

DIRECTIONS IN DEVELOPMENT

What Makes Exports Boom?

MARK J. ROBERTS
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Foreword

Export supply responsiveness is of central concern to the World Bank and its client countries. In the past fifteen years the success of structural adjustment programs has depended significantly on the extent to which strong export responses have followed commercial policy reforms and devaluation. Where responses have been strong, countries have been able to move past balance of payments crises and get on with the business of recovery and growth. Strong export responses have also enabled countries to quickly reap the efficiency gains associated with larger trade volumes, to draw on a richer menu of intermediate goods, and to import capital goods that embody new technologies. Although much of the adjustment to the debt crisis has now been accomplished, it remains an important problem in many countries. Further, the ease with which countries will absorb negative external shocks in the future will hinge partly upon the ease with which they can induce their producers to reallocate production from domestic to foreign markets.

Unfortunately, export supply responses are not well understood. Seemingly similar reform packages have generated a large range of export responses in different countries and time periods. Studies attempting to explain the export growth puzzle using macroeconomic or sectoral data on trade flows have met with little success. Hence policymakers have faced substantial uncertainty whether a given reform package will, for their country, generate the needed response.

To obtain a fresh perspective on the determinants of export supply response, a recently completed World Bank project examined the microeconomic foundations of industrial export booms in Colombia, Mexico, and Morocco. For each country, plants were followed through time, and their decisions to begin exporting, cease exporting, or adjust their export volumes were analyzed in detail. The results, summarized in this book, shed substantial new light on the fundamental question of what makes exports grow.

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What Makes Exports Boom?

Successful development is often tied to successful exporting. Efficiency gains come from specialization and trade, both in input markets and final product markets. Moreover, at the macroeconomic level exports generate hard currency and forestall balance of payments crises. To a large extent, the ease with which negative external shocks can be absorbed depends on the ease with which producers can reallocate production from domestic to foreign markets. Some analysts also stress the positive "exposure" effects from participating in world markets—either through access to better capital goods and intermediate inputs, a richer menu of blueprints, or the technical and managerial assistance of buyers. For all of these reasons policymakers are often concerned with generating or sustaining strong sales in foreign markets.

But what generates strong export responses? Seemingly similar exchange rates and foreign demand conditions have led to different levels of exports in different countries and at different times. Attempts to explain export supply responses as simple functions of the real exchange rate and foreign demand yield widely varying results (see Newman, Lavy, and de Vreyer 1995). Policymakers are thus left wondering whether their trade and macroeconomic regime will generate an export flood or a trickle.

Several recent studies have followed large numbers of firms over time, analyzing their behavior during export booms in Colombia, Mexico, and Morocco (Roberts and Tybout 1995; Roberts, Sullivan, and Tybout 1995; Sullivan 1995; and Clerides, Lach, and Tybout 1996). Managerial decisions to begin exporting, cease exporting, or adjust export volumes were studied, then traced back to their implications for the aggregate export response. Several distinctive features emerged:

- *In each case the boom involved many firms breaking into foreign markets. Indeed, in Colombia and Morocco more than half the total growth in manufactured exports came from new exporters. Except for several industries in Mexico, the booms would not have materialized if rapid entry had not occurred.*
- *In most industries firms that were exporting before the booms did not dramatically adjust export volumes in response to devaluation. The reasons*

appear to have varied across countries. In Morocco most “incumbent” exporters were already exporting much of their output before devaluation, so capacity constraints probably limited their responses. In Colombia and Mexico, however, incumbent exporters typically sold most of their output domestically, so they could have shifted more production toward the export market. Their reluctance to do so may have been due to modest foreign demand elasticities for their products, which would have necessitated large price concessions to sell more abroad. Limited responsiveness also may have reflected their desire to avoid becoming overexposed in foreign currency.

- *Breaking into foreign markets involved significant start-up costs, but these costs declined as more firms became exporters.* In all countries and industries firms that had exported in the recent past were more likely to be current exporters than those that had not. This remained true after controlling for observed and unobserved firm characteristics, suggesting that start-up costs were important. (Interviews with exporters and nonexporters confirmed that the costs of retooling to export were significant.) Furthermore, in some industries the dependence of exporting probabilities on previous exporting experience became less dramatic as the set of exporting firms grew. This finding suggests that latecomers benefited from information externalities or that specialized export support services become more efficient when they were provided on a large scale—or both.
- *Becoming an exporter typically did not change firms in terms of their unit production costs.* Exporters are more efficient than nonexporters on average. This disparity occurs because the most productive firms tend to self-select in export markets. Despite many anecdotes to the contrary, the studies found little evidence that firms learned how to produce more efficiently by interacting with foreign buyers and competing with other sellers in global markets.

These findings hold some policy implications for countries that want to engineer an industrial export boom:

- *Rapid export growth often requires convincing producers that future profits from exporting will more than cover the start-up costs of breaking into foreign markets.* Credible commitments to favorable, stable exchange rates and an outward-oriented commercial policy are critical in this regard.
- *Temporary policy changes may lead to permanent changes in export supply.* Firms become exporters only when the expected profits from foreign sales are large enough to cover start-up costs. But firms already exporting continue to do so if production costs are covered. Hence policies that entice firms to break into foreign markets can lead to permanent increases in the number of exporters—even if these policies turn out to be temporary. Similarly, temporary

policies that discourage exports may lead to permanent decreases in export supply. This phenomenon, known as "export hysteresis," is described in several recent theoretical papers (Baldwin 1988, 1989; Baldwin and Krugman 1989; and Krugman 1989). The evidence from Colombia, Mexico, and Morocco suggests that it is empirically important.

- *One must know the characteristics of individual producers to predict the aggregate industrial export response to a given stimulus.* Questions to ask include:
 - Are most firms already exporting? If so, rapid entry can only come from the creation of new firms.
 - Are many firms on the threshold of earning profits from exports? If so, an entry surge can be induced with modest stimuli.
 - Among firms already exporting, is most capacity already devoted to foreign sales? If so, further exports from these firms are limited in the short run by capacity constraints.
 - Do firms view foreign markets as unpredictable? If so, firms will be reluctant to become overly reliant on foreign currency-denominated revenues.

Some of these questions are difficult to answer, but they are key to understanding why exports respond to incentives in some cases but not others.

- *The case for export promotion as a means to accelerate productivity growth is not supported by the studies.* Although export-oriented development is often touted as a means to achieve rapid productivity growth, there is little evidence in firm-level productivity trajectories that exporting has led to such gains.
- *There may nonetheless be a case for government subsidies and support services for new exporters.* Firms that break into foreign markets sometimes make it easier for others that follow them, so the pioneering firms generate positive spillovers, and in principle it is efficient to provide them with extra incentives to begin exporting. However, practical experience with programs to assist new exporters has been mixed, so caution is warranted.

