Multimarket entry in exporting

Nicholas Sheard[1, 2]

Department of Economics, Stockholm University

Draft

April 2009

Abstract

This paper develops a model to explain a firm's optimal entry strategy in an economy where there are multiple potential export markets. The firm's costs of entry to an export market are reduced by the experienced gained from other markets already entered, so that both the set of markets and the timing of entry to those markets are important. The model is able to explain export strategies that involve entering different numbers of markets in the long-term, as well as patterns of entry that involve either simultaneous or sequential entry, where sequential entry may involve progressions of increasing or decreasing market sizes. The model predicts that more productive firms employ strategies that generally involve entering more markets, larger markets, and entering markets more rapidly. Though the order in which exporters enter markets may be different, the model predicts a correlation in the orders of market entry, and that there should be no mutually exclusive sets of markets entered in the long-term.

Keywords: export market entry, learning by exporting, fixed costs, heterogeneous firms

1. Introduction

Though much of the theoretical and empirical literature in international trade treats the destinations of traded goods as a single entity, the recent appearance of several datasets that detail the destinations of these goods has facilitated a flourish of research into the composition of trade by destination. For instance, studies have detailed the distribution of numbers of export locations by firm (Eaton, Kortum and Kramarz, 2004) and the correlation between firm productivity and the number of export destinations (De Loecker, 2007). The

[1] Stockholm University, Department of Economics, 106 91 Stockholm, Sweden. Tel: +46 8 16 30 39. Fax: +46 8 15 94 82. E-mail address: ns@ne.su.se.

[2] The author thanks Rikard Forslid, Karolina Ekholm, Anders Åkerman, Shon Ferguson, André Romahn, Daniel Spiro and Beata Javorcik for comments and suggestions. Any remaining errors are my own.

current paper contributes to this growing literature by establishing a framework to understand the optimal pattern of export market entry in an economy with more than one potential export destination. By understanding the optimal pattern of export market entry, it is possible to gain insight into the process by which firms become exporters.

In order to represent the firm's optimal export market entry strategy when faced with several potential export markets, this paper develops a theoretical model that takes account of learning and adaptation effects related to export experience. The model is able to explain a range of optimal patterns of export market entry, depending on the model parameters and the productivity level of the firm. Furthermore, the model produces testable predictions regarding the patterns of entry employed by exporting firms.

The main prediction of the model is that the strategies employed by firms will be more aggressive for more productive firms. Here a strategy is defined to be more 'aggressive' if it generally involves entering larger markets, a larger number of markets, or entering these markets sooner. These three factors work in combination, so that a strategy may be more 'aggressive' than another even if, for example, it involves entering fewer markets or entering a particular market sooner, provided that the other factors or markets more than compensate for this[3]. Therefore, this prediction does not necessarily imply that any individual market will be entered sooner for a more productive firm; indeed due to the intricacies of the different strategies, the opposite may in fact be the case.

The model is thus able to explain why firms would employ a variety of different types of strategies. Consistent with established theory, the least productive firms do not engage in exporting at all. The next least productive firms would employ a strategy that involves entering only one or a small number of markets. Firms productive enough to enter several markets in the long-term may either progress from smaller to larger markets or vice versa, . The order depending on discounting, the relative gains from experience, and productivity; firms that enter smaller markets first will necessarily be less productive than those that enter the same markets in the long-run but enter the larger markets first. The most productive firms choose to enter all or a large number of markets immediately. All of these types of

[3] In isolation, the prediction of a positive relationship between the firm's productivity and the number of export markets it operates in is not new; indeed it has been demonstrated for Slovenian data by De Loecker (2007).

strategies may be employed by different firms in the same model economy, provided there is heterogeneity in the firms' productivity levels.

