we order the remaining 183 industries in nine groups of 20 (or 21) industries according to the market share of the specialized firms in the industry in 1980. For each of the 10 groups, we compute the change of the import ratio in 1980–2005 period, which are shown in Figure 1.

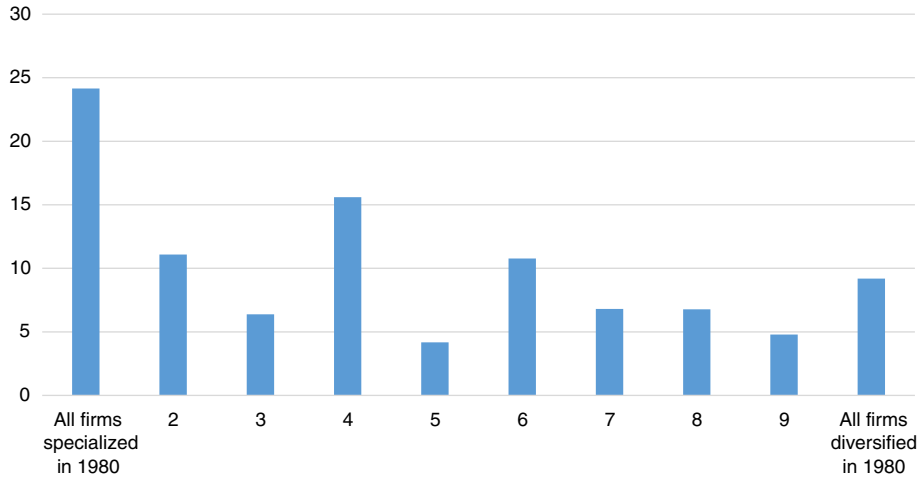

FIGURE 1 Percentage growth in imports over industry size (1980 to 2005) as a function of Decile of market share of specialized companies in 1980 [Color figure can be viewed at wileyonlinelibrary.com]

As we can see in Figure 1, the group in which the import ratio has increased the most is clearly the group with the highest percentage of activity done by specialized firms at the beginning of the period. For this group of industries, the imports ratio increased by more than 24 times, while it was always below 15 for the other nine groups. We can test this visual conclusion through basic linear regression. We run OLS using the change in the import penetration ratio from 1980 to 2005 as dependent variable and the market share of the specialized companies in 1980 for each of the 297 industries controlling for industry size in 1980 and 2005. The results in Table 7.1 confirm a positive relationship between the market share of specialized firms in 1980 and the increase in imports ratio from 1980 to 2005.

Though the Adjusted R^2 is very small, we find that imports have grown more in industries that were originally dominated by specialized firms. We interpret this result as further evidence that the negative correlation between imports and diversification detected by BW is probably not driven by firms reducing their scope as a reaction of competition, but it may be caused by importers growing more in industries dominated by specialized firms. This is ultimately inconsistent with the idea that domestic firms can increase their efficiency by refocusing in their core when the pressure from import competition grows.

3.4.2 | Diversified firms move away from industries with strong import competition

Next, we explore a second possibility that is also consistent with a negative (cross-sectional) correlation between firm scope and foreign competition, but it does not entail that firm become less diversified when they face enhanced foreign competition. This could happen if diversified firms do not focus in fewer industries, but, on the contrary, they are more likely than specialized firms to redeploy their resources away from industries in which foreign competition has grown the most. The underlying assumption is that specialized firms are more likely to remain stuck in industries with high international competition since it is harder for them to find a better alternative use of its productive assets. This type of self-selection would result in greater

likelihood of finding specialized firms operating in industries with a high level of import penetration, which would produce biased estimates if this source of endogeneity is not properly accounted for.

To analyze whether this type of reaction could be producing the results observed by BW, we investigate how many of the firms in their Compustat sample were still reporting operations in 1994 in what was their main industry earlier in 1985. We observe significant differences between diversified and specialized firms. While specialized firms in 1985 have a 42% probability of continuing operations in year 1994 in the same industry they were focused on in 1985, this probability goes down to 35% for those firms that were diversified in 1985. Thus, there is some preliminary evidence that diversified firms are more likely to change their main industry by redeploying its resources from one industry to another than specialized firms, which are more stable.