The Two Margins of Export Response

In the early 1980s Colombia, Mexico, and Morocco had balance of payments problems and implemented structural adjustment programs. In addition to fiscal restraint, these programs included large real devaluations and some trade liberalization. In Colombia and Mexico reforms were accompanied by new trade pacts that lent credibility to the outward-oriented policies. In all three countries manufactured exports responded dramatically in the second half of the decade.

Roberts, Sullivan, and Tybout (1995) examined these episodes to better understand the microeconomic anatomy of industrial export booms. Using large microeconomic data sets from each country, they quantified two basic dimensions of export supply response. The first is adjustments in foreign sales volumes by producers already exporting. This incumbent volume effect, the focus of most microeconomic studies on export responsiveness, presumably reflects decisions made by exporters in response to production costs and the marginal returns and risks associated with selling in domestic and foreign markets.

The second basic source of growth is changes in the set of producers who are exporting. This turnover effect can change aggregate exports through two channels. One is net entry into the export market. The magnitude of this effect depends not only on the net change in the number of exporters, but also on the volume of exports from the typical entrant. The other channel is replacement of one set of exporters with another. Because producers are heterogeneous and continuously experience idiosyncratic shocks, even if there is no change in the aggregate number of exporters (that is, no net entry), the population of exporting plants is in continual flux. When, for example, the average export volume among firms that stop exporting is less than the average export volume among entering firms, the replacement effect contributes to export growth. Growth in total exports can be expressed as the sum of the incumbent effect and the turnover effect, which is itself the sum of a net entry effect and a replacement effect (figure 1).

In 1984–91 Colombian manufactured exports grew 184 percent, and 103 percent of this was due to net entry into export markets. Over the

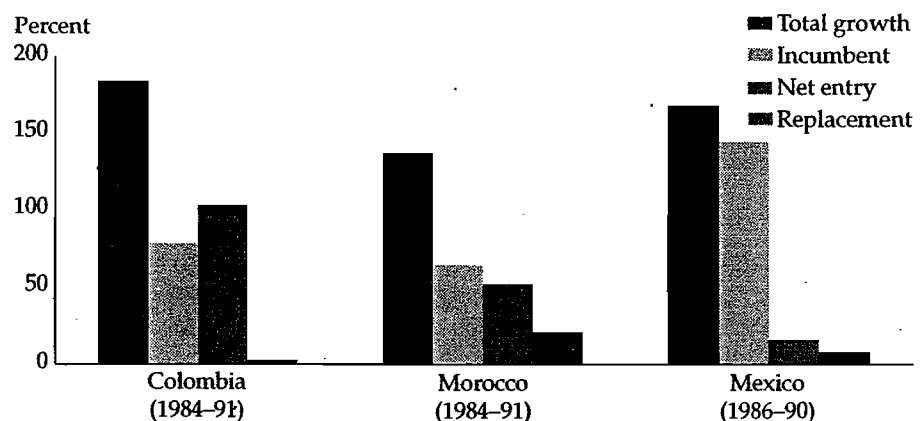
same period Moroccan exports grew 137 percent, of which 73 percent was due to turnover effects. Thus the export boom in both countries would not have happened if rapid entry had not taken place. Surprisingly, although the incentives to export changed dramatically enough to induce rapid entry into foreign markets, they did not induce incumbent exporters to rapidly expand sales abroad.

Entry also contributed to the 1986–90 export boom in Mexico, but to a much lesser degree. There are two explanations. First, unlike in Colombia and Morocco, Mexican data do not cover all producers with ten or more workers. Rather, they are essentially a closed panel of the larger firms. Hence Roberts, Sullivan, and Tybout (1995) miss turnover from newly created firms that export, as well as turnover from small exporters that shut down.

The second, more important, explanation for the small turnover contribution is that Mexican export growth is concentrated in several assembly industries—electrical machinery, transport equipment, and other machinery. In these sectors the expansion of incumbents accounted for 70–100 percent of total export growth.¹ At the other extreme, Mexican incumbents account for less than 20 percent of export growth in textiles, food, and chemicals (figure 2).

Although there are some industry-specific exceptions, it appears that export booms are typically generated when many nonexporters are induced to reorient their output toward foreign markets. To some extent new exporters are replacing producers that have stopped

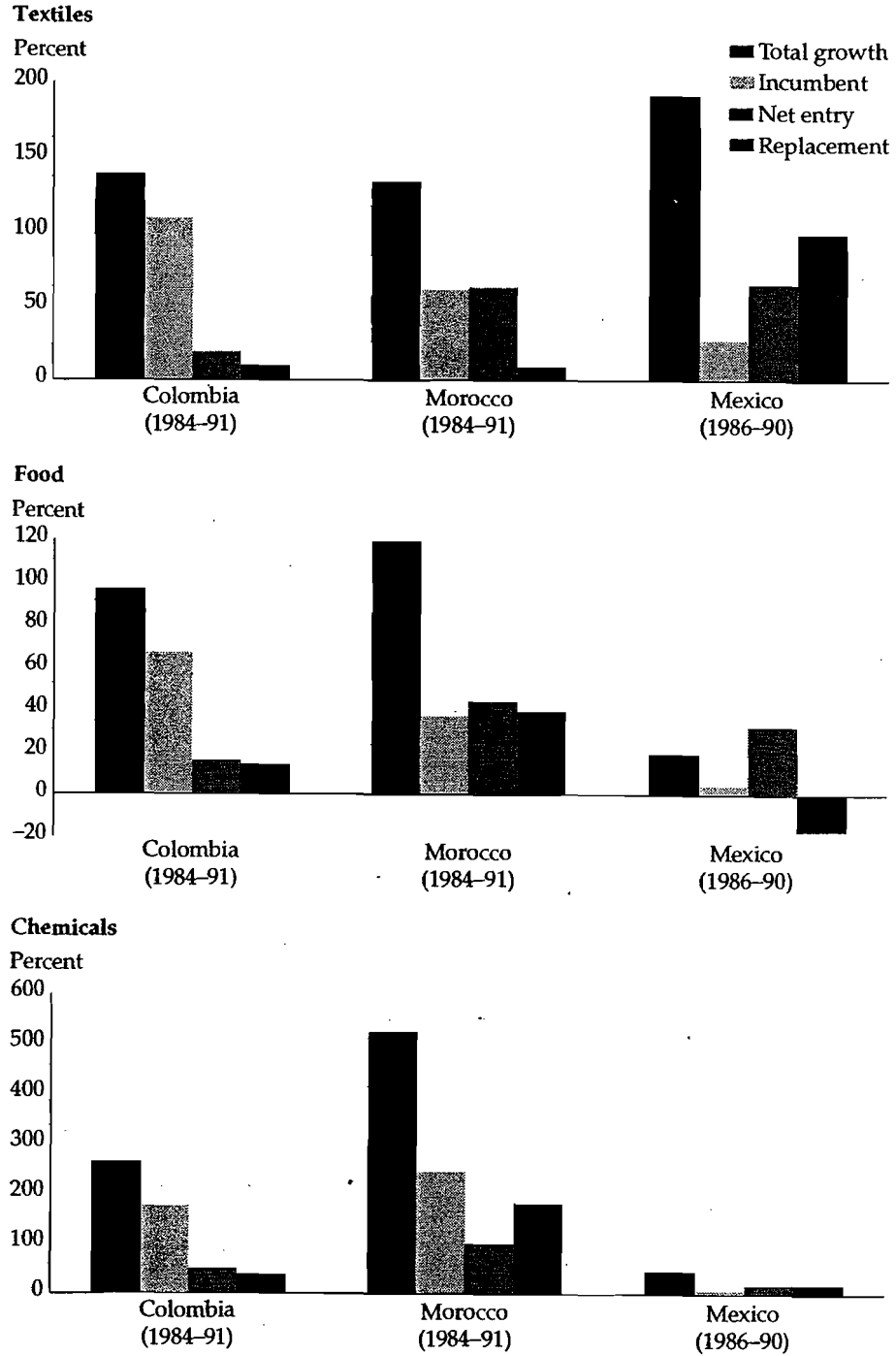
Figure 1. Export Growth in Export-Oriented Industries, by Source



