Learning to Export:

Evidence from Moroccan Manufacturing*

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Abstract

This paper tests two alternative models of selection into export: lower costs and better market familiarity. Both are potentially subject to learning-by-doing, but differ in the type of experience required. Learning to produce at lower cost – what we call productivity learning – depends on general experience, while learning to design products that appeal to foreign consumers – market learning – depends on export experience. Using panel and cross-section data on Moroccan manufacturers, we uncover evidence of market learning but little evidence that productivity learning is what enables firms to export. These findings are consistent with the concentration of Moroccan manufacturing exports in consumer items, i.e., the garment, textile, and leather sectors. It is the young firms that export. Most do so immediately after creation. We also find that, among exporters, new products are exported very rapidly after production has begun. The share of exported output nevertheless increases for 2-3 years after a new product is introduced, which is indicative of some learning. Old firms are unlikely to switch to exports, even in response to changes in macro incentives.

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1. Introduction

It is widely accepted that a positive relationship exists between exports and productivity: manufacturing firms that export are on average more productive than non-exporters. This relationship has been shown to hold in many countries using a wide variety of estimation techniques – see for instance (e.g. Hallward-Driemeier, Iarossi and Sokoloff 2002, Mengistae and Pattillo 2004, Alvarez 2004, Silvente 2005, Wagner 2002) for recent evidence. We revisit this issue using detailed firm-level data from Morocco. As in the rest of the literature, we find a strong positive correlation between exports and firm productivity. We seek to understand this relationship.

We test two alternative models of selection into export: lower costs and better market familiarity. Both are potentially subject to learning-by-doing. But they differ in the type of experience that is required. Knowing how to keep costs down is probably the by-product of general experience. We call this productivity learning. In contrast, learning to design products that appeal to foreign consumers – what we call market learning – depends primarily on export experience.

Using panel and cross-section data on Moroccan manufacturers, we uncover evidence of market learning but little evidence that productivity learning is what enables firms to export. These findings are consistent with the concentration of Moroccan manufacturing exports in consumer items, i.e., the garment, textile, and leather sectors. For these products, firms have to learn how to keep up with rapidly changing consumer tastes and fashions. They also have to adapt to the European distribution system in which adherence to delivery dates and quality standards (e.g., sizes, labelling) is crucial.

Contrary to the commonly held view that firms need to gain experience in their domestic market before they can venture in foreign markets, we find that it is the young firms that export. Most do so immediately after creation. We also find that, among exporters, new products are exported very rapidly after production has begun. The share of exported output nevertheless increases for 2-3 years after a new product is introduced, which is indicative of some learning. Old firms are unlikely to switch to exports, even in response to changes in macro incentives.

The paper is organised as follows. A rapid overview of the literature is given in Section 2 where we explain how the paper fits in – and contributes to – the existing literature. Section 3 presents a brief

conceptual framework. The data sets are introduced in Section 4. Results on the relationship between firm age and the propensity to export appear in Section 5. Duration analysis is presented in Section 6. Productivity is investigated briefly in Section 7.

2. Background

Discussion of the relationship between productivity and exports has revolved around two main hypotheses: selection and learning-by-exporting. These hypotheses are not mutually exclusive, but they differ in their empirical predictions. The learning-by-exporting hypothesis argues that, through their contacts abroad, exporters gain access to information about more productive techniques of production. Driven by intense competition in foreign markets, they have a strong incentive to upgrade their technology so as to reduce costs and remain competitive. This hypothesis predicts that firm productivity rises with exposure to international markets.

The selection hypothesis in contrast stresses the difficulties inherent in penetrating foreign markets. To the extent that firms face more competition abroad than at home, the argument goes, only productive firms can succeed in exporting (e.g. Bernard and Jensen 1999b, Bernard and Jensen 1999a, Bigsten, Collier, Dercon, Fafchamps, Gauthier, Gunning, Oduro, Oostendorp, Pattillo, Söderbom, Teal and Zeufack 2000). This hypothesis predicts that, before they begin exporting, exporters are already more productive than other firms. Regarding Morocco, this view was presented most clearly in Clerides, Lach and Tybout (1998).

Both hypotheses have received some empirical support. Aw, Roberts and Winston (2005) illustrates how exporters have higher productivity growth than exporters, especially if they invest in complementary R&D. Evidence for learning-by-exporting is also reported by Baldwin and Gu (2003) for Canadian firms and by Bigsten et al. (2000) for African manufacturing firms. Aw, Chung and Roberts (2000) find evidence of learning-by-exporting in Korea but not in Taiwan.

There is also plenty of evidence in favor of the selection hypothesis. Bleaney and Wakelin (2002) find better-performing UK firms more likely to export. Aw et al. (2000) report the same finding for Taiwan. Delgado, Farinas and Ruano (2002) and Roberts and Tybout (1997) find evidence in favor of the selection

hypothesis but only weak evidence of learning-by-exporting in Spain and Colombia, respectively. Using US manufacturing data, Bernard and Jensen (1999a) similarly find causality running from productivity to exporting and not the reverse; they find no evidence that exporting increases plant productivity growth rates.[1] Looking at African firms, Söderbom and Teal (2001) similarly find that the underlying efficiency with which the firm operates is a strong determinant of exports. In Moroccan manufacturing we also find that higher productivity firms are more likely to begin exporting. We therefore focus our analysis on the possible mechanisms underlying selection into exporting – that is, on how firms learn to export.

One explanation often offered for the market selection hypothesis is learning-by-doing (e.g. Bernard and Jensen 1999b, Tybout 2000, Harrison and Hanson 1999, Bigsten, Collier, Dercon, Fafchamps, Gauthier, Gunning, Oduro, Oostendorp, Pattillo, Söderbom, Teal and Zeufack 1999, Bigsten et al. 2000): as they gain experience, firms learn how to cut costs and become competitive on foreign markets. If this hypothesis is true, we expect older firms to be more likely to start exporting. This is strongly rejected by our data: Moroccan manufacturers who export do so shortly after firm creation: 42% export within a year of initiating production; 75% export within three years of their creation. Moreover, firms that are not exporting within three years of inception become less likely to export as time passes. [2] These effects are robust in the sense that they obtain even if we control for sector, region, year of production, and experience.

We investigate an alternative hypothesis, which we call market familiarity. To succeed in a given market, whether foreign or domestic, a firm must develop products that appeal to consumers in that market. This requires familiarity with consumer tastes and market conditions. Once in possession of such knowledge, firms can more easily develop new products suited for the same market. We test this prediction and find that, in the main Moroccan export sectors, firms that have sold one product abroad tend to develop new products targeted at foreign markets: for products that end up being exported, 80% are exported within a year of production. We also find that firms specialize either in exports or in

[1] The relationship between exports and productivity also has important general equilibrium implications. According to Bernard and Jensen (1999a), exporting in the U.S. is associated with the reallocation of resources from less efficient to more efficient plants. These reallocations make up more than 40% of total factor productivity growth in the manufacturing sector. Half of this reallocation occurs within industry and the direction of the reallocation is towards exporting plants.

[2] A different but related finding is reported by Bernard and Jensen (2004) who document that rapid export expansion in the US over the 1987-1992 period came from increasing export intensity at existing exporters rather than new entry into exporting. This suggests that established non-exporting firms seldom switch to exporting later on, even in response to external market changes.

domestic sales. Specialization is difficult to reconcile with the idea that cost reduction is the key to export success: if exporters succeed because they have lower costs, they should outcompete domestic producers at home as well, and we should not observe specialized exporters. This is not what we find. Finally, most manufacturing exports go to two countries alone, France and Spain. Again this is hard to reconcile with the idea that success in exports depends on cost advantage alone. But it is consistent with the market familiarity hypothesis – Spain is the nearest developed country and France the former colonial power.

Other explanations have been proposed for the selection hypothesis. Roberts and Tybout (1997) in particular argue that there are large sunk costs of entry in foreign markets.[3] Becoming an exporter only makes economic sense for firms that are large, well financed, and technically efficient to justify incurring this sunk cost. To the extent that such firms are more productive on average, Tybout's hypothesis can account for the observation that, before they begin exporting, exporters are already more productive. The usefulness of the sunk cost approach is illustrated by Das, Roberts and Tybout (2001) and Aw et al. (2005).

Our market familiarity hypothesis is closely related to Tybout's sunk cost idea because, as suggested by Roberts and Tybout (1997), acquiring familiarity with foreign markets is one of the sunk costs of exporting. Since we find that most exporting firms do so shortly after their creation, this nevertheless suggests that market familiarity need not come from an investment made by the firm but may pre-date firm creation. This finding is consistent with Liu and Tybout (1996)'s claim that, in Chile and Colombia, productivity growth takes place largely through entry and exit of firms, not through increased productivity of existing firms as suggested by the learning-by-doing hypothesis. Similar results are reported by Aw, Chen and Roberts (2001) for Taiwan.

Our results are also related to those of Brooks (2006), who finds low product quality significant in explaining under-exporting by Colombian manufacturers, and to those of Bleaney and Wakelin (2002), who find that innovating firms are more likely to export if they have more innovation, a finding the authors interpret as consistent with product cycle theories of trade. The search for products of exportable quality, which these authors focus on, can be seen as the sunk cost investment in market familiarity that

[3] A similar idea is expressed by Hallward-Driemeier et al. (2002) who argue that it is in aiming for export markets that firms make decisions that raise their productivity.

prospective investors have to make to identify products that suit export markets.

This paper contributes to a large literature on the role of manufacturing exports in the growth process (The World Bank 1993). The various explanations for the relationship between productivity and exports have sharply contrasted policy implications, hence the fierce debate that surrounds them. The learning-by-doing hypothesis has been used to justify infant industry protection, arguing that countries and firm first need to learn how to reduce costs before attempting to penetrate export markets (e.g., (Prebisch 1963) and the references cited in Tybout (2000)).[4] Learning-by-exporting, in contrast, has been used to promote export subsidization schemes aimed at capturing the productivity gains that exporting is expected to bring.

Our market familiarity hypothesis suggests that producing for the domestic market need not be a prerequisite for exporting. It might even be a drawback if products fine-tuned for the domestic market are ill-suited to the tastes of foreign consumers. Export promotion can thus be sought independently from domestic market considerations, e.g., through export processing zones. We nevertheless find that, when exporters initiate a new product line, there is a short learning period of one or two years during which part of the output is sold locally – possibly because it could not successfully be exported. There is therefore a role for the domestic market as a safety net for early exporters.

3. The Conceptual Framework

In this section we develop testable predictions for the relationship between exports, productivity, and market familiarity. To this effect, we construct a simple export model of the firm that includes learning by doing as well as market familiarity effects. The learning-by-doing part of the model is fairly standard. What is different is the modelling of market familiarity. Since the object of the model is but to provide a conceptual framework for the empirical work, we keep the presentation to the minimum and focus on the intuition.

