The Transformation of Firm Profitability Patterns: Changes in the Inter-Country and Inter-Industry Performance Variances After the WTO

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ABSTRACT

Many recent studies have emphasized the impact of free trade and tariff reduction on firm profitability, productivity, size, specialization, and growth. However, we still lack information on how changes in the rules of international trade alter the relative importance of headquarters country and principal industry on firm performance. Will the expansion of market boundaries influence the dispersion of returns based on the corporate identity of firms? Has the acceleration of international integration influenced the distribution of firm profitability across the globe? This study investigates whether inter-country and inter-industry variances in firm profitability have been transformed as national markets merge. The evidence is that changes in the international trading environment have influenced the structure of industries within countries, significantly altering the distribution of rates of return among firms with specific business identities and location of headquarters.

INTRODUCTION

The purpose of this research is to explore the relationship between international trade and patterns in firm performance over the decade of 1993-2003. To accomplish this purpose, we explore a very large sample of publicly held corporations in 43 countries and 293 industries, comparing dispersion of accounting results before and after the establishment of the World Trade Organization (WTO). In order to investigate the impact of reduction of trade barriers in firm performance, we compare predominant patterns of profitability distribution at two distinct historical moments using both the decomposition of performance method and the principle of quasi-experimentation in combination.

The relevance and impact of cross-country economic exchange on the business landscape is well established. The increased volume of international trade has an important implication for firm performance since, as new firms enter once protected markets, the intensity of competition between firms targeting the same consumer segments also increases. This process might be expected to significantly alter the level of concentration within those national markets and foster a higher degree of competition between firms headquartered in different countries but operating in the same industry sector. Policies that diminish restrictions on the international mobility of goods and services, such as import tariffs, export taxes, and incentives to foreign direct investments directly influence the functioning of national economies. A better understanding of how the distribution of firm profitability responds to modification in market boundaries poses an interesting and relevant research question: How do changes in competitive dynamics worldwide influence profitability patterns? A fundamental insight arising from this research is that changes in the codification of principles governing international trade in goods and services are, in fact, important influences on the variation in firm level outcomes.

RESEARCH OBJECTIVES

A better understanding of how structural patterns of corporate profitability are transformed over time is very relevant to business strategy and international management. This paper claims that inter-country and inter-industry variances in firm profitability are subject to transformations as a result of underlying economic forces, such as the formation of the WTO. It empirically demonstrates that classes of firms sharing common properties are sensitive to
changes in the international institutional environment. In this paper, corporate profitability is decomposed into specific profitability effects in two periods, before and after the selected treatment, and the results are statistically compared. Should we find that the magnitude of these effects significantly change from one period to the next, it is valid to assume: a) that these particular effects were transformed in time, and b) that this transformation was closely related to the intensification of cross-market integration occurred between the two periods promulgated by the formation of the WTO and specific economic trade blocs.

The principal proposition of this paper is that modifications of market boundaries by international trade policies are likely to influence the relative distribution of profitability among firms with distinct corporate identities, defined by the location of their corporate headquarters and their principal industry affiliation. The paper posits that the escalation of cross-border market integration is likely to influence industry structure and country conditions simultaneously. In synthesis, this paper focuses on comparing the magnitude of year, country, and industry main and interaction effects on firm profitability in two specific historical phases.

We argue that the establishment of the WTO and the subsequent five years of consolidation of regional trade blocs serve as a clear institutional “treatment” in a quasi-experimentation design (see Cook and Campbell 1979; and Shadish and Cook, 2001). By confirming that both inter-country and inter-industry variances were in fact transformed and changed significantly in magnitude in the end of the 1990s, this paper offers important empirical evidence that the escalation of cross-border integration matters to firm strategy. In addition, these results also contribute to a better understanding of how aggregate average and variance of profitability of countries, industries, and industries within countries changes in response to an evolving business landscape. Country and industry effects on firm profitability are not necessarily fixed or naturally conditioned; rather, they reflect the evolving context in which firms perform.