Note: Export-oriented industries are defined as those that exported at least 10 percent of their output and had at least twenty exporting plants. In a few cases industries that exported less than 10 percent of output were included because they had many exporting plants or accounted for a substantial share of total manufactured exports—or both. The sample periods roughly correspond to the boom years for each country.

Source: Roberts, Sullivan, and Tybout 1995.

Figure 2. Growth in Commodity Exports, by Source



Source: Roberts, Sullivan, and Tybout 1995.

exporting. But even this change tends to increase aggregate export volume because, on average, firms just beginning to export tend to do so on a larger scale than firms exiting foreign markets (see figures 1 and 2). This behavior is not surprising since exiting producers have decided that they cannot profitably sustain foreign sales.

The Volume Decision

To understand exports booms, then, it is important to understand why firms become exporters. But before we address this issue, let us raise another: why is there not more volume response from firms already exporting? One possibility is that plants are already exporting most of their output and are operating at close to full capacity. In such a case further expansion by incumbents would require new capacity formation. This explanation appears to fit Morocco, where 72 percent of exports came from firms that exported at least three-quarters of their output, and where firms were operating near full capacity (table 1). But the incumbent response was also limited in Colombia and (to a lesser extent) Mexico, where most exporters sold the bulk of their output at home.

A second explanation is that demand elasticities are not large, meaning that any particular producer has limited scope for expanding its market in the short run without offering significant price concessions.² There appears to be little basis for generalizing by industry, however. In some countries industries such as textiles and apparel face high demand elasticities abroad—and thus exhibit high potential for market penetration—while foreign demand elasticities for the same industries in other countries look much less promising.

This variation in demand elasticities may be due to transport costs and other trade barriers, which tend to make markets for developing

Table 1. Share of Total Exports by Export Intensity of Supplier (percent)

<i>Country</i>	<i>Producers exporting <25% output</i>	<i>Producers exporting 25–50% output</i>	<i>Producers exporting 50–75% output</i>	<i>Producers exporting 75–100% output</i>
Colombia (1984–91)	25.6	16.2	10.1	47.9
Morocco (1984–91)	7.4	6.6	14.2	71.8
Mexico (1986–90)	14.5	23.6	21.0	40.9

Source: Roberts, Sullivan, and Tybout 1995, table 4.

countries' manufactured goods regional or hemispheric.³ Firms in large market regions are likely to face relatively elastic demand for products because they are relatively close substitutes for other varieties available, and because they represent a small share of regional production.

Finally, if firms are risk averse, they may look to foreign markets to diversify and stabilize earning streams. But such firms will be reluctant to become too reliant on any one source of earnings—and thus may not be very responsive to changes in export incentives (Maloney and Azevado 1995). There is some circumstantial evidence from Mexico and Morocco that risk effects inhibit export responsiveness. Firms willing to export a large part of their output are found in Moroccan apparel and Mexican assembly industries. These are the sectors that import most inputs and are thus relatively able to hedge exchange rate risk.

The Entry and Exit Decision

Whatever the reason, the limited responsiveness of producers already exporting makes the emergence of new exporters a critical feature of export booms. Hence any explanation of export responsiveness must include a study of the forces that shape entry into foreign markets.

Presumably, individual firms decide whether to export on the basis of profit expectations.⁴ Expectations differ across firms for various reasons so, at any point in time, some firms will view exporting as highly lucrative, some will view it as extremely unprofitable, and some will fall in between. Most firms that expect large profits from exporting will already be doing so. But others will have recently found themselves in a position to earn profits from foreign operations. And firms that expect exporting profits large enough to cover start-up costs will enter.

Thus to predict net entry, knowledge of expected export profits is required for each firm. Also needed are estimates of the costs of retooling for foreign markets, which include researching foreign markets, developing packaging systems, learning procedural norms, and establishing distribution networks (box 1).

To quantify these two determinants of the decision to export, Roberts and Tybout (1995) and Roberts, Sullivan, and Tybout (1995) developed econometric models that relate expected exporting profits and sunk costs to the exchange rate, marginal production costs, and other plant characteristics such as location and product.⁵ Their models imply distributions of expected profits across firms in Colombia and Morocco on the eve of their export booms (figures 3 and 4).

For each country two distributions are reported. One describes producers who were exporting in the previous year of analysis, and the other producers who serviced only the domestic market in the previous year. Exporters are separated from nonexporters because exporters will continue exporting as long as expected profits are greater than zero, while nonexporters will begin exporting only if expected profits exceed the sunk costs of retooling for foreign markets. These costs, econometrically estimated along with expected profits, are indicated by the vertical line in each graph.⁶

Box 1. The Start-up Costs of Becoming an Exporter

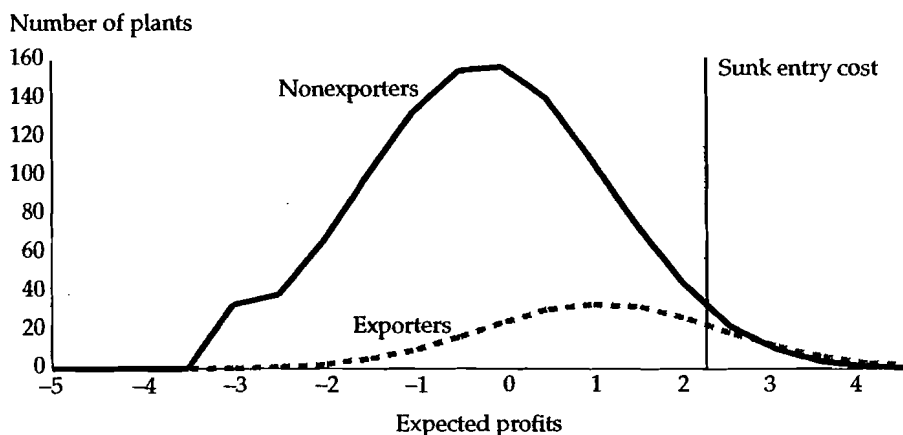
To reveal managerial thinking on the decision to export, a stratified sample of 186 Colombian firms was interviewed in 1990 for the World Bank and the Colombian government's export promotion agency, PROEXPO (First Washington Associates 1991). What were their views on the start-up costs of breaking into foreign markets?