Firms are assumed to have one or several product lines.[5] The output of product j by firm i is denoted

[4] Others point to micro evidence that learning by doing takes at most a couple years (e.g. Alchian 1963, Searle 1945, Griliches and Lichtenberger 1984).

[5] Why they have multiple lines of production is not modeled explicitly, but it could be because each product line is subject to decreasing returns to scale beyond a given threshold, or because product lines benefit from economies of scope.

Q_{ij}. The total number of products is J. Each output can either be sold domestically or exported. For simplicity, we ignore the possibility of multiple export destinations and focus on a single one. For Morocco, this is a reasonable assumption given that most manufacturing exports go to a small group of European countries.[6] Exports are denoted X_{ij}; domestic sales are written D_{ij}. The export and domestic prices are written p_{ij}^x and p_{ij}^d, respectively. Prices are net of transport and marketing costs. Firms take prices as exogenously given.

To obtain a model in which producers need not fully specialize in either market, we assume an Armington function of the form:

$$Q_{ij} = (X_{ij}^{\frac{\sigma-1}{\sigma}} + D_{ij}^{\frac{\sigma-1}{\sigma}})^{\frac{\sigma}{\sigma-1}} \tag{3.1}$$

Parameter σ is the elasticity of substitution; it captures the ease with which producers can switch sales across the two markets. Producers allocate output Q_{ij} across the two markets so as to maximize profit subject to equation (3.1). The decision to sell on the domestic or export market depends on the relative price. When $\sigma > 1$, near corner solutions exist in the sense that, for a large enough export price, (virtually) all output is exported – $Q_{ij} = X_{ij}$ – and for a low enough export price, nothing is exported – $Q_{ij} = D_{ij}$.

The optimal allocation rule is:

$$\frac{X_{ij}}{D_{ij}} = p_{ij}^{\sigma} \tag{3.2}$$

where $p_{ij} \equiv \frac{p_{ij}^x}{p_{ij}^d}$ is the relative price between the export and domestic market. The easier it is switch from the domestic to the export market, the more responsive exports are to the relative price. At the optimum, the value of one unit of output Q_{ij} is:

$$q_{ij} = \left((p_{ij}^x)^{\sigma} + (p_{ij}^d)^{\sigma}\right)^{\frac{1}{\sigma}}$$

The value of the firm's exports is $V_i^x \equiv \sum_j p_{ij}^x X_{ij}$ and the share of exports in total sales is V_i^x / V_i^q where $V_i^q \equiv \sum_j q_{ij} Q_{ij}$.

[6] Around 46% of manufacturing exports go to France and around 30% to Spain.

Output is produced with capital K_i and labour L_i.[7] Let T_i denote the total factor productivity of firm i which, for the moment, we take as given. The production function of the firm is written in compact form as $G(Q_i, K_i, L_i, T_i) \leq 0$ with $Q_i \equiv \{Q_{i1}, ..., Q_{iJ}\}$. We assume that returns to the production of any individual good are eventually decreasing. This ensures that production and firm size are bounded.

Let the product range R_i of firm i be defined as the set of goods produced by the firm. For instance, $R_i = \{1, 0, 0, ..., 1\}$ if the firm only produces goods 1 and J. The choice of product range depends on factor costs r and w as well as on the vector of output prices $q_i \equiv \{q_{i1}, ..., q_{iJ}\}$. Define $c_{ij}(R_i, r, w, T_i)$ as the average unit cost of production associated with a particular product range. We assume that unit cost is decreasing in T_i. Good j is produced only if $c_{ij} \leq q_{ij}$.[8] For a low enough q_{ij}, good j is not produced. The features of the model are summarized in the following proposition.

Proposition 1. *(1) For each individual product, the ratio $\frac{X_{ij}}{D_{ij}}$ depends on relative prices p_{ij} not on T_i.*

(2) For the firm, V_i^x/V_i^q depends on T_i only through the range of products being produced.

The first part of the proposition implies that there are goods that are intrinsically export goods: if they were produced by the firm, they would primarily be exported, irrespective of the firm's total factor productivity. The reverse is also true. Of course, it is conceivable that export goods yield a lower price q_{ij} so that only highly productive firms can profitably undertake the production of export goods. This is the second part of the proposition.

Firms begin with different levels of productivity and market familiarity; some firms are more productive or more familiar with a certain market from the start. Over time, firms also learn how to increase productivity and how to better tailor their products to a specific market. We call the first productivity learning and the second market learning.

Formally, let us define productivity learning as any form of learning that raises T_i. Examples of productivity learning include better organisation of the labour force and of the shop floor, fine tuning of the equipment and of the methods of production, and better quality control (e.g. Searle 1945, Alchian 1963,

[7] In practice, certain types of capital and labor may be specific to the production of particular product lines while others are not product specific. We abstract from these considerations here and assume that firms reorganize their equipment and labor force to suit their production needs.

[8] The determination of the optimal product range is a mixed-integer programming problem. Such problems are by definition difficult to solve. The difficulty can be seen by noting that c_{ij} depends on R_i. Characterizing the solution is not essential to our purpose beyond noting that the optimal product range varies with total factor productivity.

Arthur 1990). We assume that productivity learning depends on firm experience. Following Griliches and Lichtenberger (1984) and Young (1991), we also assume that there is an upper limit to productivity learning. A simple example of a production function with productivity learning for a single product firm is:

$$Q_i = aL_i^{\alpha}K_i^{\beta}T(t_i) \equiv aL_i^{\alpha}K_i^{\beta}\frac{1}{1+\lambda_j e^{-\delta t_i}}$$

where $t_i \geq 0$ is the time since production by firm i began. As $t \to \infty$, $Q_i = aL_i^{\alpha}K_i^{\beta}$. The larger parameter δ is, the faster learning takes place. Parameter λ_j captures the learning gap for good j: the larger λ_j is, the smaller $T(0)$ is.

Market learning is introduced as follows. Market familiarity is necessary for firms to design products that fit market conditions and appeal to consumers. Better adjusted products fetch a higher price. Firms differ in their initial market familiarity. To export, firms must learn about foreign markets so as to reduce transaction costs and to fine tune their products and marketing strategy to suit the preferences of consumers in export countries (Clerides et al. 1998). Since better familiarity enables firms to fetch a higher price – net of marketing and transactions costs – market learning can be modelled as affecting the (net) export price $p_{ij}^x = \bar{p}_{ij}^x\phi(t_{ij})$ where t_{ij} is the time since export of good j began. To successfully sell their products domestically, firms must similarly learn about local conditions.

For multiple product firms, we assume that productivity learning has beneficial spillovers for the entire firm. In contrast, market learning has beneficial spillovers only in a specific market, i.e., it raises the prices of other products but only for exports or for domestic sales. Examples of models with learning spillovers across goods are found in Stokey (1991) and Young (1991). Because market learning spillovers are limited to a single market, they generate multiple equilibria: as they learn more about one market, firms are more likely to develop products for that market. As a result, they tend to fully specialize.

Productivity and market learning have different empirical implications regarding how firms' exports evolve over time. With productivity learning, firms reduce production costs c_{ij} over time as T_i rises. As a result, they become competitive in the production of more goods and the product range R_i changes.[9] To

[9] For the product range to change with T_i, it must be that learning (eventually) benefits unproduced goods more than produced goods, otherwise the firm would simply increase the production of the same goods. If returns to learning are sufficiently strong, certain goods might be dropped from the product range. See Stokey (1988) and Young (1991) for examples of models that satisfy both requirements.

the extent that export goods are systematically more costly to produce for inexperienced firms, we would expect newly created firms to initially produce exclusively for the domestic market. As they learn and their total factor productivity rises, they would progressively increase the range of goods they produce to include export goods. Firms switch faster from the domestic to export markets if productivity learning is fast – low δ – the learning gap in export goods is small – high λ_x – and learning spillovers across goods are large.

Market familiarity spillovers imply that, if a firm has exported before it is more likely to design new products aimed at foreign markets, and vice versa. Export experience thus raises the likelihood of developing new products for export. With time, this tends to generate specializations as firms gain market-specific knowledge they use to develop targeted products. The model also makes predictions regarding the pattern of exports for individual products. Define $\bar{p}_{ij} \equiv \bar{p}^x_{ij}/p^d_{ij}$ and let $\phi(t_{ij}) = e^{\gamma t_{ij}}$ to capture market learning. If a product is not fully exported from the outset (corner solution) but is ultimately designed for the export market, we have:

$$\frac{X_{ij}}{D_{ij}} = \bar{p}^{\sigma}_{ij}\phi(t_{ij})^{\sigma}$$

This shows that the share that is exported increases over time. If the function $\phi(t_{ij})$ is unbounded, the firm always ends up exporting all its production. If, however, the product was not designed for export from the start, then it is never exported. Put differently, exporters are firms that initiate the production of goods designed for foreign markets.[10]

Model predictions can be summarized as follows. With productivity learning, firms that do not initially export eventually do: their share of exports rises over time as productivity increases and export oriented products enter the product range. Firms thus need not be exporters from the start for their exports to rise over time. In contrast, with market learning, if a firm does not rapidly export a product from the onset of its production, it never exports it. Past exporters are more likely to develop new products for the export market. These predictions are not mutually exclusive.

[10] If σ is large, little market learning can trigger a large shift between local and export sales. In this case, exports can increase with little measurable effect on $q_{ij} = \left((p^x_{ij})^{\sigma} + (p^d_{ij})^{\sigma}\right)^{\frac{1}{\sigma}}$ and thus on total factor productivity (measured in value).

Productivity and market learning are related to the sunk cost hypothesis of Roberts and Tybout (1997). According to this hypothesis, firms need to reach a minimum productivity level before they can incur the various costs required to start exporting – one of which is acquiring familiarity with foreign markets. The sunk cost hypothesis therefore predicts that a high enough productivity level is required before a firm begins exporting. To the extent that productivity increases with experience – i.e., that productivity learning is present – it therefore predicts that the likelihood of exporting increases with firm age. It is also possible that there is no productivity learning but that exporters are more productive from the outset. In that case we should still observe market learning even if productivity learning is absent. In the rest of this paper we investigate whether these various predictions account for the export pattern of Moroccan manufacturers.

4. Local Context and Data

Morocco has implemented substantial liberalization policies since the mid-1980's but these reforms have slowed down after 1993. By industrial country standards, massive trade liberalization took place in Morocco during the 1980s. The trade reform initiated in 1984 reduced the coverage of import licenses (quotas) from 41% to only 11% of all imports by 1990. The maximum tariff fell from 165% to 45% during this period (e.g. Haddad 1992, Haddad and de Melo 1996, de Melo, Haddad and Horton 2001).