However, these numbers could be partially driven by differences in firm survival between specialized and diversified firms and not by differences in resource redeployment. Next, we condition on firm survival and we explore how the probability of remaining in the main industry has varied for diversified and specialized firms as a function of import penetration. Figure 2 displays the probability of a firm reporting operations in 1994 in what it was its main industry in 1985 broken down by decile of import penetration in 1994 and split by specialized and diversified firms. The data reported is conditional on firms having survived until 1994. The figure shows how the probability of a specialized firm reporting operations what it was its main industry in 1985 does not seems to vary with import penetration and it is always above 80% (note that this is conditional on firm survival). On the contrary, diversified firms seem to have a lower probability of reporting operations in its main business in 1985 when import penetration in 1994 is the highest. This is clearer in the last three deciles of industries based on import penetration, in which the probability of keeping the same core business drops substantially until being zero for the last decile. This is informal evidence that diversified firms are more likely to redeploy resources away from their core industry when it suffers sharp increases in foreign competition.

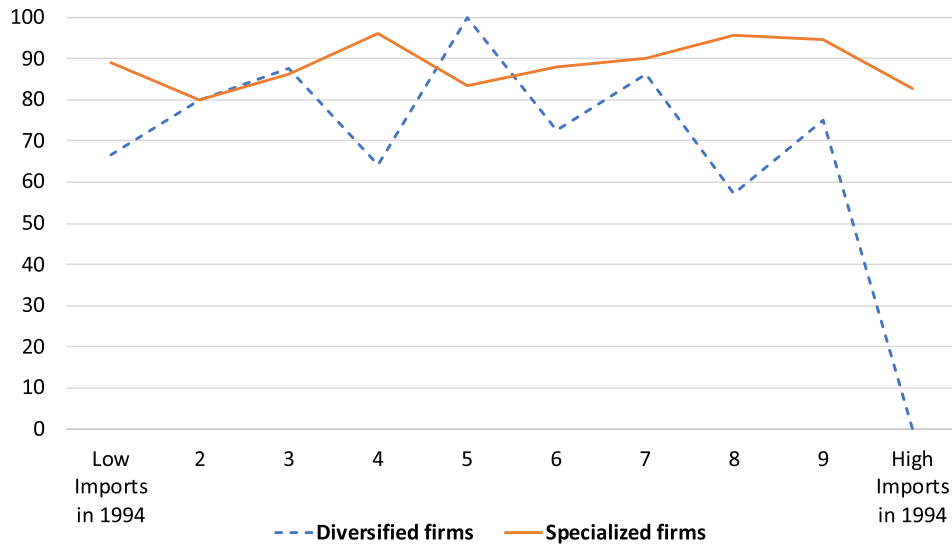

FIGURE 2 Percentage of Firms Continuing Operations in the Same Core Industry (1985 to 1994) for Increasing Deciles of Import Penetration in 1994: Single business vs diversified firms [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 7.2 Analysis of the sources of endogeneity: Logistic regression of Core industry persistence.

	Same Core Industry in 1985 and 1994		
Constant	2.469 (0.000)	2.056 (0.000)	2.538 (0.001)
Diversified in 1985	−0.739 (0.054)		
Entropy index in 1985		−1.222 (0.007)	
Herfindahl index in 1985			−0.748 (0.009)
Import penetration in 1994	−0.026 (0.944)	0.014 (0.970)	0.0397 (0.387)
Diversified in 1985 * Import penetration in 1994	−1.690 (0.101)		
Entropy in 1985 * Import penetration in 1994		−2.410 (0.079)	
Herfindahl index in 1985 * Import penetration in 1994			−1.786 (0.066)
Import penetration in 1985	0.185 (0.820)	−0.014 (0.985)	−0.098 (0.897)
Firm sales in main industry in 1985 (log)	−0.080 (0.593)	−0.067 (0.658)	−0.080 (0.599)
Firm operating profits in main industry in 1985	0.002 (0.263)	0.002 (0.239)	0.002 (0.300)
N	387	387	387

Note: p-values are below coefficient values in parentheses.