Market research. Among exporters and nonexporters alike, the types of market research considered to be most important for entry were buyer identification and contact, foreign prices, market selection, and standards and testing requirements (volume III, table 13, p. 29). Nonexporters also felt that legal advice and assistance were important (volume IV, table 16, p. 22). Most firms envisioned using, or had actually used, external services, both private (for fee) and public, to overcome information obstacles. Outside assistance came from broker and distributors, chambers of commerce, associations of suppliers, and trading companies. Many firms also did their own research, "especially in the areas of foreign market selection, buyer identification and contact, as well as standards and testing requirements" (volume III, p. 30).

Product development. Among firms that had already broken into export markets, only one-tenth developed a new product to do so. Two-thirds sold products that they already produced for domestic consumption, and another quarter adapted such products for export (volume III, table 13, p. 22). Similarly, among nonexporters, "new product(s) would be developed by only four of the twenty-seven nonexporters interviewed" (volume IV, p. 18). More than half "of the [nonexporters] indicated that they would initiate exports by selling an existing product. About one-third of [the nonexporting] companies stated that they would adapt an existing product for export sales." (volume IV, p. 18). Those that did think it was necessary to change their product or develop a new one cited most frequently the need to improve product quality and to adapt its design to foreign markets (volume IV, table 14, p. 19). In short, product development is by no means a necessary precondition for exporting.

Distribution. For firms that sell directly to foreign buyers, the problem of establishing distribution channels may be substantial, both domestically and internationally. But for a fee firms can hire third parties to handle distribution and contain this type of start-up cost. Perhaps for that reason, among nonexporters contemplating entry, "indirect distribution channels were [envisioned] twice as frequently as direct channels." Among firms already exporting, however, direct and indirect channels were used equally. Agents and distributors were the dominant mechanisms for indirect distribution; trading companies were unusual.

Learning. After transportation problems, firms viewed customs clearance, Colombia's international reputation, and documentation problems as the most important nonfinancial obstacles to exporting. Each of these problems recurs with each shipment, but is moderated to some extent by learning. The efforts that firms invest in educating themselves and their buyers should also be viewed as part of the start-up costs of becoming an exporter.

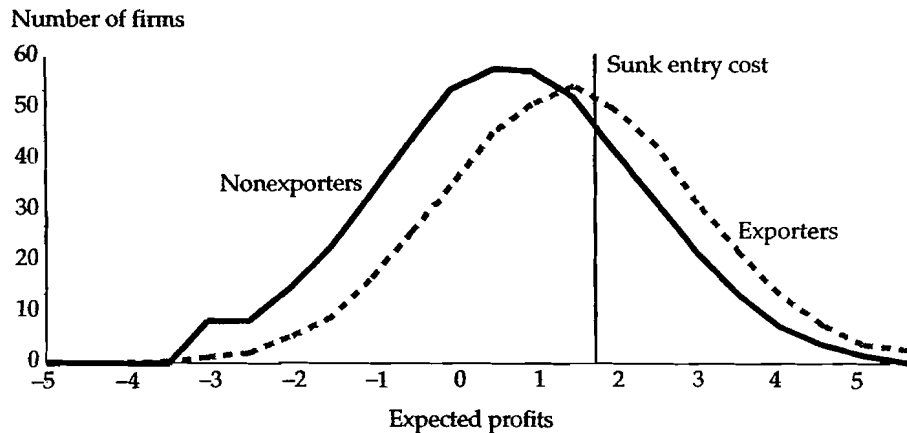
Figure 3. Colombia: Expected Export Profits of Exporters and Nonexporters

Source: Authors' calculations based on models estimated by Roberts, Sullivan, and Tybout 1995.

Part of the expected profit distribution for exporters lies below the zero threshold. Negative expectations occur because some plant characteristics (such as marginal costs) and external demand change over time, so that some exporters are always experiencing negative profit shocks and exiting, even in the absence of macroeconomic changes. Similarly, part of the expected profit distribution for nonexporters lies above the sunk entry cost threshold, because some nonexporting firms can be expected to experience sufficiently large cost reductions or increases in foreign demand to induce entry. Together these features of the profit distribution imply that there is continual turnover in the set of exporting producers.

Although the expected profit distribution for exporters lies to the right of the distribution for nonexporters in each country, there is a surprisingly large overlap. Thus many nonexporters would generate more profits by participating in foreign markets than many exporters. Nonetheless, given the entry costs associated with becoming an exporter, most domestically oriented producers do not find foreign sales worthwhile. Put differently, these figures highlight the importance of history in shaping export supply.

In the year of analysis there were 1,354 Colombian producers and 939 Moroccan producers in export-oriented industries—so some differences in figures 3 and 4 should be expected on the basis of number of observations. Nonetheless, the cross-country contrast in profit distributions is surprising. The share of Moroccan firms engaged in exporting is roughly double that for Colombia, and there are relatively more exporters near the entry threshold in Morocco. Hence a given change in the incentive structure is likely to have a larger effect on the number of entrants in Morocco. On the other hand, it should be easier

Figure 4. Morocco: Expected Export Profits of Exporters and Nonexporters

Source: Authors' calculations based on models estimated by Roberts, Sullivan, and Tybout 1995.