There is an extensive literature on Morocco's industrial sector, focused essentially on evaluating the impact of trade liberalization and foreign direct investment on firm performance and centreing the analysis mostly on export oriented industries (e.g. Haddad and Harrison 1993, Harrison 1996). One caveat to this literature is that none of the papers, even the most recent ones (e.g. Currie and Harrison 1997, Clerides et al. 1998), account for the impact of macroeconomic reforms since 1992. This is because papers written to date use the data base from Clerides et al. (1998) that covers the years 1985 to 1991. As a consequence, it is possible that papers on Moroccan manufacturing have been searching for effects that were not there yet. Indeed, trade liberalization policies were still going on during the early nineties, and the supply response is generally delayed. It is therefore important to bring new data to the issue to either confirm or challenge earlier results.

The data we use in this paper comes from two related sources. The first source is a census of manufacturers conducted every year by the Moroccan Ministry of Industry. This data set covers only a small number of variables, such as employment, output, and exports, but it is available for 15 years from 1985 until 1999. Coverage of medium and large firms is virtually universal.

The second data source is the Firm Analysis and Competitiveness Survey (FACS) conducted jointly by the Ministry of Industry and the World Bank from September to December 2000. To reduce costs, the FACS survey focuses on manufacturing firms located in the six regions where most of the country's manufacturers are located: Casablanca, Rabat, Tangiers, Nador, Fes, and Settat. The first four are located on the coast; Fes and Settat are inland.[11] Two-thirds of the country's manufacturers are located in and around the town of Casablanca alone.

Seven sectors of activity are covered: food processing, textiles, garments, leather, electrical machinery, chemicals, and plastics. Only firms of 10 employees or more are included, as they are the most likely to export. The sample of 859 firms is drawn randomly from the census firms with more than 10 employees in the selected regions and sectors. To facilitate comparison, we confine our analysis of census data to the same regions and sectors, which contains over 30,000 observations.

The coverage of the FACS survey is extensive. The questionnaire is divided into three parts: general questions answered by upper management; accounting data collected from the accountant; and manpower data collected from personnel. Three consecutive balance sheets were collected – for 1997, 1998, and 1999 – as well as two revenues and losses accounts – for 1998 and 1999. Detailed information is available on exports, including dates at which the firm began production and exports of up to six distinct products.

The main characteristics of FACS firms are summarized in Tables 1 and 2, both for the whole sample and broken down by exporting status. Values are translated into US dollars using the exchange rate of 10 dirhams for 1 dollar that prevailed at the time of the survey. Sixty percent of the FACS sample is in the textile and garment sectors; sixty percent are located in and around Casablanca.

Average sales amount to US$2.4 million per year. Average employment is 123 permanent and 13 temporary workers. Firms have been in existence for 16 years on average. Regarding exports, 56% of

[11] To facilitate interpretation, we refer to regions by the name of their main city rather than using the Moroccan names for the region itself, which the reader is less likely to know.

respondent firms sell all or part of their output abroad. Manufacturers export on average 43% of their output. This proportion varies with firm size, large firms exporting more (68% of output), small firms exporting less (33%). There is extensive specialization, however: 47% of all firms do not export any of their output while 34% export all their production. Only 17% of manufacturers serve both the domestic and export markets. The destination of exports largely mirrors the origin of imports: 83% of all exports go to Europe, 46% to France alone and much of the rest to Spain; 6% of exports go to neighbouring Maghreb countries, 5% to other destinations - primarily sub-Saharan Africa. Most exports leave Morocco by road (MCI 2000); the rest leaves by sea.

Of all 7 sectors studied, the garment sector is the most oriented towards exports: on average, garment firms export 80% of their output. Textile and leather manufacturers export, on average, 37-40% of their output. Food processors export a third. The remaining three sectors export less than 10% of their output on average. There are also strong differences across regions. Firms located in Rabat and Tangier export on average more than half of their production. Firms in the Casablanca or Nador regions export on average 40% of their output. Those located in Fes and Settat, cities located in the interior, export on average 30% and 15%, respectively.

On average, Moroccan firms have been exporting for 10 to 12 years. Exports to particular parts of the world do not appear to have begun before or after other regions: there is no difference in the year at which exports to particular regions began. The average time lag between producing a new product and exporting is 2 years; in 76% of the cases, export begins the year production starts. Contrary to the learning-by-doing hypothesis, manufacturers do not sell their products to domestic consumers for a few years before launching into exports. The domestic market, therefore, does not seem to serve as testing ground for new products.

The time lag between enterprise creation and exporting is equally short. The average time lag is 3.6 years but 42% of firms begin exporting in the year of their creation. Another 22% begin exporting after one year. Firms that do not export within a couple years of their inception are unlikely to ever export. Exporting thus appears to require little or no learning-by-doing at all. In fact, most manufacturing operations appear to be set up from the outset to serve either the domestic or the international market.

This is also the interpretation of Clerides et al. (1998) who, in their comparison of Moroccan, Colombian, and Mexican manufacturers in the early 1990's, write that "most of the impetus to become exporter in Morocco came from firm specific demand sides shocks. Many Moroccan exporters are young plants that were founded with the exclusive purpose of selling particular apparel and textile products abroad." We now investigate these issues more in detail.

5. Firm Age and Exports

We begin our analysis of the propensity to export with the census data.[12] From data on sales and exports, we define the share of output that is exported $S_i \equiv V_i^x / V_i^q$. This is our dependent variable.

We investigate how S_i evolves as firms age. We assume that export markets are more competitive than domestic markets. This is a reasonable assumption, and one that is borne out by the FACS survey: of those exporters who complain about difficulties exporting (196 cases), 88% state that their major difficulty is either the low price or high quality of competing products.

Given this assumption, the learning-by-doing hypothesis predicts a monotonic increase in S_i as firms gain experience. This is because higher productivity allows them to better compete in export markets. The market familiarity hypothesis, by contrast, makes no such prediction. Whether or not firms export depends on what market they decide to target. For firms that target the export market from the outset, we expect S_i either to be 100% from the start or to rise over time as the firm learns to better adapt its products to foreign market conditions. But for non-exporters, no increase in S_i is expected as firms age.

Our testing strategy is to regress S_i on firm age and examine the shape of the relationship. To avoid imposing any functional form restriction, age enters the regression in a non-parametric manner – i.e., as a series of dummy variables from age 1 to age 20.[13] Since S_i is censored from below at 0 and from above at 1, we use a two-limit tobit estimator. Similar results are obtained if instead of S_i we use as dependent

[12] We ignore firms with data imputed by the Ministry for national account purposes. In a number of remaining firms, the respondent did not fill in the export question, which is then coded as 'missing'. We suspect that, in the overwhelming majority of cases, this means there are no exports. Comparison with FACS data indeed indicates that dropping these missing observations overestimates the propensity of Moroccan firms that export. For this reason, we replace missing exports by zero if exports in other years are either always zero or always missing. For firms that exports in some years only, a missing value remains missing. This process yields export propensities that are close to those observed in the FACS survey.

[13] 79% of the observations are between 1 and 20 years of age. Dummies for ages above 20 are non-significant and have been dropped to streamline the presentation. Adding them does not affect our qualitative results.

variable an indicator function that takes value 1 if the firm exports.

We suspect that productivity and market learning affect industries differently. In the garment sector, for instance, consumer taste is critical. We therefore expect market familiarity to be particularly important in the garment sector. In contrast, industries in electrical machinery, chemicals, and plastics sell their products primarily to intermediate buyers who have a say in product design. In their case, familiarity with the market may be less important but cost effectiveness more critical. To investigate this possibility, regressions are estimated separately for the garment sector, other light industries (food processing, textile, and leather), and the remaining sectors which, for the purpose of this paper, we call heavy industries (electrical machinery, chemicals, and plastics). When interpreting the results, one should keep in mind that few Moroccan heavy industries export, making estimation less precise.

We estimate the relationship between exports and firm age with various controls. In all regressions we include proximity effects and yearly dummies. Yearly dummies control for possible time effects that affect firms in a similar way, such as exchange rate variations, macro shocks, and shifts in trade policy. Proximity effects control for systematic variation in export probabilities within regions, for instance arising from agglomeration externalities between nearby firms (Greenaway, Sousa and Wakelin 2004). Proximity effects may also reflect the fact that firms in a given location are influenced by common aggregate effects, such as proximity to roads, power, and shipping facilities. Elbadawi, Mengistae and Zeufack (2001) indeed find that domestic and international transport costs have a strong influence on the level of exports. Location and sector-specific externalities may also be present. To control for all these location effects on exports, we proceed as follows.[14] Let I_{ispt} be an indicator variable equal to 1 if firm i in sector s in province p in year t exports; it is 0 otherwise. We define a proximity variable $P_{ispt} \equiv \sum_{j \neq i} \frac{I_{jspt}}{N_{spt}-1}$ where N_{spt} is the number of firms in sector s, province p, and year t. Variable P_{ispt} measures the proportion of exporting firms in the vicinity of i. On average, 60 observations enter in the construction of each P_{ispt}.

We also worry that old firms may be qualitatively different from new firms. Until the mid 1980's, the Moroccan domestic market was protected from foreign competition. For this reason, old firms might be in

[14] The proximity variable is affected by reflexion bias Manski (1993) so its estimated coefficient should not be taken literally. Since it is used as a control variable, this bias is largely irrelevant.

industries or regions that focus on the domestic market. Trade liberalization might have brought foreign firms that are more familiar with exports and use Morocco as an export platform. New firms might also be more formal and thus more likely to export because they have better access to credit and the like. To control for these possible confounding factors, we include dummies for sector, region, and legal status, as well as the shares of foreign and government ownership as additional controls. Coefficients for control variables are very similar to those reported in Table 3 which we discuss below, and so are not reported here to save space.

Coefficient estimates for firm age effects, our main variable of interest, are presented in Figure 1 together with their 95% confidence interval. The results indicate that young firms are much more likely to export than old firms, a result that directly violates the productivity learning model. This is true for all sectors combined, for garments, and for light industries. In heavy industries, firm age has no significant effect on exports. Except for heavy industries, we observe an increase in exports immediately after firm creation, a result one would expect if new firms increase exports as they learn about their market. It takes a year or two for new firms to raise the share of exported output. It therefore appears that the Moroccan market serves as breeding ground for new firms breaking into export markets, but only or a short period of time. Virtually identical results are obtained if the dependent variable is 1 if the firm exports and 0 otherwise.

Some might argue that our results are misspecified because they ignore the effect of firm size which, from the previous section, we know to be strongly related to exports. It is true that the effect of firm age on firm size is strong and significant.[15] But firm size might also be a consequence of the firm's export strategy. To investigate these issues further, we add lagged sales and lagged labour force as additional controls. The use of lagged values eliminates simultaneity bias (current exports influencing current sales). But it does not eliminate endogeneity bias since firm size and export share both follow from the choice of product range.