The model developed in this paper is based on the heterogeneous firms framework of Melitz (2003), in which firms realise their productivity level when they are formed, then decide whether to operate and, if so, whether to export. In this paper, the firms have several potential export markets and therefore, if they decide to export, also decide on an optimal strategy for entering some set of these. The firm is assumed to learn from the experience of exporting, which can be beneficial in entering other markets in the future, so that in many cases it is optimal for the firm to stagger entry into the various export markets. Though there is some evidence that exporting activity may increase a firm's productivity (Aw, Chung and Roberts, 2000; Van Biesebroeck, 2006; De Loecker, 2007; Aw, Roberts and Xu, 2008), these results are still somewhat controversial, contradicting the well-accepted results of Clerides, Lach and Tybout (1998) and Bernard and Jensen (1999). Therefore, the benefits of experience are assumed here to accrue through the more intuitive route of the costs of establishing a new export market. This mechanism involves the firm learning how to adapt its products, run an advertising campaign, and establish a distribution network: all processes that the firm is likely to learn to do more effectively with experience.

The model developed in this paper is similar to that of Lawless (2009), who also attempted to represent a firm's pattern of entry into many export markets, though with a different focus. Her model is also based on the heterogeneous firms model of Melitz (2003) and allows for heterogeneous fixed costs of entry, real incomes, and price levels across export markets. However, as she assumes no learning effects this leads to a hierarchy of markets, with all markets being entered in the same order by all firms, the more productive firms simply entering a larger number of markets along the chain. Though this prediction was only partly upheld by the data for Irish firms that she analysed, the current paper, by allowing for learning effects to lower the fixed costs of entering subsequent markets, is able to explain heterogeneity in the orders of market entry employed by different firms. Furthermore, while her model does not predict how rapidly different firms will enter export markets, the model presented here generates the intuitive prediction that more productive firms will enter export markets more rapidly. On the other hand, by considering uncertainty Lawless is able to offer interpretations of the exit as well as entry of firms from export markets, which she shows to be empirically important as the frequency of exit from export markets is high.

In analysing firms' patterns of export entry, it is interesting to ask whether an ordering of market sizes is important; and if so, whether firms have a tendency to enter smaller markets first and then larger markets, or vice versa. Lawless (2009) predicts that, all else equal, a firm would enter larger markets first due to the higher levels of revenue that they yield, then enter less profitable, smaller markets when these are all that is left. Rauch and Watson (2003) put forward the theory that less efficient exporters would begin by exporting a small volume and then build up that volume gradually, which we might expect to become manifest by firms entering smaller markets to experiment and learn before progressing to larger markets. The model presented here does not strongly support either view, but rather is able to explain the incentives that a firm would have to take either approach.

The remainder of the paper is organised as follows: the model is presented in section 2; a discussion of a firm's optimal strategies is presented in section 3; the relatively simple case involving only two potential export markets is presented in section 4; some possible extensions to the theoretical model are presented in section 5; and the conclusion is presented in section 6.

2. Model

The economy in the model is comprised of the firm's home country and I foreign countries that the firm may choose to export to. There are a large number of other firms operating in the economy, so that the firm we focus on does not consider the effects that its export decisions have on price levels in the destination countries or the strategies of other potential export firms. To enter any given export market, the firm must sink an initial fixed cost, which is an increasing function of the market's size but, due to learning effects, a decreasing function of the number of destinations that the firm already exports to. After entering the market, the firm receives a permanent stream of revenues. As the fixed cost of entry is decreasing in the number of export destinations, the firm is able to benefit in the long-term by entering markets gradually. The model is outlined in more detail in this section.

2.1. Consumers

The consumers in the model are assumed to have identical, constant elasticity of substitution preferences of the Dixit and Stiglitz (1977) type, with demand elasticity parameter $\sigma > 1$. Where there is a continuum of Ω goods available in the economy[4], the utility of a representative individual is:

$$U = \left[\int_0^{\Omega} x_{\omega}^{\frac{\sigma-1}{\sigma}} d\omega \right]^{\frac{\sigma}{\sigma-1}}$$

The price of good ω is denoted p_{ω} and the income of the individual is denoted *Y*. The demand of the representative consumer for good ω is therefore:

$$x_{\omega} = \frac{p_{\omega}^{-\sigma}}{P^{1-\sigma}} Y$$

Where $P = \left[\int_0^{\Omega} p_{\omega}^{1-\sigma} d\omega \right]^{\frac{1}{1-\sigma}}$ reflects the overall level of prices in the market.