We can formally test how this persistence in the core business differs between specialized and diversified firms, and furthermore whether this persistence depends on the level of import penetration. To do so, we use the sample of surviving firms in 1994 in the BW Compustat sample. We run logistic regressions where the dependent variable is the probability of reporting the primary activity in 1985 in the same industry than in 1994, and the results are reported in Table 7.2. The independent variables are a dummy that indicates whether the firm was diversified in 1985, the level of import penetration in the industry in 1994, and the interaction between both variables to test whether diversified firms have been more likely to exit their main industry, especially when import penetration grows. We also replicate the regressions using the other two diversification variables (entropy and Herfindahl index). We add several control variables that may influence the likelihood of remaining in the industry, including firm sales in the main industry in 1985, segment profits reported by the focal firm in the main industry in 1985, and the level of import penetration in 1985.

We can see that diversified firms indeed have a lower likelihood of keeping the same core industry. Furthermore, the interaction of the diversification dummy with the strength of import penetration has moderate *p*-values, around 0.07 for the Entropy index and the Herfindhal index, and 0.10 for the diversification dummy. Hence, we find evidence for the idea that

TABLE 7.3 Analysis of the sources of endogeneity: Year by year logistic regressions of probability of that year being the first one that the firm is in the sample

	Year 1986	Year 1987	Year 1988	Year 1989	Year 1990	Year 1991	Year 1992	Year 1993	Year 1994
Constant	−1.673	−1.664	−1.689	−.873	−2.105	−1.980	−1.699	−2.049	−1.812
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Diversification dummy	−0.336	−1.131	−0.636	−0.486	−0.558	−1.192	−1.006	−0.469	−1.059
	(0.153)	(0.000)	(0.018)	(0.007)	(0.037)	(0.000)	(0.000)	(0.117)	(0.000)
Import penetration	−0.096	−0.019	−0.288	0.037	0.088	−0.066	−0.096	0.154	0.047
	(0.815)	(0.949)	(0.475)	(0.810)	(0.635)	(0.773)	(0.621)	(0.363)	(0.754)
Diversification * import penetration	−0.229	0.490	−0.530	−0.840	0.320	0.111	−0.153	−0.828	−0.049
	(0.829)	(0.573)	(0.672)	(0.254)	(0.673)	(0.921)	(0.875)	(0.439)	(0.923)
Number of new entries	134	115	118	293	110	108	114	115	140
N	995	1,013	1,000	1,157	1,151	1,182	1,266	1,118	1,206

Note: *p*-values below the coefficients in parentheses.

diversified firms are more likely to switch their core industry, which is reinforced somewhat further when import competition increases.

3.4.3 | New firms that enter markets when import competition increases are more likely to be specialized

In this third potential reason for the endogeneity, the negative correlation between foreign competition and firm scope again may not be driven by changes in firm diversification strategies as a response to increasing levels of imports, but due to industries with higher levels of import competition attracting new entrants that are more likely to be specialized. We investigate this possibility by analyzing whether new firms that enter the Compustat sample in industries with higher imports are more likely to be specialized, which would affect the estimates that are not based on within-firm analysis. Thus, we examine whether firms that enter in the Compustat sample for the first time after 1985 are more likely to be specialized and, also, if this likelihood increases with the level of import penetration of the industry. We run logistic regression for each year in which the dependent variable is a dummy equal to one if it is the first year of the firm in the sample. Table 7.3 displays these year by year regressions.

We can see that new entrants in the Compustat sample are indeed more likely to be specialized firms (diversification dummy equal to zero). However, the interaction of the dummy for diversification and the Import Penetration has always high *p*-values, such that we do not find support for the idea that specialized firms are relatively more likely to enter in industries with high import penetration. We have replicated this analysis also adding the same control variables as in BW, getting qualitatively the same results. Thus, we do not find evidence that specialized firms are more likely to enter industries specifically with high import penetration.