Results for all regressors except age dummies are shown in Table 3.[16] Lagged effects are in general

[15] Regressing the log of sales on the log of firm age yields a coefficient of 0.75 with a t-value of 34.

[16] We also estimate a Heckman selection model where the dependent variable is the share of exported output. The purpose of this is to verify the robustness of our results if we allow the decision to export and the decision of how much to export to be generated by a different process. The controls are the same as in Table 3. Results, not reported here to save space, are very similar to Table 3. The effect of firm age on both the propensity to export and the share of exported output is again

significant and, except for heavy industries, have the expected sign. In all regressions, the employment effect is largest in magnitude. This confirms that it is the large firms that export. Similar results for sub-Saharan Africa are reported by Bigsten et al. (2000) and Söderbom (2001). Controlling for firm size changes the shape of the relationship between firm age and S_i: it now is monotonically declining with firm age after the first year (Figure 2). This suggests that the rise in S_i observed among young firms immediately follows an increase in labour and sales. The labour expansion that accompanies the rise in S_i is consistent with the observation that, in Morocco, it is the labour intensive industries that export. The presence of more temporary workers in the workforce is also associated with more exports in the light manufacturing sector, further reinforcing the idea that a cheap and flexible labour force is behind Moroccan exports.

Turning to the other control variables, we see that most are significant and have the anticipated sign. Proximity effects are strong and significant in all regressions: a rise in the proportion of exporting firms nearby from 0 to 50 percent is associated with an increase in the share of exports by 34 percentage points. As before, heavy industries stand out as an exception: the coefficient of the proximity variable is one order of magnitude lower. The removal of the proximity variable from the regression does not affect qualitative results regarding firm age.

Yearly dummies show an upward sloping trend in export propensity. This indicates that Moroccan manufacturers have become more export oriented over time, a finding consistent with trade liberalization. The year 1996 marked the high tide of Moroccan manufacturing exports. The rise is strongest in the garment sector (a 51 percentage point increase in export propensity compared to 1985) and weakest in heavy industry (an 11% percentage point increase only). Recent years witness a sizeable reduction in export propensity in the garment sector – from 51% to 31%. The timing of this trend reversal (1997) coincides with the Asian crisis, the strong devaluations incurred in South East Asia, and the resulting loss of competitiveness of Moroccan garment exports. Other sectors are less affected.

We find that foreign-owned firms export significantly more, suggesting that they use Morocco as an export platform. These results are consistent with Haddad and Harrison (1993) and Harrison (1996) who

non-linear: initially positive, then negative.

show that Moroccan firms with foreign equity participation export more than their domestic counterparts. The effect of foreign ownership is large: going from 0 to 100 percent foreign ownership increases S_i by 22 percentage points. We also find that corporations export more than unincorporated firms, an effect that may be due to size differences.

Except for an initial but short-lived rise in Figure 1, the propensity to export declines with firm age. This is true even though we include yearly dummies and control for proximity effects. This decline is inconsistent with the productivity learning model, but it is not explained by the market learning model either. One possibility is that the population of firms changes over time in a way that is not adequately captured by our regressors.

To investigate this possibility and control fully for unobservable changes in sample composition, we reestimate the model using a least square estimator with firm-level fixed effects.[17] We continue to control for yearly dummies and proximity effects. We have 9198 observations with firms moving in and out of exporting. Age coefficients are summarized on Figure 3. Once we control for firm-level fixed effects, we see that the probability to export increases rapidly for young firms, but remains constant among old firms. This effect is robust and significant and it is present for garments and light industries; these are also the sectors that export the most. One possible interpretation is that there is very rapid learning-by-doing in young firms. Another is that, because of borrowing constraints, new firms take a few years to reach their steady state.

These results further suggest that the observed decline in export propensity among old firms is due to a change in unobserved heterogeneity among firms: the firms created in the 1990's differ from old firms in their intrinsic propensity to export in a way that is not fully captured by observable characteristics such as sector, location, or size. The response of the Moroccan manufacturing sector to trade liberalization has thus taken the form of entry by firms interested in exports, not of old firms turning to export markets.

[17] Virtually identical results are obtained using a conditional (i.e., fixed effect) logit regression on whether firms export or not.

6. Product Age and Exports

The census data shows that firms increase exports over a period immediately following their creation. The time it takes for individual firm to break into export markets is quite short: 3 to 5 years. We also find that old Moroccan firms are much less likely to export than young firms, even controlling for location, sector, year, firm size, firm ownership, and proximity effects. Taken together, these findings suggest the presence of some learning prior to export but are inconsistent with pure productivity learning.

Does this mean the market familiarity hypothesis better accounts for the evidence? The census data cannot conclusively answer this question because it contains no information on the development of new products and on the time lag between product development and exports. Fortunately this information is available in the FACS survey. Data were collected on sales and exports for the three main products of each firm, both for 1999 and 1998. Market learning predicts that, if a product will be exported, exporting should begin soon after production starts since products are designed for specific markets. A new product may be entirely exported from the start, especially if the firm already has export experience. If only a share of the product's output is initially exported, market learning predicts that the exported share should rise over time.

Each FACS surveyed firm was asked to identify its main products, with a maximum of three. For each of these products, the firm was asked to give the dates at which production and exports began. All together, 1369 different products were identified, 59% of which were exported by the time of the survey. One half of the recorded products began production before 1988. As shown in Table 4, for 80% of those products currently being exported, exports began within the first year of production; 91% were exported within 5 years. This proportion is highest in the garment sector (96%) and lowest in heavy industry (71%), but it is high for all industries. This means that, if a product is not exported within five years of the beginning of production, the chances that it will eventually be exported are very small. These findings by themselves suggest that products are developed for specific markets.

We also have information about the time elapsed between a firm's creation and its first exports. Some 42% of surveyed firms begin exporting in the year of their creation; 75% export within three years of their creation. If a firm does not export within the first years of its creation, the chance that it will export

later drops dramatically. This is consistent with the idea that most firms are created around a small set of products designed for specific markets.[18]

We investigate these ideas further by estimating a duration model of the time from production to export. Our objective is to test the productivity and market learning models. If learning to reduce production costs is important to break into foreign markets, the time elapsed between the creation of the firm and the introduction of a particular product should have a positive effect on the probability of exporting that product. This is because, according to the productivity learning model, gains in productivity resulting from learning-by-doing should help firms compete in export markets. In the market learning model, it is experience in exporting that matters.

To test these hypotheses, we regress for each product the time between first production and first export on the firm's total experience and export experience, plus a number of controls. The firm's total experience and export experience are measured at the time the new product was put in production. This is because, if new products are designed for specific markets, it is experience at the design stage that matters for export success. Both experience measures are entered in log form because we expect grains from experience to exhibit decreasing marginal returns. More precisely, let t_{i0} be the creation date for firm i, t_{ix} be the first year firm i exported, and let t_{ij} be the first year of production of good j by firm i. Total experience L_a is defined as $L_a = \log(t_{ij} - t_{i0} + 1)$ while export experience L_x is defined as $L_x = \log(\max(t_{ij} - t_{ix}, 1))$ for an exporting firm, as $L_x = 0$ otherwise. With productivity learning, total experience is what should matter; with market learning, only export experience matters.[19] Given that most exported products are exported in the first year of production, this test is quite conservative: the effect of export experience is identified only thanks to those firms that do not export right away.

In addition to sector and region dummies, we also include dummies for the time at which production began. The policy and market conditions prevailing at the time production began might indeed have induced firms to target either domestic or foreign markets. The calendar year of production is entered

[18] To confirm this interpretation, we construct a Simpson specialization index as $S_i^2 + (1 - S_i)^2$. The index is 1 if the firm either exports nothing or exports everything. We regress this index on firm size and find that small firms are more specialized; large firms, in contrast, tend to straddle both markets. This is consistent with a product range approach in which firms are organized around a limited range of products designed for specific markets.

[19] We also experimented calculating total and export experience up to the time the product is exported. For non-exporters, experience is measured at the time of the survey. In all regressions (except the Weibull results for the garment sector), the resulting coefficient for total experience is negative and strongly significant. These findings mirror earlier results about the effect of firm age on the propensity to export.

in non-parametric fashion to allow for non-linearities. In particular, we are interested in the effect of the change in trade regime that occurred in the 1980's as Morocco opened up to international trade. Dividing the data into quartiles, three dummies are created: before 1980; between 1980 and 1988; and between 1988 and 1994. The omitted dummy is for production starting in 1995 or thereafter. We expect the first two dummies to be significantly negative: production decisions made in a protected environment are more likely to target the domestic market.

Results are presented in Tables 5 and 6. Two models are estimated: a parametric hazard model with a Weibull distribution; and a Cox non-parametric hazard model. The advantage of the Cox model is that it does not impose any structure on the shape of the conditional hazard over time. Both models yield by and large similar results, the main difference being that Cox results are slightly less significant for most controls.

For both the Weibull and the Cox model, export experience is found to have a large and significant effect in three of the four regressions. The exception is garments where export experience is positive but non-significant. This is because most garment manufacturers export very soon after firm creation, so that there is not enough variation in export experience to identify the effect of experience (i.e., most is zero). Total experience is negative and non-significant for all sectors except garment, where it is positive. This effect, however, is only significant in the Weibull regression.

Confirming our earlier analysis, regression results shows that the probability to export drops rapidly within a few years of production. For the Weibull model, time dependence is captured by a coefficient p. A value of $p < 1$ implies a declining hazard, and vice versa for $p > 1$. We find a significantly negative estimate of $\log(p)$, which implies $p < 1$. For the Cox model, time dependence is represented in the form of Kaplan-Meier survival estimates. These estimates, not shown here to save space, similarly indicate a declining probability of switching into export over time.

From the Cox model, we see that products introduced prior to 1980 are much less likely to be exported, but there is no difference between products introduced in the 1980's or between 1989 and 1994: it appears as if the market liberalization effects of the 1984-1990 trade reform had largely been anticipated by firms introducing new products in the 1980's. To confirm that the production date effect is not due to

unobservable differences across firms, we also estimate a firm-level fixed effect regression in which the time-to-export is the dependent variable. Non-exported products are excluded. Results show that, within a firm, products introduced prior to 1988 take longer to be exported. The effect is particularly strong prior to 1980. These results suggest that trade liberalization had affected exports by changing the type of products Moroccan manufacturers decide to produce – and possibly the type of firms that are set up.

7. Exports and Productivity

We have seen that market learning provides a more convincing explanation of exporting behaviour than productivity learning. Does this imply that there is no relationship between exports and productivity?