ANTECEDENTS

Ghemawat (2003) presented strong evidence supporting the conclusion that cross-border market integration has intensified in the past few decades, directly affecting the international mobility of products, capital, labor and knowledge. In addition, formal contracts established between countries have contributed to the consolidation of an increasing number of free trade agreements and economic blocs, such as NAFTA, the EU, the AFTA, and the Mercosur, among others. Regional integration aroused in a period of considerable consolidation of a multilateral trading system promoted by the restructuring of the WTO (1995-6), as a replacement for GATT. As a result, a quarter of global output is now exported and trade has expanded faster than output by a significant margin in the past 50 years. Trade intensity clearly reached new heights in the last decades of the 20th century. The ratio of world exports to world GDP increased from about 1% at the beginning of the 19th century to nearly 10% towards the beginning of the 20th century, and has since increased further (Maddison 1995; Ghemawat 2003). A recent WTO report (2005) confirmed that the ratio of world exports to world GDP reached a new high of 29% in 2004. The ratio of imports and exports to GDP has risen from 16.6% to 24.1% between 1985 and 1997 in developed countries, and 22.8% to 38% in developing countries in the same period. Indeed, this evidence suggests that the decline in protection to local firms based on tariff reductions is likely to expand the boundaries of a national market and exposed firms within it to a greater number of foreign rivals, either through imports or foreign direct investments (FDIs). At the same time, ‘local’ firms may be motivated to expand sales coverage, increasing the number of competitors in foreign economies either through exports or FDI. As a consequence, trade agreements between countries have the potential to considerably affect firm performance through changes in industry configurations.

Recent studies on free trade agreements have shown that tariff reduction has a tendency to significantly improve productivity. As supported by theoretical papers (Dijkstra 2000; Melitz 2002), opportunities are opened with tariff cuts, allowing firms to increase economies of scale, although this process might intensify the rate of entry and exit to many industries and national economies (see also Pavcnik 2002; Bagg 2005). Tariff reductions expose firms to increasing competition, which tends to drive out less efficient firms. The decline in the number of less-efficient firms, combined with increasing firm size, firm specialization, and labor efficiency, contributes to overall productivity growth (Gu et al. 2004, among others authors sponsored by Statistics Canada). However, other studies on developing areas (Tylbout and
Westbrook, 1995) have suggested that tariff cuts contribute to keeping firms small and reducing local productivity without necessarily changing exit rates (see also Lewis-Bynoe, Griffith and Moore 2002). There are cases, of course, in which the government is motivated to support non-competitive firms or local firms can survive by catering to very small niches not accessible to foreign-based larger rivals.

There is also substantial empirical evidence of a positive linkage between trade liberalization and the rate of investment, specifically an indirect linkage between trade and growth (Sachs and Warner 1995; Ferrantino and Butcher 1997). Trade expansion also improves productivity of labor and influences the level of employment in manufacturing sectors (Gaston and Trefler 1997) as well as for the level of national savings and capital accumulation (Abuka 2005). Trade liberalization has also been shown to impact the use of financial leverage across firms. It affects the trade-off between the tax advantages of debt and expected bankruptcy costs, reducing the financial leverage of firms (Baggs and Brander 2006). Baggs (2005) has also shown that falling domestic tariffs are associated with declining profits, especially for import-competing firms, while falling foreign tariffs are associated with increasing profits, especially for export-oriented firms (see also Hay 2001; Thompson 1993). Tybout (1992), reporting on four studies sponsored by the World Bank, concluded that trade liberalization reduced price-cost margins in Turkey, Mexico, and Cote d’Ivoire.

Previous empirical studies, however, focused fundamentally on the analysis of behavior of firms (i.e., firm-specific fixed effects) or national macro-economic aggregated conditions. Great emphasis has been given to the level of firms or the level of nations. In the literature cited above, the common influence of country and industry affiliation as conditions of “firm classes” are not directly controlled or investigated. Few studies have directly addressed an intermediary dimension between economic agents and national economies: the implications of collective characteristics of firms, such as the membership to a certain market for technology or to a specific legal environment, have been neglected for most the part.

Corporate commitments to certain industries and the location of headquarters in certain countries might be expected to significantly moderate the impact of cross-border market integration. Scholars in the field of international business have frequently suggested that differences in an institutional context may influence the performance of firms headquartered in a country (Henisz 2000; LaPorta et al., 1997). At the same time, but with different interests in mind, researchers in strategic management have emphasized that the industry affiliation of a firm affects its performance (McGahan and Porter 1997, 2002; Hawawani Subramanian and Verdin 2003). The demonstrated influence of both industry and country on firm profitability motivates further investigation into their relative importance in changing times.