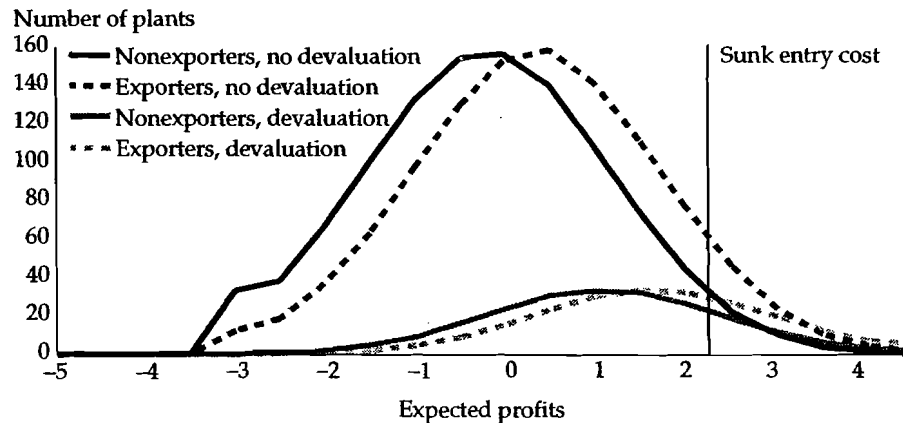
to induce high rates of entry in Colombia, since it begins from a small exporter base, and rightward shifts in the expected profit distribution push more and more firms across the entry threshold.

What determines the shape and location of profit distributions? Significant factors include the distribution of marginal production costs across plants (which in turn depends on capital stocks, wages, and capacity utilization), geographic location (which determines transport cost to the border), multinational affiliations, and product type.⁷ More detailed analysis reveals that in some industries (for example, textiles and leather products) many producers are massed near the critical profit levels at which entry or exit occur, while in other industries most are far from those thresholds. When most firms are far from their threshold, only small responses to devaluation can be expected, either because the expected profits from exporting are negative for most firms (for example, bakeries in both countries) or because most firms are already exporting (apparel producers in Morocco, for instance). In the second case, new plant creation is necessary for further entry into foreign markets.⁸

To generate an increase in the net entry rate, policymakers must increase the expected profits from exporting. The obvious measure is real devaluation. It not only raises current export profits but increases the probability of a favorable exchange rate in the future, making it more likely that there will be profits from exporting in the years to come. And higher future profits compound the incentive to retool for foreign markets today and to be in a position to continue exporting without start-up costs in the future.

The responsiveness of expected profits to devaluation depends on a number of factors. For example, if most competitors are foreign, devaluation changes the price of the home country's products relative

Figure 5. Colombia: Shifts in Expected Profits with a 20 Percent Devaluation



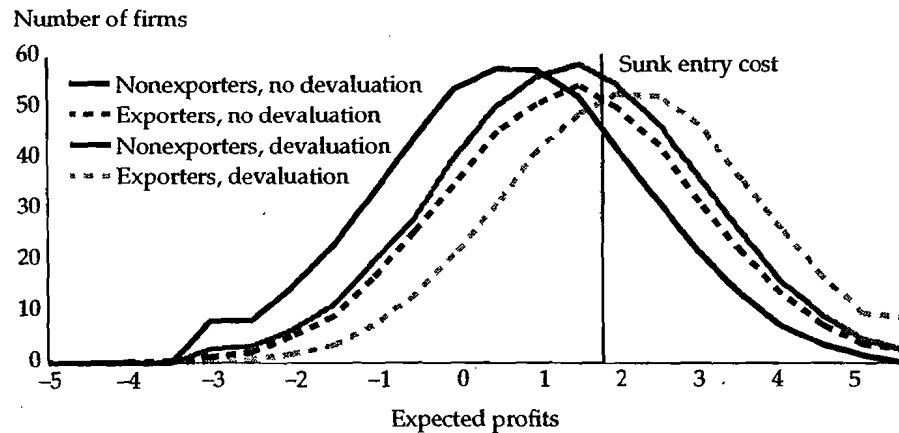
Source: Authors' calculations based on models estimated by Roberts, Sullivan, and Tybout 1995.

to all other countries' products, and can generate large demand increases. Modest changes in the exchange rate of a country like Bangladesh, say, can have big effects on world demand for Bangladeshi textiles because they are close substitutes for many foreign-produced alternatives. This may explain why small economies servicing large markets, such as Singapore and Hong Kong, have had a relatively easy time generating rapid export growth. Another reason is limited demand elasticities at home for their products.

The effects of devaluation on expected profits also depend on whether firms must import a large share of intermediate inputs. Such firms will find that their marginal costs rise relatively more with devaluation and—depending on real wage effects and demand-side considerations—may have little extra incentive to export with devaluation. Harrison (1996) shows that multinational corporations often fall into this category. So, other things being equal, industries with low domestic content—in developing countries, consumer electronics and transport equipment—are less likely to react strongly to devaluation than those that rely on domestic inputs—wood products, metal products, and food processing. By the same logic, firms in export processing zones and firms that operate under duty drawback schemes are less affected by devaluation than otherwise equivalent exporters that use domestic inputs.

To give some sense of the magnitudes of the shifts that occurred in Colombia and Morocco, we use estimates of the Roberts-Sullivan-Tybout model to infer profit distributions before and after a 20 percent devaluation (figures 5 and 6).

The effects of a 20 percent devaluation can be seen by looking at the portion of the curve shifted across the exporting threshold for

Figure 6. Morocco: Shifts in Expected Profits with a 20 percent Devaluation

Source: Authors' calculations based on models estimated by Roberts, Sullivan, and Tybout 1995.

exporters (that is, zero) and nonexporters (that is, sunk entry costs). In Morocco modest real devaluation shifts a big chunk of the profit distribution for exporters above the zero profit threshold, deterring forty-eight of the least profitable exporters from shutting down their foreign operations. Another sixty-three firms are encouraged to retool for exporting as the nonexporter distribution is shifted to the right. Similar reactions to a 20 percent devaluation are predicted for Colombia. It is predicted that thirty-six marginally profitable Colombian exporters would be deterred from exiting foreign markets, and forty-nine new exporters would be induced to enter. Combined, these simulated patterns of turnover imply that a 20 percent real devaluation would increase the number of exporters by 111 (or 27 percent) in Morocco and 85 (or 36 percent) in Colombia.

One reason for such a potent effect is that devaluation directly improves operating revenues per unit exported. But there is also a more subtle effect at work. Devaluations mean that favorable exchange rates are likely in the near future, and thereby create further incentives to incur start-up costs. The estimates pick up this linkage too.⁹

Given the empirical importance of start-up costs, should policymakers subsidize new exporters or provide public export promotion services—or both?¹⁰ If exporters generate positive spillover effects for others, they are insufficiently compensated, and a subsidy that encourages exporting might be warranted. As Aitken, Hanson, and Harrison (forthcoming) note, spillovers might “make it feasible to construct specialized transportation infrastructure, such as storage facilities or rail lines, or may improve access to information about which goods are popular among foreign consumers.” Potential exporters might also

learn about the mechanics of exporting by observing that firms are already selling abroad.