In their comparison of Moroccan, Colombian, and Mexican manufacturers, Clerides et al. (1998) find that Moroccan exporting firms do better than non-exporters, but this result is less robust in Morocco than Colombia and Mexico. Their main hypothesis is that there are fixed costs associated with exporting. Since producers of large batches are better able to spread these costs, firms with more capital should be more likely to export, which is exactly what the authors find. However, they find no evidence that the causal relationship is from exporting to productivity. Indeed, highly productive firms appear to select themselves into the export market. Finally, there is no evidence that entering the exporting market reduced the marginal costs of Moroccan firms between 1984 and 1991.

In this section, we briefly revisit these issues in two steps. To ensure comparison with other studies, we first establish that exporting firms have higher total factor productivity than non-exporting firms. We then examine whether non-exporting firms that are more productive than other non-exporting firms are more likely to begin exporting. We find that they are. We also find that exporting firms that are less productive than other exporting firms are more likely to abandon exports.

The first step is to show that exporting firms are more productive. Since we do not have data on firm-specific prices, productivity is defined in value terms. This means that we cannot separate productivity changes into quantity and price effects. In agreement with our model, the analysis thus treats equivalently a reduction in the physical inputs required to produce a given quantity of output, and a change in design that enables the firm's products to fetch a higher price.

Using the FACS data set we estimate a production function of the form:

$$Q_i = a(\sum_s \gamma_s L_i^s)^\alpha K_i^\beta T_i^\theta e^{\rho R_i + \eta X_i}$$

where Q_i is value added of firm i, L_i^s is labour of type s, K_i is capital, T_i is time since enterprise creation, and X_i is the share of output that is exported. Financial constraints are believed to affect productivity because they prevent firms from operating at full capacity. Exporting firms may have better access to finance and this in turn may explain why they are more productive. To control for this possibility, we include firm liquidity R_i as additional regressor. As proxy for R_i, we use a balance sheet financial ratio defined as the difference between long term liabilities and long term assets, normalized by the value of capital.[20]

We also normalize labour coefficients such that $\gamma_s = 1$ for unskilled workers. After taking logs and using the approximation $\log(1+x) \simeq x$ for x close to 0, we obtain the estimating equation:

$$\log Q_i = \log a + \alpha L_i + \alpha \sum_s (\gamma_s - 1)\frac{L_i^s}{L_i} + \beta \log K_i + \theta \log T_i + \rho R_i + \eta X_i \tag{7.1}$$

where L_i is total labour. When estimating the above, sector and region dummies are added to control for inherent differences in total factor productivity (TFP). To control for simultaneity bias, all labour variables, capital, liquidity, and exports are instrumented using lagged values. Equation (7.1) is estimated separately for garment, light manufacturing, and heavy manufacturing firms.

Results presented in Table 7 show a strong positive relationship between exports and total factor productivity in all sectors except heavy industry. The magnitude of the estimated coefficient η is large: compared to a non-exporter, a garment or light industry manufacturers that exports all its output is 25-30% more productive on average. We also see that firm experience per se is not associated with higher TFP: the coefficient of firm age is small and non-significant. Most of the effect of exports is due to the fact of exporting: replacing the share of exported output by an export dummy yields virtually identical

[20] A positive ratio R_i means that the firm has secure long-term funding (debt and equity) over and above what is required to finance immobilized assets. The difference can be used to finance inventories, wages, client credit, and the like. A negative ratio indicates that short-term liabilities (supplier credit, overdraft facility) are implicitly used to finance long-term asset, a situation that put the firm at the mercy of a liquidity squeeze.

results.[21]

Next we investigate the selection-into-export hypothesis by testing whether firms that end up exporting have higher productivity even before they export. According to the manufacturing census most Moroccan exporters export immediately. We nevertheless were able to identify 642 firms that initiated exports after their creation. Since the census data does not contain information about capital, we cannot estimate TGFP and focus on labour productivity instead.

The literature has proposed different ways of conducting the test. For instance, one could rely on time series analysis to test whether higher productivity Granger-causes exports (Bleaney and Wakelin 2002). Here we adopt a simpler approach that compares average productivity across firms. The advantage of this approach is that it is more robust to measurement error.[22] We proceed as follows. A measure of average labour productivity before exporting is obtained by regressing the log of output on firm-level fixed effects as well as a series of controls – employment, share of temporary workers, (log of) age and age squared, and dummies for sector, region, year, and legal status.[23] We only use observations on non-exporting firms and on exporting firms before they begin exporting. Firm-specific fixed effects are our measure of unobservable time-invariant labour productivity before exporting. Of course, these estimated fixed effects are subject to measurement error since they are constructed on the basis of a rather short time series. We would therefore expect their coefficient to be biased towards zero.

We construct an indicator variable that takes the value 1 if the firm subsequently began exporting; otherwise it is 0. This indicator variable is regressed on the estimated firm fixed effects from the first step regression. Firms that export in every year are ignored. Results are shown in Table 8 with additional controls for experience, sector, region, and legal status. We find that firms that had a higher than average labour productivity before exporting are significantly more likely to begin exporting.[24] This is true for all

[21] We also investigated whether export experience raises TFP – the learning-by-exporting hypothesis. To this effect, we reestimated the equation presented in Table 8 using only exporting firms and replacing X_i by the (log of the) number of years since first export. If export experience raises total factor productivity, the coefficient on number of years since first export should be positive and significant. The estimated coefficient has the right sign but is not significant, indicating no strong relationship between export experience and TFP. Other parameter estimates are similar to those reported in Table 8. We also estimated the same regression on non-exporters and found no effect of firm age on productivity. Sample size is small in both cases, however, which means that the power of these tests is weak. Since these results are not the focus of the paper, they are not discussed further.

[22] See also footnote 18.

[23] Similar results are obtained using random effects. Only fixed effects are reported here because a Hausman test rejects the hypothesis that random effects are independent from regressors.

[24] A higher capital intensity could in principle account for both higher productivity and the switch to exports. Although

sectors except garments where the effect is not significant – largely because there are so few observations on garment exporters who did not export right from the start. These results are consistent with those obtained by Clerides et al. (1998) and by Bernard and Jensen (1999a). We again see that the effect of firm age is non-linear: controlling for inherent productivity, the probability of switching into export rises within the first year or two after inception, after which time it falls.[25] These findings are consistent with the duration analysis presented in Section 6.

We also investigate whether firms that stop exporting were less productive while they were exporting than firms that continue exporting. The approach is a mirror image of the above.[26] Results are reported in Table 9. They indicate that firms that stop exporting were less productive than other exporters before they stopped exporting. The effect is only significant for garment manufacturers, however. The probability to switch out of export increases monotonically with firm age. [27]

Taken together, the results presented in this section suggest that a high labour productivity is a precondition for moving – and remaining – into exports. High labour productivity is thus an essential determinant of competitiveness. But the analysis also demonstrates that this high productivity does not come from firm experience. Rather, firms that break into export markets are more productive from the start, as is further confirmed by the finding that they begin exporting within a few years of creation. It follows that the response of the Moroccan manufacturing sector to trade liberalization must have worked primarily through the creation of new, more productive firms that target export markets from their inception.

8. Conclusion

We have examined the effect of experience and learning on the exporting behaviour of Moroccan manufacturers. We contrasted two types of explanations for selection into exporting. These explanations are

we cannot rule out this explanation in the absence of data on capital stock, it is inconsistent with the fact that export industries in Morocco are less capital intensive than industries catering to the domestic market (see Table 2).

[25] We also investigated whether productivity shocks trigger exporting. To this effect, we regressed the switch into exports on lagged productivity. Results show no relationship: firms do not begin exporting because a fortunate productivity shocks in the preceding year pushes them above the competitiveness threshold, but rather because they are more productive on average.

[26] If firms switch in and out of exports more than once, we only consider the first episode and ignore the subsequent ones.

[27] The relationship between export market exit and productivity has also been studied by Girma, Greenaway and Kneller (2003) for the UK. These authors also find a negative association between firm performance and export exit.

not mutually exclusive but are separately testable. The first one assumes that a firm must be sufficiently productive before it can export. The second assumes that success in exports depends on familiarity with export markets. In both cases, the required knowledge is potentially subject to learning-by-doing: firms that initially lack the necessary knowledge can accumulate it through experience. The only difference is that the two types of learning depend on different kinds of experience: learning how to reduce costs (what we call productivity learning) depends on the general experience of the firm, while learning how to design products for export (i.e., market learning) is a function of export experience.

Results provide support for the market learning hypothesis. In contrast, descriptive statistics and multivariate analysis are at odds with the productivity learning hypothesis and we find little if any evidence that general experience matters in the decision to export. Firms seem to produce with either the domestic or the export market in mind. We find that firms that initially focused on the domestic market occasionally switch to exports in response to changes in market conditions – as measured by time dummies. But most of the export response is due to new firms that enter and focus on foreign markets right from the start. This is particularly true for small firms which are found to fully specialize either in exports or domestic sales. This situation probably results from the fact that, since firms focus on a limited range of products, they have little flexibility to respond to large shifts in market conditions whenever products developed for one market are unsuitable for the other.

In agreement with the sunk cost hypothesis and much of the literature, we find a strong relationship between exports and total factor productivity: firms that eventually export were more productive even before exporting. Our contribution is to show that exports is driven at least in part by market familiarity, as suggested for instance by the work of (e.g. Rauch and Casella 1998, Casella and Rauch 1998) on international networks. This is also in line with the fact that Morocco exports primarily to France and Spain, two countries with which it shares a long colonial history.

The work presented here leaves a number of issues unanswered. Regressions presented in Section 5 show proximity effects to be very strong: firms located near other exporters are much more likely to export, even when we control for year, firm age, and firm level fixed-effects. It is unclear why. The proximity variable may capture variation in export probabilities that is due to pure geographical effects

(e.g., proximity to borders or to population centres). It may also capture infrastructure effects, industrial services, or externalities among firms, such as the diffusion of ideas and market relevant knowledge. Further research is needed to disentangle these various effects.

We have argued here that market familiarity is important. We have also seen that certain firms appear both more productive and better suited to export markets right from the start. The next step is to find the origin of market familiarity and productivity advantages at start-up. Results presented here suggest some avenues for further research, notably foreign ownership and physical proximity to other exporting firms. Another possible diffusion process is suggested by the geographical concentration of Moroccan manufacture exports to France and Spain, two countries with a history of Moroccan immigration. It is conceivable that some returning migrants take advantage of their familiarity with French and Spanish tastes to invest in manufacturing exports.[28] These issues deserve further investigation.

If confirmed by further analysis, our results have important policy implications. First, the argument that protection of the domestic market is essential for firms to gain enough experience to compete in international markets does not appear valid, at least for Morocco over the period studied. Second, the response of the manufacturing sector to trade liberalization primarily comes from new firms and new products. Helping new firms is thus essential to maximize the manufacturing export response to changes in relative prices. An immediate corollary is that obstacles to the creation of new firms (such as difficult access to finance) are bound to reduce a country's response to trade liberalization. This might explain why combining financial liberalization with structural adjustment generates little response in manufacturing exports whenever it leads to higher interest rates and tighter credit markets.