The question is whether collective behavior and performance of firms affiliated to certain countries and industries change significantly in the context of increasing cross-market integration? Managers, entrepreneurs, and policy makers should be aware of conditions generating or impeding superior performance. The task of estimating not only industry and country effects but also how they are transformed (when the environment changes) offers a natural extension to the existing studies on performance decomposition.

This research builds on findings established by previous researchers who studied the influence not only of industry on the profitability of firms located in many different countries but also of other effects, such as those related to country of operations, social network, and country of headquarters, (e.g., Khanna and Rivkin 2000; Furman 2001; Makino Takehiko and Chan 2004; McGahan and Victer 2010). Unlike previous studies, however, this paper compares the effects in different periods, before and after the policies promoted by the WTO. This is done with the objective of assessing the relevance of changes in the global trade environment and the unique ways these changes affect the relative magnitude of the industry and country effects on firm performance.

**HYPOTHESES**

This paper decomposes the accounting performance of firms into separate portions that are systematically associated with country, industry, and country-industry influences on firm performance, controlling for year effects and autocorrelation of the residuals. The analysis identifies whether firms associated with a home country or main industry tend to perform similarly. Industry effect captures distinctions in the aggregate average profitability of firms affiliated
to different industry sectors defined at the NAICS 4-digit level. Home-country effect captures distinctions in the aggregate average profitability of firms headquartered in different national locations. The country-industry interaction effect captures whether a group of firms affiliated to the same industry in one country generates an aggregate average rate of return significantly different from that generated by another group of firms affiliated to the same industry in a different country.

The analysis investigates a series of hypotheses related to the influence of the cross-border market integration on effects conditioning the performance of firms. All deal with the transformation of patterns in the distribution of profitability within the period under consideration, fundamentally predicting whether there will be an increase or decrease in the impact of these factors across a decade. This analysis is done based on a comparison of the magnitudes of the selected effects measured at the beginning of the 1990s (1993-1995) and at the beginning of the 21st century (2001-2003). The first hypothesis deals with the transformation of the magnitude of headquarters country to firm performance. Neoclassical traditional theories (i.e., general equilibrium models) posit that within the context of an increasing reduction or elimination of barriers to the mobility of factors of production, profitability differences between countries will ultimately disappear. Market liberalization ideally involves a more efficient allocation of resources and contributes to a faster adoption of technology and knowledge (Krueger 1998; Rodrik 1992). Competitive trade would make the costs of such factors converge along with traded goods prices. Free mobility of capital especially would provide a single worldwide investment pool, demanding and generating similar rates of return, independent of location. Freedom of investment would level the playing field for all producers (i.e., factor-price equalization theorem). One of the general assertions of the Stolper-Samuelson theorem is that free trade equalizes not only product prices but also the prices of factors between countries, stating that providers of factors of production will end up earning the same rate of return.

This suggests that country effects are most likely to decrease within the context defined by increased cross-border integration. In addition to a purely neo-classic perspective, it is also feasible to consider an institutional perspective as well: institutional theory (Powell & DiMaggio 1991) predicts the relative decrease in country effects on firm profitability as the result of a process of imitation and/or conformity to prevalent norms of business behavior. Greater openness to international markets allows firms and even national governments to adopt best practices and the most efficient institutional arrangements as a consequence of greater flow of knowledge and so access to information on cases occurring in different places in the world. In this sense, competitive dynamics within countries would become more similar to each other as the consequence of the adoption of similar organizational (and legislation) models. For these reasons, we hypothesize the following:

**Hypothesis 1:**

Null Hypothesis: The magnitude of the headquarters-country main effect will be the same in 2001-2003 as it was in 1993-1995.

Alternative Hypothesis: The magnitude of the headquarters-country main effect will be lower in 2001-2003 than it was in 1993-1995.