Overall, of the three potential explanations that could explain why the negative correlation between firm diversification and import penetration dissipates when we add firm fixed effects and control for endogeneity of import penetration in BW's empirical analysis, we find stronger evidence for the first one, that is, import penetration increases more in industries dominated by specialized firms, and also some support for the second explanation, i.e., diversified firms are more likely to redeploy resources away from their core industry when import penetration increases.

4 | DISCUSSION

Scholars in the field of strategy have recently stressed the need for replications as a critical way to accumulate knowledge that builds and improves on prior work on a given topic (Ethiraj, Gambardella, & Helfat, 2017). Following these calls, we replicate the empirical analysis in Bowen and Wiersema (2005) to investigate the changes in the product diversification strategy of U.S. firms as a response to the increase in import competition that the world economy has witnessed in the last few decades. Although we obtain very similar conclusions to the BW study when using the same methodology (Tobit regressions) and data set (Compustat), the results change substantially when we add firm fixed effects and, even more, when we account for endogeneity using *Tariffs* as instrumental variable. Our analysis indicates that U.S. firms' response to an increase in import competition was not to refocus on their core business, though there are opposite time trends in diversification and import competition that might suggest a

negative correlation between both variables. We also reach similar conclusions when using an alternative data set (NETS) that does not have the limitations of the Compustat database. In fact, when controlling for firm fixed effects and accounting for endogeneity with tariffs as exogenous instrument, the results with the NETS database provide the strongest results, suggesting that U.S. firms actually increased their own level of product diversification as a response to greater pressure from foreign imports.

Our study concludes that the BW results seem to be driven by a combination of an omitted variable bias and the endogenous self-selection of importers. To estimate the causal impact of import competition on firm diversification, we need to remove the systematic differences across firms potentially associated with both firm diversification and import competition by controlling for firm fixed effects. The fact that the results change so much when firm fixed effects are added is clear evidence that there are indeed systematic differences between firms that need to be controlled for, especially if we want to investigate firms' reactions as opposed to correlations between import competition and diversification through time.

As a replication of a previously published study, we would like to elaborate on the methodological choices that we have made in contrast to the original study and other possible approaches. First of all, it was possible for us to replicate the BW study with the information they provided in their paper, which allowed us to reach the same conclusions using Tobit analysis. This is a credit to the authors' high-quality work and full disclosure, which inspired us and made it possible to conduct our replication study. When conducting research, researchers face trade-offs between alternative methods, and BW chose to use Tobit regression to account for the large number of firms that are not diversified. This choice is quite reasonable, but it makes it impossible to control for firm fixed effects, which has important implications for the empirical analysis and the conclusions one can draw. The Tobit coefficients show that the firms in the sample are more concentrated when import competition is higher, but this analysis is between-firms, hence affected by possible external factors (e.g., changes in sample composition), and it does not truly capture the firms' reaction to changes in import competition (i.e., within-firm response to greater import competition).

To use firm fixed effects, we need to rely on OLS (or 2SLS) regression, though they can produce biased estimates when the data are censored. When we run OLS with and without the censored observations (i.e., non-diversifiers), we can estimate the range that includes the unbiased (yet unknown) coefficient for import penetration, while also controlling for firm fixed effects to more rigorously detect within-firm reactions in diversification strategy. From our analysis, we conclude that the actual impact of import penetration on diversification is not negative, as the Tobit analysis indicates. Thus, the limitations of Tobit seem to be greater than those of using fixed-effects estimation in our analysis, for which the bias can be bounded.