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Table 1. Breakdown of FACS sample firms by sector and region

Sector of activity	**All**	**Non-exporters**	**Exporters**
Food processing	10%	12%	7%
Textile	23%	24%	23%
Garments	37%	22%	50%
Leather	8%	5%	11%
Electrical and Electronic Equipment	4%	6%	3%
Chemicals (including pharmaceuticals)	9%	15%	3%
Plastics	9%	16%	3%
Region			
Casablanca	60%	65%	56%
Tanger-Tetouan	14%	10%	17%
Rabat-Sale (Zemmour)	6%	4%	9%
Fes-Boulemane	11%	10%	13%
Oriental (Nador, Oujda)	4%	5%	3%
Chaouia-Ouardigha (Settat)	4%	7%	2%
Total number of observations	859	401	446

Source: FACS survey data.

Table 2. Descriptive Statistics of the FACS Sample

				Difference exporter/ non-exporter	
	Mean	**Non-exp.**	**Exporter**	**t-test**	**p-value**
Annual sales ('000 US$)	2406	1863	2904	2.76	0.006
Permanent workers (number)	123	55	186	9.43	0.000
Temporary workers (number)	13	7	17	2.89	0.004
Purchase value of equipment and machinery ('000 US$	1335	900	1733	3.26	0.001
Years since creation	16	19	14	5.56	0.000
Percentage foreign ownership	21%	12%	27%	-5.22	0.000
Share of exports in total sales	43%	0%	82%		

Source: FACS data. Number of observations: 859.

Table 3. Determinants of the Share of Exports, Controlling for Firm Size

	All sectors		Garment		Light manuf.		Heavy manuf.	
	Coef.	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**
Firm age dummies	shown in Figure 3							
Firm size:								
Total sales (lagged)	0.036	**4.72**	0.191	**12.39**	0.009	0.82	-0.041	**-3.39**
Total manpower (lagged)	0.303	**30.09**	0.212	**10.56**	0.289	**20.41**	0.270	**15.85**
Share of casuals in manpower (lagged)	0.276	**6.92**	-0.040	-0.41	0.450	**8.68**	-0.078	-1.11
Proximity to exporting firms:								
Proportion of exporting firms nearby	0.681	**14.66**	0.302	**2.91**	0.680	**10.44**	0.091	1.06
Yearly dummies (1986 omitted category):								
1987	0.032	0.81	0.116	1.43	0.021	0.37	-0.063	-1.06
1988	0.016	0.38	0.115	1.32	0.011	0.18	-0.046	-0.71
1989	0.069	**1.77**	0.175	**2.20**	0.060	1.10	0.033	0.59
1990	0.091	**2.47**	0.194	**2.60**	0.089	**1.69**	0.044	0.79
1991	0.110	**3.00**	0.164	**2.20**	0.112	**2.17**	0.073	1.34
1992	0.099	**2.69**	0.165	**2.19**	0.078	1.50	0.104	**1.90**
1993	0.146	**3.96**	0.224	**2.92**	0.125	**2.39**	0.124	**2.26**
1994	0.261	**6.26**	0.446	**4.99**	0.241	**4.11**	0.178	**2.96**
1995	0.263	**6.01**	0.456	**4.92**	0.217	**3.53**	0.190	**3.01**
1996	0.300	**7.14**	0.510	**5.67**	0.284	**4.84**	0.107	**1.72**
1997	0.259	**5.99**	0.393	**4.29**	0.276	**4.58**	0.050	0.76
1998	0.239	**5.48**	0.269	**3.01**	0.266	**4.36**	0.137	**2.05**
1999	0.253	**5.42**	0.311	**3.25**	0.271	**4.12**	0.180	**2.63**
Firm ownership:								
Share of foreign ownership	0.002	**7.40**	-0.001	**-2.22**	0.003	**7.62**	0.003	**7.60**
Share of government ownership	0.002	**5.76**	0.001	0.91	0.002	**4.35**	0.003	**5.53**
Sector dummies:								
Garment	omitted sector		n.a		n.a		n.a	
Food processing	-0.622	**-18.23**	n.a		omitted sector		n.a	
Textile	-0.564	**-25.01**	n.a		0.070	**2.20**	n.a	
Leather	-0.301	**-11.39**	n.a		0.311	**8.25**	n.a	
Electrical machinery	-1.071	**-23.05**	n.a		n.a		omitted sector	
Pharmaceutical	-1.155	**-27.11**	n.a		n.a		-0.071	**-2.33**
Plastics	-1.235	**-27.68**	n.a		n.a		-0.137	**-4.27**
Region dummies (Casablanca is omitted region):								
Settat	-0.362	**-5.74**	-0.792	**-2.47**	-0.565	**-5.79**	-0.066	-1.17
Nador	0.335	**6.83**	0.390	0.47	0.366	**6.26**	-0.035	-0.39
Rabat	-0.029	-0.92	0.070	1.26	-0.009	-0.19	-0.008	-0.15
Fes	-0.065	**-2.32**	0.377	**5.97**	-0.267	**-6.79**	0.079	1.49
Tangiers	0.026	1.14	0.428	**9.90**	-0.126	**-3.86**	-0.090	**-1.87**
Legal status (sole proprietor is omitted category):								
SARL (limited liability company)	0.280	**9.49**	0.373	**7.16**	0.211	**4.98**	0.202	**2.78**
SA (corporation)	0.330	**13.27**	0.444	**9.54**	0.272	**8.02**	0.341	**5.06**
SNC (partnership) & other status	0.210	**3.78**	0.097	0.66	0.187	**2.78**	0.031	0.18
Cooperative	0.054	0.88	0.092	0.79	0.099	1.22	-2.412	.
Nber of observations, of which:	22387		5722		10913		5437	
zero	11953		1434		5975		4430	
non-censored	6009		1536		3423		940	
one	4425		2752		1515		67	

Data: annual census, 1985 to 1999. Dependent variable is share of exports in total output. Estimator is two-limit tobit.
t-values that are significant at the 10% level or better appear in bold. Year 1985 is lost because of the use of lagged regressors.

Table 4. Time between first production and first export of a new product

	All sectors		Garment		Light manuf.		Heavy manuf.	
Years before exporting	# obs.	cumul.%	# obs.	cumul.%	# obs.	cumul.%	# obs.	cumul.%
0	605	80%	388	92%	190	71%	27	43%
1	32	84%	9	94%	17	77%	6	52%
2	14	86%	2	94%	8	80%	4	59%
3	13	88%	6	96%	5	82%	2	62%
4	7	89%	0	96%	7	84%	0	62%
5	14	91%	1	96%	7	87%	6	71%
6 - 10	36	95%	13	99%	14	92%	9	86%
11 - 20	21	98%	5	100%	12	97%	4	92%
> 20	14	100%	0	100%	9	100%	5	100%
Number of observations	756		424		269		63	

Data: FACS. Only for products exported by the time of the FACS survey.

Table 5. Duration analysis of time to export a new product -- Weibull regressions

	All sectors		Garment		Light manuf.		Heavy manuf.	
Experience	**Coef.**	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**
Total experience	0.991	-0.17	1.217	**2.49**	0.838	**-2.02**	0.733	-1.47
Export experience	1.533	**4.07**	1.209	1.44	1.942	**3.01**	2.150	**2.38**
Time of firm creation (creation after 1994 is omitted category):								
Firmd created before 1980	0.136	**-13.78**	0.124	**-9.15**	0.136	**-8.97**	0.112	**-4.57**
Firm created in 1980-1988	0.563	**-5.21**	0.641	**-3.15**	0.473	**-3.83**	0.302	**-2.63**
Firm created in 1989-1994	0.615	**-4.55**	0.581	**-4.07**	0.638	**-2.24**	0.385	**-2.11**
Sector dummies:								
Garment	omitted category		n.a.		n.a.		n.a.	
Food processing	0.653	**-2.27**	n.a.		0.464	**-3.34**	n.a.	
Textile	1.847	**5.86**	n.a.		0.525	**-3.79**	n.a.	
Leather	1.821	**3.63**	n.a.		omitted category		n.a.	
Electrical machinery	0.558	**-2.41**	n.a.		n.a.		omitted category	
Pharmaceutical	0.225	**-6.31**	n.a.		n.a.		0.400	**-2.68**
Plastics	0.189	**-5.91**	n.a.		n.a.		0.367	**-2.71**
Region dummies (Casablanca is omitted region):								
Settat	0.603	-1.53	n.a.		0.466	**-1.89**	0.710	-0.54
Nador	1.118	0.40	1.176	0.16	1.001	0.00	0.623	-0.45
Rabat	1.937	**5.08**	1.820	**3.60**	2.346	**3.47**	2.224	**1.83**
Fes	1.493	**3.66**	1.966	**5.14**	0.780	-1.03	1.473	0.52
Tangiers	1.256	**1.88**	1.504	**2.53**	1.013	0.06	1.521	0.83
Log(p)	-0.269	**-8.55**	-0.178	**-4.54**	-0.390	**-6.92**	-0.246	**-1.94**
No. of subjects	1260		535		441		284	
No. of failures	696		406		235		55	
Time at risk	11996		2359		4929		4708	

The dependent variable is time from first production to first export for a given product. Estimator is Weibull regression
The sign of the estimated coefficients indicates the effect on the hazard, which is inversely related to duration.
A positive coefficient implies a higher hazard, e.g., probability of switching into export, and hence a shorter duration.
t-values that are significant at the 10% level or better appear in bold.