The second hypothesis deals with the possible transformation of the magnitude of the industry affiliation effect on firm performance. Industrial organization studies have traditionally identified persistent differences between industries and recognized the intrinsic distinction of lines of business (Ghemawat, 2000). Barriers to entry/exit, sunk and fixed cost requirements, investment cycles, and elasticity of demand, among other structural features of industry, tend to create distinct opportunities for differentiating firm conduct, regardless of location (Bain 1966; Porter 1981; Caves 1989; Sutton 1991). Underlying structures of industries might, therefore, stimulate different conduct, creating relevant differences in firm performance. Unequal profitability opportunities for different lines of business are likely to reinforce inter-industry differences in profitability margins. In the absence of trade barriers between national economies, firms operating in different industries are expected to generate increasingly distinct levels of return as the reflection of differences in their marginal and total average costs. Intra-industry variance in firm profitability might increase with increasing international trade because of differentiated conditions of supply and demand (Williamson 1963; Porter 1976, 1980). As a consequence, the integration of markets and reduction of legal protection to inefficient firms affiliated to
certain lines of business would tend to magnify the variance of firm returns by industry of affiliation. For this reason, we hypothesize the following:

**Hypothesis 2:**

Null Hypothesis: The magnitude of the industry main effect will be the same in 2001-2003 as it was in 1993-1995.

Alternative Hypothesis: The magnitude of the industry main effect will be higher in 2001-2003 than it was in 1993-1995

The third hypothesis deals with the transformation of the magnitude of the country and industry affiliation interaction effect on firm performance. Recent empirical evidence has shown the emergence and persistence of country-industry interaction effects on firm profitability (McGahan and Victor 2010). Increasing global integration might reinforce geographical specialization based on absolute or comparative advantage, as advocated by traditional trade theory (*Ricardo’s law*) and modern standard theory of trade (*H-O model*), increasing the opportunities for industries to achieve their highest performance in one country but not in others.

While the Ricardo’s Law is based on the assumption that countries have different labor opportunity costs of producing more of a certain product, the Heckscher-Ohlin (*H-O*) model is based on the assumptions that there are factors of production that are immobile between countries and that these factors can be used in different combinations to produce different goods and outcomes. Both theories support the proposition that particular countries are capable of sustaining a comparative advantage in particular industries. Although trade liberalization favors efficient firms at the expense of less efficient firms, some countries may well host low-performing firms, for example, for political reasons. Greater competitive intensity might not mean the exit of less efficient firms, but is likely to reduce their growth rates and rents (as shown by Tybout and Westbrook, 1995; Lewis-Bynoe et al., 2002). Market integration, therefore, should generate new opportunities for country-industry interaction effects to arise. Case studies in developing countries have shown that although entry barriers have decreased when trade is liberalized, these environmental changes are not necessarily followed by a corresponding reduction of exit barriers, possibly because of lobbying or the simple fact that less efficient, smaller firms can cater successfully for relatively unprofitable customer segments. This means that profitability per industry will most likely vary considerably depending on the location and geographical distribution of efficient/inefficient firms. The direct implication is that country identity and industry affiliation can interact in many relevant ways, generating unique profitability (and loss) situations. In addition, clusters of firms within certain countries might have access to differential technologies and innovation systems (Porter 1990; Enright 1998), increasing their competitive advantage over rivals located in other countries. Concomitantly, firms in the largest countries might benefit from economies of scale and network effects, as highlighted by the *new trade theory* (see Krugman 2001), also increasing the competitive advantage of firms with headquarters located in particular countries but operating in the same industry sector. For these many different reasons, we hypothesize the following:

**Hypothesis 3:**

Null Hypothesis: The magnitude of the industry country interaction effect will be the same in 2001-2003 as it was in 1993-1995.

Alternative Hypothesis: The magnitude of the industry country interaction effect will be higher in 2001-2003 than it was in 1993-1995

These three sets of hypotheses are tested based on the full sample and two restricted samples: one, considering only manufacturing firms, and, another, considering four selected economic blocs. The first restricted sample assesses how the results change for manufacturing firms, given that manufacturing has experienced the greatest level of internationalization. The second restricted sample assesses how the results change by specific economic bloc, comparing results ten years apart for four of the most important free trade agreements in the world: the EU, NAFTA, MERCOSUR, and AFTA. The model controls year main and interaction effects and so, for macroeconomic shocks occurring each year, either those affecting the whole global economy or a specific country or industry.
Method

We measured and compared the statistical magnitude of country and industry main and corresponding interaction effects based on firms’ profitability generated in the beginning of the 1990s and in the beginning of the 21st century, with a five-year gap separating the two consecutive periods, taking the foundation of the WTO as the reference point. The first period considers profitability results generated in 1993, 1994 and 1995, and the second period considers profitability results generated in 2001, 2002 and 2003. We applied data drawn from the Global Compustat file, which includes 4,397 different firms in 43 countries and 293 industry sectors, after a screening process reflecting the intentions of this particular study.