Is there evidence that this type of spillover matters? Aitken, Hanson, and Harrison show that the presence of multinational exporters in a given region makes it more likely that domestic firms will export. Clerides, Lach, and Tybout (1996) find that the sunk costs of breaking into foreign markets are negatively related to the number of firms that already have done so. Thus preliminary findings suggest that potential exporters learn about selling abroad by observing firms that already do so, and a case might be made for programs that compensate exporters for the spillovers they generate.

Caution is warranted for several reasons, however. First, if potential exporters could learn everything they needed to know by observing incumbent exporters, they would never be willing to hire professional assistance. But these firms routinely pay for help getting started (see box 1). In fact, the market is global—many Colombian firms went to foreign sources to hire professionals. Second, as Keesing and Lall (1992) have noted, most trade promotion organizations that are publicly operated have been ineffective because they emphasize the “provision of information related to trade and organizing subsidized participation by local firms in trade fairs and missions” (p. 187) rather than focusing on the specific techniques and skills relevant for specific markets. All told, it may be best for policymakers to deemphasize public export promotion agencies and do no more than provide modest, neutral start-up subsidies. Successful export promotion is much more likely to hinge on creating a stable, predictable environment in which export profits are expected over the medium term.

Structural Changes in Export Supply

Let us now turn to the issue of why, within a given country, the removal of a stimulus—say, the reversal of a real devaluation—might not return exports to their prestimulus level.

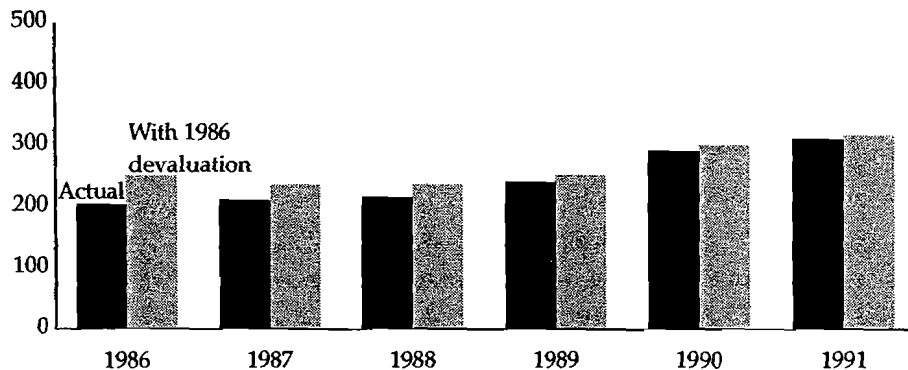
Sunk Costs and Irreversibility

Several well-known theories explain the phenomenon of irreversibility in export supply relationships, sometimes called export hysteresis. The first one emphasizes sunk start-up costs (see box 1). Having already covered such costs, incumbent exporters find it more profitable to continue selling abroad than do identical firms without exporting experience. Hence a temporary devaluation that induces new entry may permanently increase the number of exporters. Similarly, temporary unfavorable conditions for exporters can permanently reduce the export base (Baldwin 1988; Krugman 1989). Further, the tendency of producers to “stay put” in the face of exchange rate fluctuations is likely to increase with uncertainty about future exchange rates (Dixit 1989). Managers want to avoid repeatedly bearing start-up costs and exit costs. So, if they can learn something about the medium-term future by waiting to see how events unfold, they may do so.

To quantify the ratchet effect created by start-up costs, the Roberts-Sullivan-Tybout estimates are used to simulate a temporary (one-year) 10 percent devaluation relative to observed exchange rate trajectories in Colombia and Morocco. The simulated devaluation takes place in the base year—1986 for Colombia and 1987 for Morocco—but the exchange rate returns to its actual trajectory in subsequent periods (figures 7 and 8).

If there were no sunk costs, the extra firms induced to export in the base year would cease exporting subsequently, so the only systematic discrepancy between the actual and simulated number of exporters would be in the base year. However, the effects of the base year devaluation linger on indefinitely in the simulations, reflecting the tendency of firms to stay in the export market once they have borne the sunk

Figure 7. Number of Colombian Exporters under Actual and Temporary Devaluation, 1986–91



Source: Authors' calculations based on models estimated by Roberts, Sullivan, and Tybout 1995.

entry costs. This ratchet effect may explain why Mexico, having enlarged its base of industrial exporters with devaluation and reforms, managed to sustain strong exports in the late 1980s despite real appreciation.

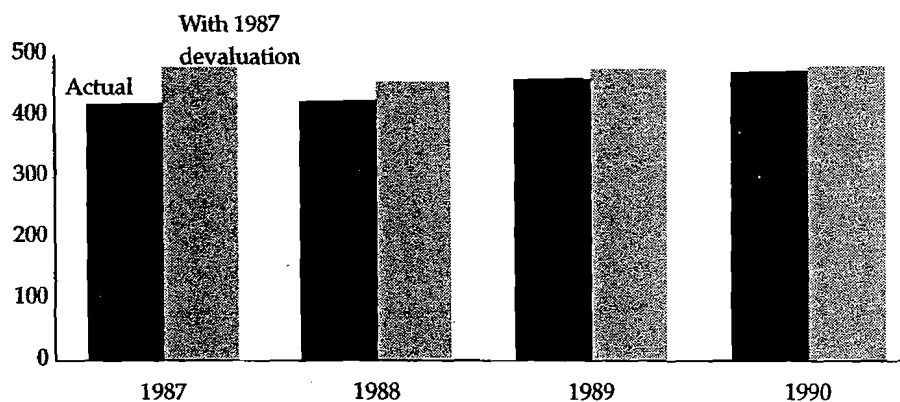
The effects of the base year devaluation tend to diminish over time. The reason is that the extra firms induced to export are on the margin of positive export profits, and are thus more likely to suffer earnings shocks that are sufficiently negative to drive them out of foreign markets. The longer these marginal firms are in the export market, the more likely they are to experience a bad year and exit.

Learning by Exporting

Some analysts stress a second reason why breaking into foreign markets changes firms, making them more inclined to continue exporting. Once firms begin to service foreign markets, producers may benefit from knowledge spillovers (box 2). Information they acquire can be transmitted directly by buyers—who supply product specifications and expertise—or indirectly by increased familiarity with the operations of competing producers in the global marketplace. Similarly, knowledge may spill over from exporting to nonexporting firms within an industry, particularly when the exporting firms are multinationals (Aitken, Hanson, and Harrison forthcoming). This learning is not undone when, for example, the exchange rate reverts to its earlier value, so the export supply function may be permanently altered by temporary changes in the incentive structure.