Table 6. Duration analysis of time to export a new product -- Cox regressions

	All sectors		Garment		Light manuf.		Heavy manuf.	
Experience	**Coef.**	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**
Total experience	0.974	-0.48	1.112	1.35	0.879	-1.48	0.715	-1.58
Export experience	1.293	**2.42**	1.066	0.48	1.499	**1.82**	2.223	**2.46**
Time of firm creation (creation after 1994 is omitted category):								
Firmd created before 1980	0.389	**-6.50**	0.504	**-3.01**	0.333	**-5.01**	0.195	**-3.37**
Firm created in 1980-1988	0.902	-0.97	1.028	0.21	0.747	-1.51	0.482	-1.60
Firm created in 1989-1994	0.885	-1.17	0.905	-0.76	0.875	-0.68	0.491	-1.56
Sector dummies:								
Garment	omitted category		n.a.		n.a.		n.a.	
Food processing	0.765	-1.42	n.a.		0.546	**-2.56**	n.a.	
Textile	1.419	**3.35**	n.a.		0.614	**-2.85**	n.a.	
Leather	1.585	**2.80**	n.a.		omitted category		n.a.	
Electrical machinery	0.672	-1.64	n.a.		n.a.		omitted category	
Pharmaceutical	0.291	**-5.21**	n.a.		n.a.		0.403	**-2.66**
Plastics	0.235	**-5.12**	n.a.		n.a.		0.360	**-2.77**
Region dummies (Casablanca is omitted region):								
Settat	0.608	-1.50	n.a.		0.501	**-1.70**	0.810	-0.33
Nador	1.036	0.13	0.803	-0.22	1.025	0.08	0.608	-0.48
Rabat	1.486	**3.06**	1.317	**1.68**	1.865	**2.53**	2.291	**1.88**
Fes	1.227	**1.87**	1.304	**2.08**	0.867	-0.58	1.446	0.49
Tangiers	1.153	1.17	1.250	1.38	0.991	-0.05	1.528	0.84
No. of subjects	1260		535		441		284	
No. of failures	696		406		235		55	
Time at risk	11996		2359		4929		4708	

The dependent variable is time from first production to first export for a given product. Estimator is Cox regression
The sign of the estimated coefficients indicates the effect on the hazard, which is inversely related to duration.
A positive coefficient implies a higher hazard, e.g., probability of switching into export, and hence a shorter duration.
t-values that are significant at the 10% level or better appear in bold.

Table 7. Productivity and Exports

	All sectors		Garment		Light manuf.		Heavy manuf.	
Exporting:	**Coef.**	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**	**Coef.**	**t-value**
% of output exported (*)	0.261	**2.69**	0.248	**2.06**	0.298	**1.95**	0.562	0.46
Firm characteristics:								
Log of manpower (*)	0.787	**10.87**	0.999	**12.58**	0.804	**9.50**	1.429	0.37
Share of managers (*)	1.468	**2.78**	1.825	**2.76**	0.893	0.92	-0.385	-0.04
Share of qualified workers (*)	-0.076	-0.60	-0.115	-0.74	-0.097	-0.47	-0.373	-0.25
Share of clerical workers (*)	1.844	**3.36**	4.460	**2.90**	1.806	**2.73**	4.073	0.35
Share of temporary workers (*)	-0.508	**-1.85**	-0.687	**-1.76**	-0.935	**-2.19**	-1.752	-0.23
Log of purchase value of equipment (*)	0.348	**5.29**	0.141	**2.28**	0.401	**6.95**	-0.224	-0.07
Liquidity ratio (*)	0.024	0.38	0.002	0.07	0.118	**2.22**	-0.616	-0.28
Log of firm age	0.022	0.35	0.017	0.21	0.027	0.33	0.439	0.34
Sector								
Garment	omitted sector		n.a.		n.a.		n.a.	
Food processing	0.545	**3.35**	n.a.		omitted sector		n.a.	
Textile	0.062	0.63	n.a.		-0.495	**-2.73**	n.a.	
Leather	-0.098	-0.75	n.a.		-0.631	**-2.98**	n.a.	
Electrical machinery	0.485	**2.72**	n.a.		n.a.		omitted sector	
Pharmaceutical	0.792	**4.85**	n.a.		n.a.		1.128	0.33
Plastics	0.363	**2.58**	n.a.		n.a.		-0.350	-0.44
Region (Casablanca is omitted region)								
Settat	-0.274	-1.59	n.a.		0.081	0.31	-0.530	-0.53
Nador	-0.520	**-2.63**	0.711	1.01	-0.507	**-1.97**	-0.354	-0.22
Rabat	0.092	0.66	-0.110	-0.62	-0.042	-0.17	0.106	0.04
Fes	-0.079	-0.70	-0.201	-1.48	-0.073	-0.38	0.404	0.21
Tangiers	-0.141	-1.39	-0.182	-1.46	-0.221	-1.38	0.636	0.21
Intercept	1.272	**4.56**	1.850	**6.13**	1.317	**2.92**	3.128	0.39
Number of observations	710		260		285		165	
R-squared	0.716		0.795		0.735		0.538	

The dependent variable is the log of value added. Estimator is 2SLS. (*) Instrumented with lagged value. Data: FACS.
t-values that are significant at the 10% level or better appear in bold.

Table 8. Productivity and Propensity to Switch into Exporting

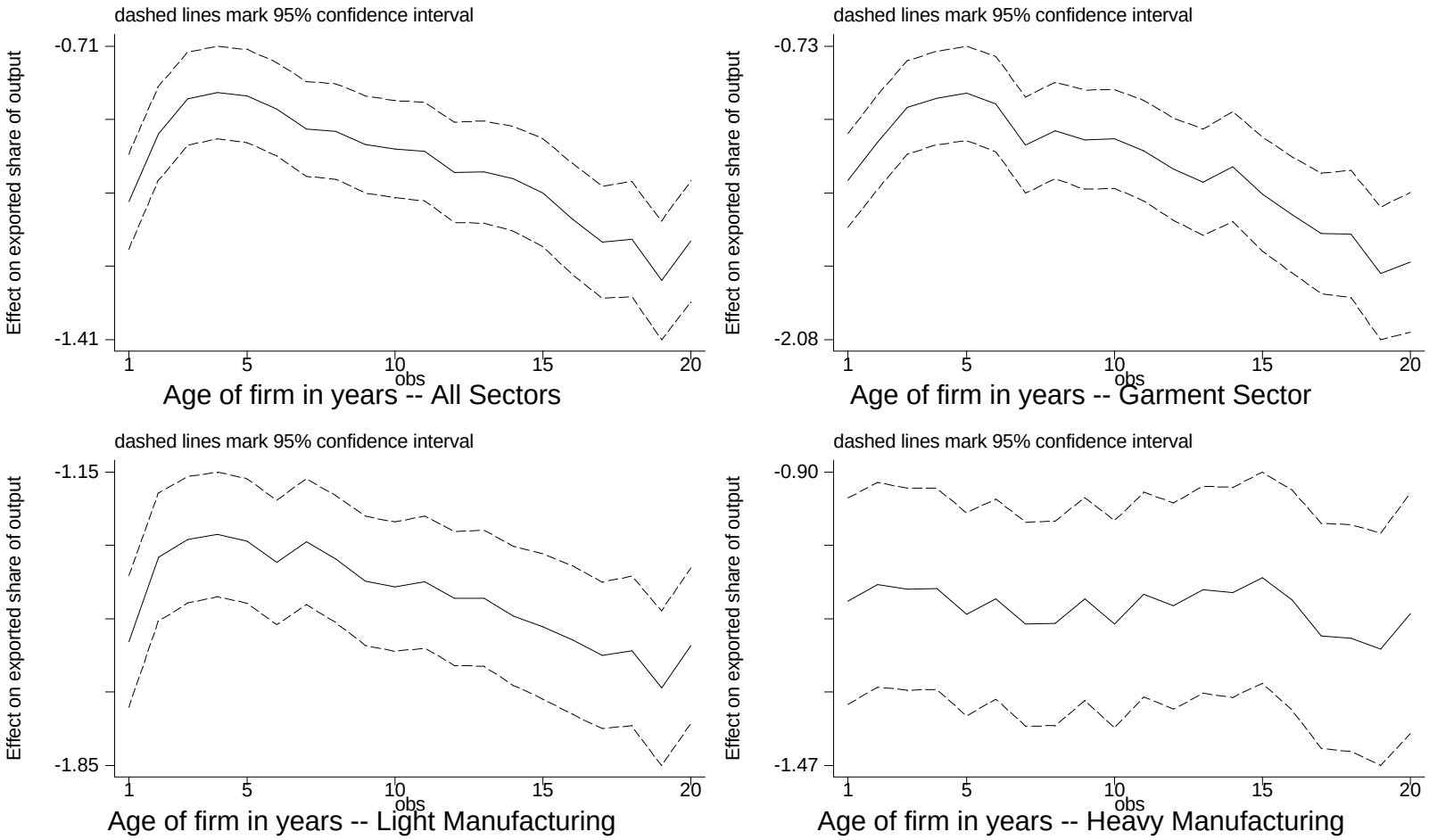
	All sectors		Garment		Light manuf.		Heavy manuf.	
	Coef.	**z-value**	**Coef.**	**z-value**	**Coef.**	**z-value**	**Coef.**	**z-value**
Productivity (*)	0.300	**6.02**	-0.193	-1.50	0.310	**4.77**	0.554	**5.15**
Firm characteristics								
Log of firm age	2.955	**5.51**	4.663	**3.47**	2.671	**3.57**	2.534	**2.15**
Log of firm age (squared)	-0.529	**-5.52**	-0.889	**-3.43**	-0.434	**-3.27**	-0.502	**-2.46**
Foreign ownership	0.010	**4.49**	0.009	1.24	0.011	**3.14**	0.006	**1.72**
Public ownership	0.000	-0.08	0.003	0.35	-0.002	-0.66	0.002	0.46
Sector (garment is omitted sector)								
Garment	omitted sector		n.a.		n.a.		n.a.	
Food processing	-1.911	**-8.15**	n.a.		omitted sector		n.a.	
Textile	-0.250	**-1.66**	n.a.		1.444	**6.67**	n.a.	
Leather	-0.042	-0.22	n.a.		1.733	**6.60**	n.a.	
Electrical machinery	-1.941	**-7.50**	n.a.		n.a.		-0.388	-1.40
Pharmaceutical	-1.948	**-8.70**	n.a.		n.a.		-0.463	**-1.84**
Plastics	-1.647	**-8.35**	n.a.		n.a.		omitted sector	
Region (Casablanca is omitted region)								
Settat	-0.611	**-2.09**	1.415	1.08	-0.793	**-1.66**	-0.440	-1.01
Nador	-0.225	-0.66	n.a.		0.234	0.58	-0.617	-0.80
Rabat	-0.439	**-1.76**	0.103	0.21	-0.824	**-1.88**	-0.558	-1.18
Fes	-1.054	**-4.68**	-0.523	-0.89	-1.166	**-4.28**	-0.378	-0.67
Tangiers	-0.195	-1.22	-0.048	-0.14	-0.057	-0.28	-0.538	-1.30
Legal status (sole proprietor is omitted category)								
SARL (limited liability company)	0.495	**3.74**	0.847	**3.05**	0.470	**2.63**	0.160	0.49
SA (corporation)	1.274	**10.24**	1.487	**6.10**	1.021	**6.21**	1.989	**4.52**
Intercept	-4.968	**-6.53**	-7.627	**-4.26**	-6.720	**-6.22**	-6.202	**-3.55**
Number of observations	2741		467		1389		983	
Pseudo R-squared	0.177		0.163		0.159		0.217	

The dependent variable is whether firm switches into exporting. Estimator is logit. Data: Manufacturing census 1985-99.
(*) Estimated fixed effect of regression of value added on firm characteristics for non-exporters. See text for details.
t-values that are significant at the 10% level or better appear in bold.