Basically, we compared dispersion of outcomes in groups of firms in the early 1990s with those in the early 2000s in order to measure the profit impact of international trade policies supporting globalization. This comparison is done based on the methods of natural or quasi-experimentation (i.e., when the consequence of a treatment is not based on random assignment and there is no systematic control of competing factors of influence), wherein the magnitude of effects within a period $T$ is contrasted with the magnitude of the same effects in period $T + n$. Hypotheses 1-3 are tested by analyzing the variance in performance among the firms in the first and second periods, and then comparing each pair of coefficients representing the same effect. Each historical pair of coefficients is estimated separately according to the following linear equation (reflecting the precedents in the variance of decomposition literature, such as Rumelt 1991 and McGahan and Porter 1997, McGahan and Victer 2010):

$$r_{k,t} = \mu + y_t + \alpha_c + \beta_i + \kappa_{c,i} + \nu_{i,t} + \delta_{c,t} + \epsilon_{k,t}$$

(Equation 1) represents the full model employed to represent the performance of a particular firm $k$ in year $t$, such that $r_{k,t}$ represents the return on assets of firm $k$ at time $t$. Firm $k$ is assumed to be identified at time $t$ with country $c$ and industry $i$. The variable $\mu$ represents the grand mean of the return on assets among all firms represented in the dataset. $\alpha_c$ is the influence of the affiliation with country $c$, and $\beta_i$ is the influence of membership in industry $i$. The interaction between industry $i$ and country $c$ is captured by the coefficient $\kappa_{c,i}$. The year controls are given by $\gamma_t$, $\delta_{c,t}$, and $\nu_{i,t}$, which represent aggregate year, country-year, and industry-year, respectively. The control for country-industry-year effect is not included this time because it was not significant in previous tests. The residual $\epsilon_{k,t}$ is the excess return to firm $k$ at time $t$ that is not explained by the grand mean, country and industry effects or the year controls.

This model already controls for the auto-correlation of the residuals as a condition to isolate the impact of omitted variables and persistent shocks at any level with influence over successive years. In the current study, the hypotheses are tested by comparing each effect in the first period with each corresponding effect in the second period. Thus, we associate Hypothesis 1 -- that home-country effect is transformed along the period under consideration -- with the finding that $\gamma$ in period 1 significantly differs from $\gamma$ in period 2. Similarly, we associate Hypotheses 2 and 3 in the same way, always comparing whether the size of an effect significantly changes from one period to the next. This means that the hypotheses are expressed directly as follows:

Null Hypotheses:

- $H_1$: $\alpha_{c1} = \alpha_{c2}$
- $H_2$: $\beta_{i1} = \beta_{i2}$
- $H_3$: $\kappa_{c1,i} = \kappa_{c2,i}$

Alternative Hypotheses:

- $H_1$: $\alpha_{c1} > \alpha_{c2}$
- $H_2$: $\beta_{i1} < \beta_{i2}$
- $H_3$: $\kappa_{c1,i} < \kappa_{c2,i}$

To estimate whether the coefficients for the same effect are different from each other according to the period (greater or smaller, according to the case highlighted above), we follow the traditional rationale for conducting dependent-sample t-statistic tests, with some modifications to reflect the methodology presented above. We are fundamentally concerned whether the incremental $R^2$ generated by an effect significantly changes from one period to the next. Therefore, the test measures the proportional difference between the products of the sum of squares of the effect under consideration divided by the sum of squares of the model in both periods, and then divides the result by the pooled standard deviation of the sampling distribution of the effect during the whole period. The effect can be declared significantly different from one period to the next (greater or smaller) if the result of this calculation is higher than the corresponding critical $t$-value, based on the level of significance at $p < .10$ in a double-tail distribution and the corresponding degrees of freedom per effect under consideration.
RESULTS

All three alternative hypotheses were confirmed, rejecting the assumption of no changes in profitability patterns. Table 1 presents the core results in a synthetic way to facilitate comparison and interpretation. Each line represents an estimation of the coefficient per effect, based on the how much the R² increases step-wise. Column 1 presents the result for the first period, and Column 2 for the second period. Column 3 shows the level of difference between the effects in both periods. Column 4 formally indicates the direction of change, whether it increases or decreases from one period to the next. Column 5 indicates if the change is statistically significant, and Column 6 provides the exact t-value and confirms the level of significance. The same principle is valid for Tables 2 and 3, which present the results for the restricted samples (‘manufacturing sectors only’ and ‘different economic blocs’).