In support of the learning by exporting view, empirical studies often find that exporting plants are more efficient than their domestically

Figure 8. Number of Moroccan Exporters under Actual and Temporary Devaluation, 1987-90



Source: Authors' calculations based on models estimated by Roberts, Sullivan, and Tybout 1995.

oriented counterparts (Aw and Hwang 1995; Chen and Tang 1987; Haddad 1993; Handoussa, Nishimizu, and Page 1986; Tybout and Westbrook 1995; and Roberts, Sullivan, and Tybout 1995). But none of these studies asks whether exporting generates efficiency gains. Plausible arguments can be made that the causality flows in the opposite direction: firms with relatively low marginal costs self-select into export markets because the returns are relatively high (see, for example, Roberts, Sullivan, and Tybout 1995).

In a recent study Clerides, Lach, and Tybout (1996) address this causality issue. Their methodology is based on a simple idea: if exporting indeed generates efficiency gains, then firms that begin to export should thereafter exhibit a change in their patterns of productivity growth. Hence average cost trajectories should improve relative to industry norms after entry into foreign markets.

To look for this improvement, the authors constructed average variable cost measures for each producer and expressed them relative to industry norms (figures above zero indicate above-average costs, given the firm's capital stock and age). They then followed producers that became exporters over time and compared their performance with others. For each firm that switched from being a nonexporter to an exporter, performance in the three years before the switch (years -3, -2, and -1) was compared with performance in the three years after entry (years 1, 2, and 3). Similarly, for firms that exited the export market, the three years before exit (-3, -2, and -1) were compared with the three years after exit (1, 2, and 3). (Data for Mexico and Morocco only cover years -2, -1, 0, 1, and 2.) Firms that always export and firms that never export were used as comparison groups. Cross-firm averages for each type of firm are shown in figure 9.

Box 2. Learning by Exporting

The notion that firms learn by exporting has been advanced many times in the trade and development literature. Below is a sample of statements:

"A good deal of the information needed to augment basic capabilities has come from the buyers of exports who freely provided product designs and offered technical assistance to improve process technology in the context of their sourcing activities. Some part of the efficiency of export-led development must therefore be attributed to externalities derived from exporting." (Evenson and Westphal 1995, p. 2264)

"Buyers want low-cost, better-quality products from major suppliers. To obtain this, they transmit tacit and occasionally proprietary knowledge from their other, often OECD-economy, suppliers." (World Bank 1993, p. 320)

"The important thing about foreign buyers, many of which have offices in Seoul, is that they do much more than buy and specify. . . They come in, too, with models and patterns for Korean engineers to follow, and they even go out to the production line to teach workers how to do things." (Rhee, Ross-Larson, and Pursell 1984, p. 41)

"When consumer goods exports are made to buyers' orders by local firms, buyers' help or that of similarly knowledgeable consultants is generally indispensable at first, in showing these new exporters what is required and how to put together the entire package exactly as required, even though by local standards the exporters are already capable manufacturers." (Keesing and Lall 1992, p. 180)

"When local goods are exported the foreign purchasing agents may suggest ways to improve the manufacturing process." (Grossman and Helpman 1991, p. 166)

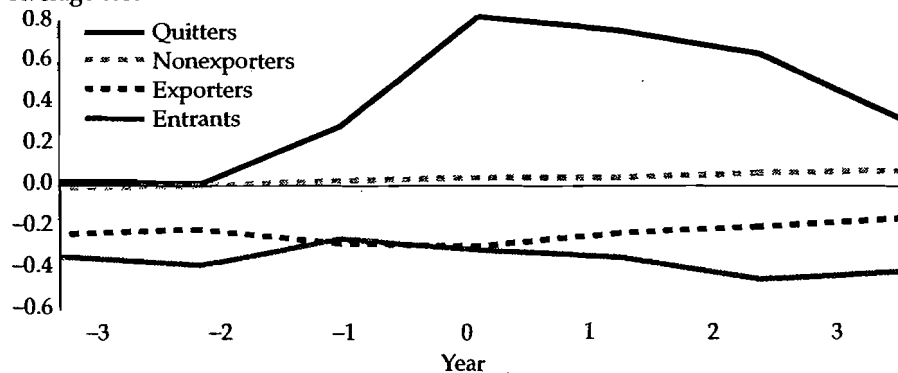
"Countries that trade in world markets invariably learn a great deal about innovative products and about the novel methods that are being used to produce older goods. While it is true that agents in an economically isolated country might also acquire some such information by reading professional journals, speaking to foreign experts, or inspecting prototype products, it seems that the contact that develop through commercial interaction play an important part in the international exchange of ideas." (Grossman and Helpman 1991, p. 238)

In Colombia and Mexico plants that become exporters typically have low unit costs *before* they enter foreign markets, while nonexporters and (especially) exiting plants have higher average costs. This pattern supports the notion that low-cost plants self-select into export markets, and it provides one explanation for the fact that exporters tend to be more efficient. There is only a marginally significant tendency for new Colombian exporters to experience cost reductions after entering, however, and new exporters in Mexico and Morocco show no tendency toward postentry cost reductions.¹¹

Figure 9. Paths of Average Variable Cost

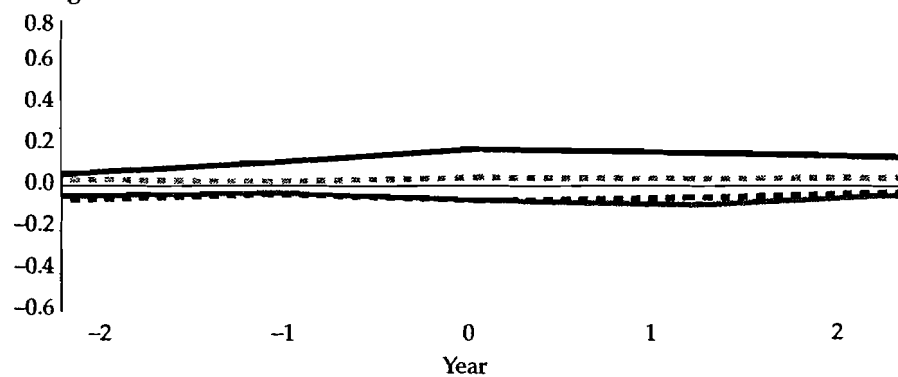
Colombia

Average cost



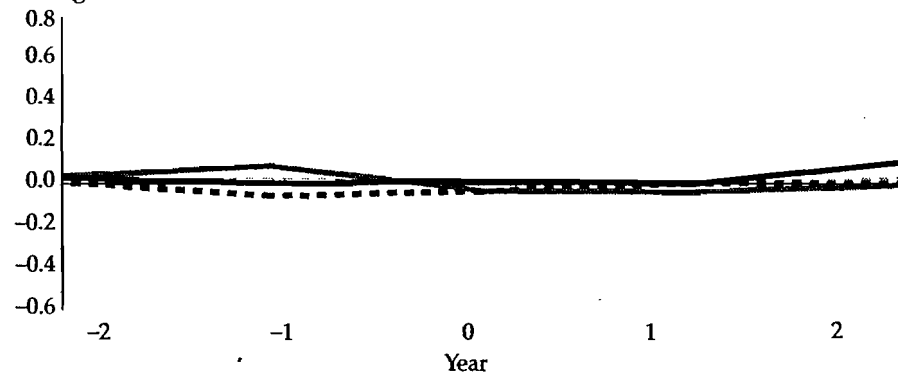
Mexico

Average cost



Morocco

Average cost



Note: Data have been purged of time, age, and size effects. Year 0 is considered the transition (middle) year.