In terms of methodology, our empirical strategy is closer to the one employed by Cuñat and Guadalupe (2009). For instance, as they do, we also use import penetration instrumented by import tariffs to estimate the impact of exogeneous changes in foreign competition. However, Cuñat and Guadalupe (2009) employ the weighted average of the import penetration across all industries in which the diversified firm is active, as well as industry-demeaning the import penetration variable. We also followed their approach and show the results in Table 5 in the online Appendix S1 with different methods using the BW sample. We first find negative but insignificant coefficients using their measure of import penetration in Tobit regressions. Furthermore, we find positive values for the import penetration variable in alternative econometric analyses, though always with high *p*-values, which is consistent with the results reported earlier.

Our analysis of firm diversification and import competition increases our understanding of firm responses to competitive threats. Probably most critical, we find empirical evidence that the negative correlation between imports and diversification previously found by BW can be interpreted in a different way. Our results suggest that diversified firms may be more successful in deterring entry of foreign competitors, possibly because they have access to a larger pool of resources (Fresard, 2010). Imports actually increased more their penetration in those industries that were initially dominated by non-diversifiers, which is at odds with the key idea in BW that refocusing makes firms stronger against their competition, including foreign imports. This is ultimately the key debate about diversification to which we wanted to contribute with our replication of BW.

Our results further show that diversified firms seem to be more likely to redeploy resources away from sectors with higher foreign competition. This last finding is a contribution to the recent strand of literature that has investigated the role of non-scale free resources and intertemporal economies of scope as a source of value creation for diversified firms (Helfat & Eisenhardt, 2004; Levinthal & Wu, 2010). Helfat and Eisenhardt (2004) introduced the concept of intertemporal economies of scope (versus traditional intratemporal economies of scope) as a new source of value creation for diversified firms, arguably derived from entry into new product-markets in conjunction with partial or complete exit from old product-markets. Levinthal and Wu (2010) further clarify how non-scale free assets, those assets whose use is subject to an opportunity cost, are those for which redeployment generates intertemporal economies of scope. We contribute to this literature by providing evidence of how diversified firms engage in intertemporal resource reallocation away from the sectors more strongly affected by foreign competition.

Previous literature has already discussed how redeployment of non-scale free resources across time from one market to another can be induced by changes in demand conditions (Wu, 2013), for example, when diversified firm move away resources from declining sectors to emergent ones. This also may occur when technological innovations lead to an overall redeployment of resources towards new related sectors and away from marginal businesses, where either firm innovation does not occur or rivals have the upper hand (Kaul, 2012). Our results are fully consistent with this possibility of switching in focus, which is easier to execute by diversified firms. In line with the benefits of diversification already acknowledged by the literature (Bolton & Scharfstein, 1990; Fresard, 2010), diversification allows firms to move scarce resources away from more competitive environments, presumably increasing the value of strategic resources (Sakhartov & Folta, 2014), as opposed to a more venal view of diversification merely driven by agency reasons (Berger & Ofek, 1995; Lang & Stulz, 1994).

We believe that more work still is needed in this research area, both conceptually and empirically, mainly because of limitations in extant research, including ours. For instance, our study examines the average impact of foreign competition on firm scope, relying only on one measure of import competition. However, not all foreign competitors present the same threat to domestic players, so that they may have different effects on their decisions regarding firm scope. Foreign competition from European companies might have a different impact on the diversification decisions of US companies, as compared to foreign competition coming from low cost competitors outside the OECD. Strategies formulated in response to low-cost competitors may require differential resources with respect to product differentiation strategies (Fernandez-Kranz & Santalo, 2010), and this extra burden on resources may have an impact on firms' scope decisions. More research on diversification is necessary to understand when firms may decide to escape from or to fight with different types importers (or other types of competitors).

Similarly, our analysis does not investigate other strategic alternatives for firms to deal with greater competition from imports. Diversification versus refocusing are certainly not the only possible responses. For instance, plant relocation to countries with lower costs is likely to be a valid option when importers only have a cost advantage. Future research may compare diversification to other options, which could shed more light on firms' strategic response to a harsher competitive environment.

ORCID

Manuel Becerra https://orcid.org/0000-0003-0054-3606
Garen Markarian https://orcid.org/0000-0002-9595-8566
Juan Santalo https://orcid.org/0000-0002-0339-3343

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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