First we will focus on main effects. Table 1 shows that the country main effect in 1993-1995 is significant and explains 4.35% of variation in performance; the country main effect in 2001-2003 is also significant and explains 1.92% of variation in performance. The difference between the percentages of variation explained is significant (with p < .001), allowing us to reject the null Hypothesis 1, meaning that the country effect changed, becoming significantly lower (although still significant as a distinct effect influencing firm performance). The country effect loses more than half of its relevance in the second period compared with the first. Considering only manufacturing industries (Table 2), the country main effects are also significant in both periods, and decrease considerably from 5.76% to 2.49% (p < .001). The conclusion is that differences between home countries become less relevant with time, or at least, became less relevant in shaping the performance of firms during the period under investigation, which was characterized by high levels of growth in cross-market integration.

Table 1: All firms - Comparison between two periods

<table>
<thead>
<tr>
<th>All Set of Effects</th>
<th>Incremental R²</th>
<th>Hypothesis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Sample</td>
<td>1993-1995</td>
<td>2001-2003</td>
</tr>
<tr>
<td>year</td>
<td>0.18%</td>
<td>0.45%</td>
</tr>
<tr>
<td>country</td>
<td>4.35%</td>
<td>1.92%</td>
</tr>
<tr>
<td>industry</td>
<td>10.20%</td>
<td>11.67%</td>
</tr>
<tr>
<td>year-country</td>
<td>0.47%</td>
<td>0.88%</td>
</tr>
<tr>
<td>year-industry</td>
<td>3.91%</td>
<td>5.61%</td>
</tr>
<tr>
<td>country-industry</td>
<td>28.17%</td>
<td>35.39%</td>
</tr>
<tr>
<td>Model</td>
<td>47.27%</td>
<td>55.91%</td>
</tr>
</tbody>
</table>

Significance levels: † p < .10; * p < .05; ** p < .01; *** p < .001

Table 2: Manufacturing Only - Comparison between two periods

<table>
<thead>
<tr>
<th>Manufacturing Set of Effects</th>
<th>Incremental R²</th>
<th>Hypothesis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Sample</td>
<td>1993-1995</td>
<td>2001-2003</td>
</tr>
<tr>
<td>year</td>
<td>0.27%</td>
<td>0.36%</td>
</tr>
<tr>
<td>country</td>
<td>5.76%</td>
<td>2.49%</td>
</tr>
<tr>
<td>industry</td>
<td>5.31%</td>
<td>7.22%</td>
</tr>
<tr>
<td>year-country</td>
<td>1.93%</td>
<td>1.89%</td>
</tr>
<tr>
<td>year-industry</td>
<td>1.68%</td>
<td>1.41%</td>
</tr>
<tr>
<td>country-industry</td>
<td>17.01%</td>
<td>31.48%</td>
</tr>
<tr>
<td>Model</td>
<td>31.98%</td>
<td>44.85%</td>
</tr>
</tbody>
</table>

Significance levels: † p < .10; * p < .05; ** p < .01; *** p < .001

The industry main effect in 1993-1995, as Table 1 shows, is significant and explains 10.20% of variation in performance; the industry main effect in 2001-2003 is also significant and explains 11.67% of variation in performance. The difference between the percentages of variation explained is significant (p < .01), and so we can reject null Hypothesis 2, meaning that the industry main effect significantly changed. It became slightly larger. The result of this
test is consistent for manufacturing firms, although there are exceptions depending on the economic bloc under consideration. Considering only manufacturing industries, as Table 2 shows, the industry main effects are also significant in both periods (p < .10). The conclusion is that differences between principal industry affiliations have become more relevant with time. However, industry main effect has not significantly changed in the MERCOSUR, although the overall magnitude of the effect is considerably high at the level of 17%. Industry main effect has significantly decreased in the AFTA and EU. See Tables 3a-d for more details.