Source: Clerides, Lach, and Tybout 1996.

These trajectories thus cast doubt on the importance of learning by exporting. But they are not a formal test for whether becoming an exporter changes a firm's productivity trajectory. For example, if exogenous forces push factor costs for firms that become exporters, these forces may continue to improve firms' performance after they enter foreign markets, giving the appearance of learning by exporting. Accordingly, the authors also estimate a dynamic econometric model in which they account for other determinants of performance and look for evidence that firms becoming exporters reduce costs as a result. They find even less evidence of this phenomenon than figure 9 suggests.

By itself, the absence of evidence for the learning-by-exporting hypothesis does not mean that there are no externalities, and therefore does not speak to the wisdom of subsidizing exports. It might be that nonexporting plants learn how to be more efficient from exporters or that employees of exporting firms acquire general skills that enhance their market value. Hence Clerides, Lach, and Tybout (1996) investigated whether nonexporters tended to become more productive when exporting firms became more common in their industry or geographic location. They found no evidence of productivity spillovers. Combined with their finding that learning effects from exporting cannot be detected, this result casts doubt on the popular notion that outward-oriented trade policies generate significant productivity gains through knowledge spillovers.

Summary of the Microeconomic Evidence

The effects of macroeconomic conditions and policy variables on manufacturing exports have been notoriously unpredictable in the empirical literature. The research summarized here suggests that that unpredictability can be traced largely to neglected microeconomic characteristics of manufacturing sectors. In particular, the export response to a given stimulus is shaped by the cross-firm dispersion in unit production costs, the extent of product differentiation, and, critically, the prevalence of previous exporting experience.

By focusing on these microeconomic characteristics, we have highlighted some features of export supply responses not previously quantified. First, export booms in Colombia, Morocco, and to a lesser extent Mexico would have been more modest if large numbers of firms had not decided to break into foreign markets. In Colombia and Morocco more than half of total export growth came from this source.

Second, new exporters face significant start-up costs as they develop marketing channels, adapt products and packaging to foreign tastes, and learn bureaucratic procedures. Thus they become exporters only when the expected profits from foreign sales are large enough to cover these costs, and are unlikely to respond to export incentives that are viewed as transitory. Credible, sustainable exchange rate and commercial policies that do not discriminate against exporters are key requisites to large-scale entry. All countries that induced booms appear to have met these conditions.

The amount of entry that a given policy induces also appears to vary across countries depending on the nature of their industrial sectors. Responses can vary dramatically not only with comparative advantage but also with the dispersion in efficiency levels across firms. When dispersion is large, it is unlikely that many firms are poised on the exporting threshold and will respond to moderate policy changes. The prevalence of previous exporting experience also matters. When the pool of exporting producers is small, policymakers must convince many other firms that the future will be kind to exporters, and that retooling for foreign sales is warranted. In cases where most firms are

already exporting most of their output, rapid export expansion can be accomplished only through the rapid creation of new plants. This is possible if there are low industry barriers to entry—as was the case for apparel producers in Morocco, for example—but in other instances it may not be feasible. In either case the microeconomic features of any country's industrial base dictate which policies will elicit the largest export response.

Because firms are changed by the experience of becoming an exporter, a temporary flux in the incentive structure can permanently alter export volumes. The changes that matter most, however, have to do with learning how to export rather than learning how to be more productive. There is little support for the idea that, once firms become exporters, they are able to reduce costs using information transmitted by foreign buyers or through exposure to foreign competitors.

Notes

1. The transport equipment sector is dominated by multinationals that, shortly before the Mexican sample period, had invested in substantial new capacity (Shapiro 1993).

2. These elasticities are difficult to estimate with accuracy. Econometric evidence from Colombia, Mexico, and Morocco yields numbers in the range of 1.5–5.0 (Roberts, Sullivan, and Tybout 1995).

3. This fact is well documented by the gravity model literature, which finds that the level of bilateral trade flows is strongly correlated with the physical proximity of trading partners. See, for example, Deardorff (1984).

4. In this context expected profits include both the current increment to operating profits earned from becoming an exporter and the “option value” of being able to export in the next year without bearing the start-up costs again (see, for example, Krugman 1989).

5. These estimates of latent profits are based on a dynamic discrete-choice model of the export decision, fit to the same plants that are described in figure 1. Latent profits include operating profits from exporting in the current period plus the present value of being able to export in the future without bearing start-up costs.

6. There is robust econometric evidence that these sunk costs are significant. There is also evidence that investments in becoming an exporter depreciate quickly if they are not used. After being absent from foreign markets for three years, a firm that was once an exporter finds it as costly to re-enter foreign markets as a firm that was never an exporter. Bernard and Jensen (1995) fit a variant of the Roberts-Sullivan-Tybout model to U.S. data and find similar results.

7. In both countries leather, clothing, and textiles showed relatively high expected exporting profits, while bakeries and machinery and equipment showed negative expected profits for most firms. Traditional comparative advantage effects are probably largely responsible.

8. By 1989, 68 percent of apparel producers in Morocco were exporters, and many others were small firms oriented toward the domestic market with “low financial, technical, and marketing capabilities [that prevented them] from becoming indirect exporters” (World Bank 1994, p. 23). Not surprisingly, export growth through new plant creation was a distinguishing characteristic of the growth of Moroccan apparel exports.

9. Outward-oriented commercial policy reforms in both countries probably contributed to firms’ perceptions of a favorable future for exporting. These reforms could not be explicitly included in the econometric analysis, so some of their effect may be misattributed to the exchange rate.

10. Export promotion schemes are common. In Morocco the *Societe d'Assurance a l'Exportacion* (SMAEX) insures export credit and the *Centre Marocain de Promotion des Exportations* (CMPE) provides general exporting assistance. New exporting firms also enjoy a five-year tax holiday and a 50 percent reduction in taxes thereafter. In Colombia PROEXPO provides information and subsidized credit to exporters, while *Certificados de Reembolso Tributario* afford exporters partial exemption from income taxes (reducing taxes from 3–12 percent). Both countries have duty drawback schemes.

11. In some instances the relatively strong performance of exporters is attributable to high labor productivity. In other instances it is due to relatively low costs of intermediate goods.

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