Table 9. Productivity and Propensity to Switch Out of Exporting

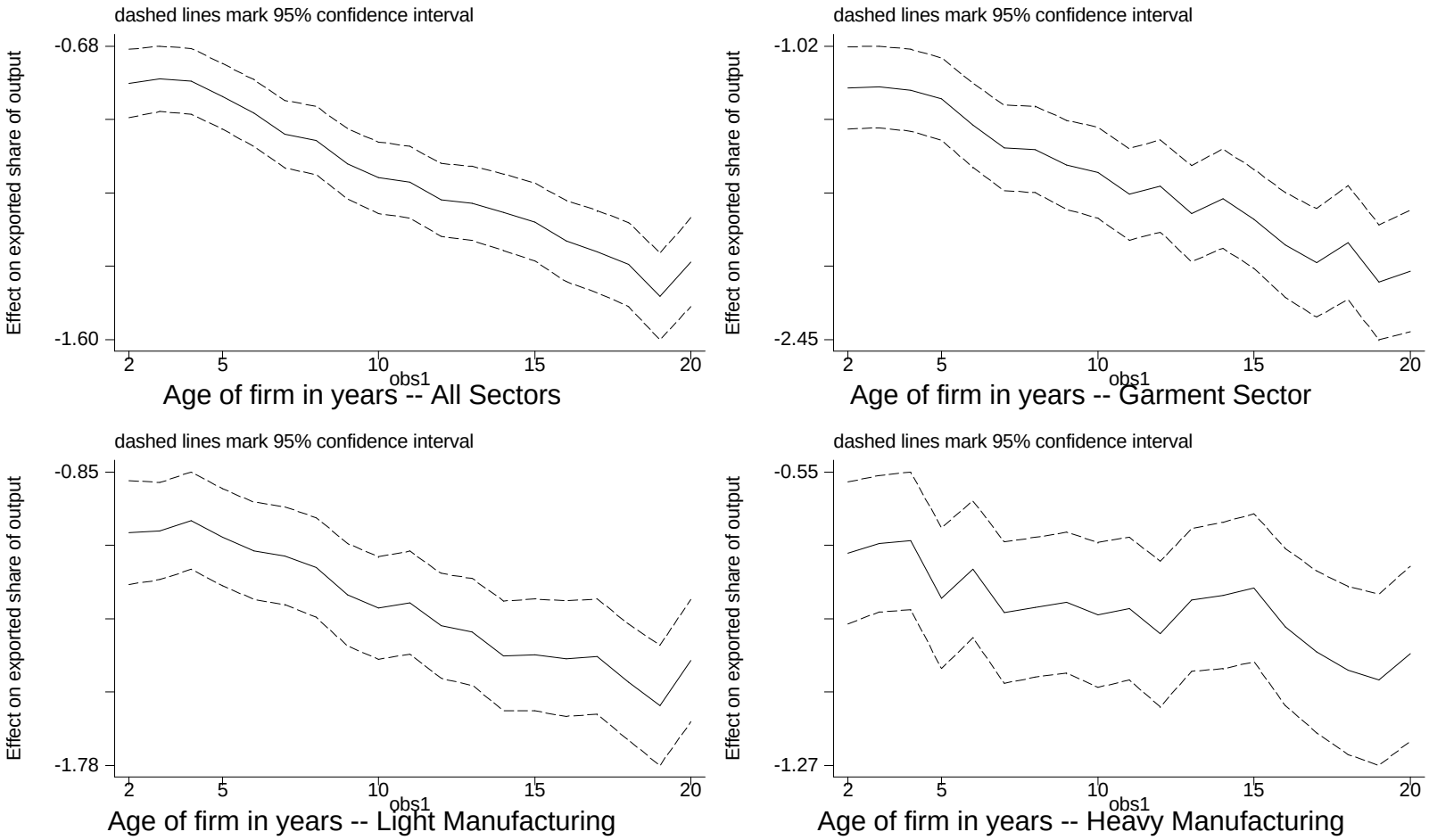
	All sectors		Garment		Light manuf.		Heavy manuf.	
	Coef.	**z-value**	**Coef.**	**z-value**	**Coef.**	**z-value**	**Coef.**	**z-value**
Productivity estimate (see text)	-0.216	**-4.00**	-0.671	**-6.17**	-0.093	-1.32	-0.051	-0.40
Firm characteristics								
Log of firm age	6.282	**7.31**	4.702	**3.33**	7.762	**5.87**	4.967	**2.16**
Log of firm age (squared)	-0.815	**-5.78**	-0.624	**-2.65**	-1.073	**-4.94**	-0.561	-1.52
Foreign ownership	0.000	0.19	-0.001	-0.32	-0.003	-1.08	0.007	1.52
Public ownership	-0.003	-1.45	0.003	0.69	0.000	0.14	-0.014	**-2.37**
Sector (garment is omitted sector)								
Garment	omitted sector		n.a.		n.a.		n.a.	
Food processing	0.309	1.43	n.a.		omitted sector		n.a.	
Textile	1.093	**8.39**	n.a.		0.695	**3.29**	n.a.	
Leather	0.304	**1.74**	n.a.		0.217	0.86	n.a.	
Electrical machinery	0.776	**2.64**	n.a.		n.a.		-0.708	**-1.89**
Pharmaceutical	1.609	**6.33**	n.a.		n.a.		omitted sector	
Plastics	1.047	**4.25**	n.a.		n.a.		-0.396	-1.10
Region (Casablanca is omitted region)								
Settat	-0.072	-0.18	-0.086	-0.08	0.284	0.53	-1.013	-1.18
Nador	0.009	0.02			0.306	0.71	0.161	0.16
Rabat	-0.445	**-1.88**	-0.863	**-2.03**	-0.251	-0.79	0.011	0.02
Fes	-0.100	-0.44	-1.011	**-2.05**	0.448	1.56	-0.139	-0.17
Tangiers	0.116	0.72	-0.544	**-1.95**	0.555	**2.57**	0.450	0.73
Legal status (sole proprietor is omitted category)								
SARL (limited liability company)	0.060	0.42	-0.205	-0.81	0.226	1.16	0.695	1.39
SA (corporation)	-0.298	**-2.07**	-0.754	**-3.12**	-0.025	-0.13	0.693	1.06
Intercept	-12.465	**-9.56**	-9.202	**-4.38**	-14.707	**-7.29**	-10.503	**-2.93**
Number of observations	2394		1127		1186		267	
Pseudo R-squared	0.161		0.164		0.124		0.153	

The dependent variable is whether firm switches out of exporting. Estimator is logit. Data: Manufacturing census 1985-99.
(*) Estimated fixed effect of regression of value added on firm characteristics for exporters. See text for details.
t-values that are significant at the 10% level or better appear in bold.



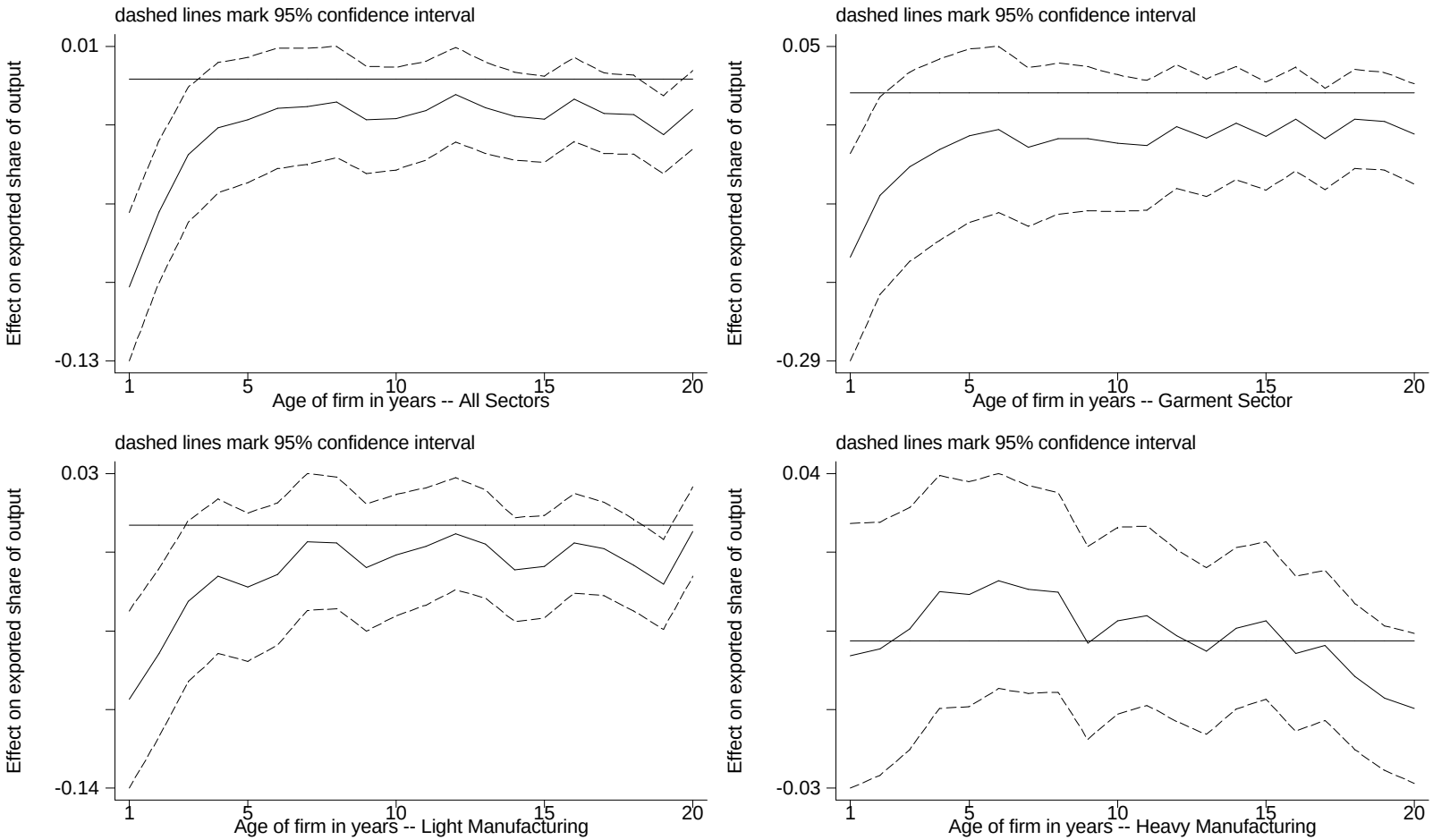
With year dummies, proximity effects, and firm characteristics

Figure 1. Firm age and exported share of output



With year, proximity effects, firm characteristics, and size

Figure 2. Firm age and exported share of output



With year dummies, proximity effects, and firm-level fixed effects

Figure 3. Firm age and exported share of output