Table 3a: European Union - Comparison between two periods
(Includes only industries located in the countries belonging to the EU)

<table>
<thead>
<tr>
<th>Core Sample</th>
<th>Incremental R²</th>
<th>Hypothesis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set of Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>year</td>
<td>1993-1995</td>
<td>2001-2003</td>
</tr>
<tr>
<td>country</td>
<td>0.26%</td>
<td>0.40%</td>
</tr>
<tr>
<td>industry</td>
<td>4.13%</td>
<td>2.75%</td>
</tr>
<tr>
<td>year-country</td>
<td>35.19%</td>
<td>31.93%</td>
</tr>
<tr>
<td>year-industry</td>
<td>0.48%</td>
<td>0.74%</td>
</tr>
<tr>
<td>country-industry</td>
<td>8.11%</td>
<td>6.40%</td>
</tr>
<tr>
<td>Model</td>
<td>18.10%</td>
<td>27.53%</td>
</tr>
</tbody>
</table>

Significance levels: † p < .10; * p < .05; ** p < .01; *** p < .001

Table 3b: North American Free Trade Agreement
(Includes only industries located in the countries belonging to NAFTA)

<table>
<thead>
<tr>
<th>Core Sample</th>
<th>Incremental R²</th>
<th>Hypothesis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set of Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>year</td>
<td>1993-1995</td>
<td>2001-2003</td>
</tr>
<tr>
<td>country</td>
<td>0.18%</td>
<td>0.57%</td>
</tr>
<tr>
<td>industry</td>
<td>3.12%</td>
<td>1.10%</td>
</tr>
<tr>
<td>year-country</td>
<td>10.66%</td>
<td>14.56%</td>
</tr>
<tr>
<td>year-industry</td>
<td>0.46%</td>
<td>0.71%</td>
</tr>
<tr>
<td>country-industry</td>
<td>5.44%</td>
<td>9.01%</td>
</tr>
<tr>
<td>Model</td>
<td>19.21%</td>
<td>25.26%</td>
</tr>
</tbody>
</table>

Significance levels: † p < .10; * p < .05; ** p < .01; *** p < .001

Table 3c: South American Free Trade Agreement
(Includes industries located in the countries belonging to Mercosur)

<table>
<thead>
<tr>
<th>Core Sample</th>
<th>Incremental R²</th>
<th>Hypothesis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set of Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>year</td>
<td>1993-1995</td>
<td>2001-2003</td>
</tr>
<tr>
<td>country</td>
<td>0.19%</td>
<td>0.71%</td>
</tr>
<tr>
<td>industry</td>
<td>7.75%</td>
<td>2.34%</td>
</tr>
<tr>
<td>year-country</td>
<td>17.05%</td>
<td>17.28%</td>
</tr>
<tr>
<td>year-industry</td>
<td>0.89%</td>
<td>1.57%</td>
</tr>
<tr>
<td>country-industry</td>
<td>7.21%</td>
<td>9.65%</td>
</tr>
<tr>
<td>Model</td>
<td>31.77%</td>
<td>30.46%</td>
</tr>
</tbody>
</table>

Table 3d: Asian Free Trade Agreement (Includes industries located in the countries belonging to AFTA)

<table>
<thead>
<tr>
<th>Core Sample</th>
<th>Incremental R²</th>
<th>Hypothesis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set of Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>year</td>
<td>1993-1995</td>
<td>2001-2003</td>
</tr>
<tr>
<td>country</td>
<td>0.13%</td>
<td>0.84%</td>
</tr>
<tr>
<td>country</td>
<td>9.80%</td>
<td>1.50%</td>
</tr>
</tbody>
</table>
Now we turn to the country-industry interaction effect. In each table, it has the greatest impact. In Table 1, it is significant in 1993-1995 and explains 28.17% of variation in performance; the country industry interaction effect is also significant in 2001-2003 and explains 35.39% of variation in performance. The country-industry interaction effect clearly explains considerable additional variation in firm profitability. The difference between the percentages of variation explained is significant (p < .001), and so we can reject the null Hypothesis 3: the country industry interaction effect changed, becoming considerably larger. The same basic conclusion is valid for restricted samples again, with the exception of Mercosur and AFTA (Table 3c-d). Considering only manufacturing industries, the country-industry interaction effects are also significant in both periods, and almost doubles from 17.01% to 31.48% (p < .001) over the decade. The conclusion is that synergies between headquarter-country and principal industry affiliations become even more relevant than before, indicating the increasing relevance of national industry clusters.

All economic blocs experienced a reduction in the country main effect and stability of year effects. However, they had different experiences regarding the behavior of industry main and interaction effects. Significant disparities are related to the trend of decreasing industry main effect in the EU and AFTA, and the stability of country-industry interaction effects in AFTA and Mercosur. One possible explanation for the first discrepancy is the possibility that the EU and AFTA might have emphasized policies that reduced industry distinctions within member countries through the elimination of historical subsidies provided to certain sectors, such as agriculture, mining, infant or export industries. In fact, we can see that the relevance of the industry effect both in the EU and AFTA is comparatively higher than in the overall sample, at the order of 35% and 19%, respectively, whereas in NAFTA the industry effect was considerably smaller at the level of 11%. The explanation for the stability of the interaction effect in AFTA and Mercosur might be related to the fact that some industry effects were already high when those trading blocks were formed. As can be seen in Tables 3c-d, the country-industry interaction effects were already at the level of more than 30%. These are interesting disparities from the core model to which warrant further research.

### DISCUSSION

Extensive previous studies have documented the impact of lower tariffs on firm profitability, growth, productivity, size, and turnover. Here, empirical results carefully guided by theory supports the notion that free trade influences firm performance according to their headquarters location and industry affiliation. The evidence seems to indicate that changes in the international trading environment have decisively influenced the structure of industries within countries, significantly altering the distribution of rates of return among firms. This is also true for manufacturing firms and specific economic blocs, although Mercosur and AFTA blocs generated the least degree of profitability variation in both periods.

Results indicate a consistent and pervasive decrease of country main effects in the great majority of situations. This shows that location of headquarters by itself has lost strength and relevance in the past decade, consistent with the elimination of national market barriers. The aggregate returns of firms located in different countries are becoming more similar to each other. In this sense, countries have become less heterogeneous when we consider firms in the global aggregate. This last result does not mean that variance in firm performance has become necessarily lower within countries. On the contrary, overall variance within countries has increased, but in such a way that countries have become more similar to each other by sharing increasing degrees of diversity in firm performance. Countries seem to have become more internally diverse with time, therefore diluting the relevance of country affiliation as a key determinant of differential firm performance.

At the same time, the overall effect of industry has consistently gained strength with the reduction of national market barriers. Industries’ expected profitability has become slightly but increasingly differentiated, raising the degree
of distinction between industry sectors. Our findings also show that industry and country effects interact in special ways, showing that expected profitability of firms significantly differs according to the affiliation with specific industries within particular countries. Thus, in this special sense, location still matters in an increasingly globalized economy, but it matters in unique ways, according to specific firm activities and corporate headquarters locations.

The increasing similarity between countries has been predicted by neoclassical economics, and the increasing differentiation of industries levels of profitability has been predicted by traditional industrial organization theory. Identifying the reasons for the increase in country-industry interactions is still a matter for further research. Many different factors are at play. Traditional trade theory tends to emphasize the result of the natural comparative advantages of countries (based on their relative endowments with the factors of production, such as fixed, natural, capital or labor resources), whereas the new trade theory emphasizes the influence of specific national industry policies and other sources of differentiation. In addition, it can be suggested that the transformation of interaction effects is just part of the intensification of the conditions that facilitate their emergence in the first place.

Areas of potential interaction between country conditions and industry intrinsic nature have been treated in many prior studies in the Strategy literature. They may help us understand the exact mechanisms underlying why country industry interaction effects arise, persist, and eventually have a quite different (here increased) influence on firm profitability in any specific period of time. Such changes might be due to: (a) market or value system imperfections (Burley and Casson 1976; Porter 1980; Dunning 1993; Khanna and Rivkin 2000); (b) cultural-legal tradition or institutional path dependence (Chui Loyd and Know 2002; Thomas and Waring 1999; Granovetter 1994; North 1990; LaPorta 1999); and (c) deliberate development of resources (Zucker et al. 1998; Almeida & Kogut 1999; Florida 2005) or infrastructure (Henisz 2001). All these factors seem to contribute to the perpetuation of a general condition of “semi-globalization” (Ghemawat 2003), explaining the apparent paradox we report here -- much smaller country main effects combined with much higher country-industry interaction effects.

REFERENCES