2.2. Firms

The firms in this model are assumed to be of the increasing returns to scale, heterogeneous productivity variety proposed by Melitz (2003), in which a firm realises its productivity after it is formed. Upon realising its productivity, the firm decides whether to produce and what strategy to employ in entering export markets. There is some fixed cost associated with establishing a firm, which in equilibrium offsets the expected operating profits and ensures that firms in the economy are formed at a positive and finite rate. After formation, the firm realises its idiosyncratic per-unit cost of production, a_{ω}, which further defines its productivity $a_{\omega}^{1-\sigma}$. Normalising the price of the sole production input to one, the firm maximises profits by setting its output price equal to $p_{\omega} = \frac{a_{\omega}\sigma}{\sigma - 1}$.

[4] As in Lawless (2009), individuals are assumed to have this type of preferences for all goods in the economy, so there is no 'traditional' or 'agricultural' sector in the model.

2.3. Export revenues

The firm is faced with *I* potential export markets, where market *i* has gross domestic product (GDP) Y_i and an overall level of prices represented by the index P_i. There is assumed to be a common transportation cost parameter, ϕ, which represents the freeness of trade with the destination market[5]. When exporting to market *i* the firm, given its output price $p = \frac{a\sigma}{\sigma - 1}$, receives the following single-period revenues:

$$\pi(P_i, Y_i) = \phi \frac{\left(\frac{\sigma}{\sigma - 1}\right)^{1-\sigma} a^{1-\sigma}}{P_i^{1-\sigma}} Y_i$$

We may simplify this expression slightly by considering the size of an export destination to be a multiple of its GDP scaled up for prices, $s_i = \alpha P_i^{\sigma-1} Y_i$, which reflects the increased potential for exporters from operating in a market where competing products are sold at higher prices. Without loss of generality, the further simplifying assumption that $\alpha = \left(\frac{\sigma}{\sigma - 1}\right)^{\sigma-1}$ yields the following:

$$\pi(s_i) = \phi a^{1-\sigma} s_i$$

Once a firm has entered an export market, it receives a permanent stream of single-period revenues. Where the firm has discount factor β, the discounted long-term revenues of entering export market *i* are given by:

$$\sum_{t=0}^{\infty} \beta^t \pi(s_i) = \frac{\pi(s_i)}{1-\beta} = \frac{\phi a^{1-\sigma} s_i}{1-\beta}$$

2.4. Fixed costs of entry to export markets

A number of studies have found positive plant-level fixed costs associated with entry into new export markets (Bernard and Jensen, 2004; Bernard and Wagner, 2001; Das, Roberts and Tybout, 2007). However, there is little evidence of ongoing fixed costs associated with

[5] These transportation cost parameters could more realistically be assumed to be heterogeneous. However, the insight gained from such an extension would be limited. A more detailed discussion of transportation costs appears later in this paper.

continuing to export, with Das, Roberts and Tybout (2007) finding that such ongoing fixed costs were not significantly different from zero. As there is no uncertainty in the current model, it makes no practical difference whether the fixed costs are assumed to be paid immediately upon entry or to be paid regularly with the same discounted aggregate value. It is therefore assumed that there are fixed costs associated with entry into a new market, but that there are no ongoing fixed costs of exporting. This assumption does not affect the results, but simplifies the model specification and fits better with empirical evidence.

The fixed cost of entry into export market *i* at time *t* is represented by the function $f^X(s_i, d_t)$, where d_t is the number of export destinations that the firm has already entered at the beginning of period *t*. The fixed cost is assumed to be increasing in the size of the destination market, to reflect that it is more costly to enter a larger market, but concave, so that there are some economies of scale, as in the model of Akerman and Forslid (2008). Again the size reflects both the GDP of the market and the overall price level, both of which are supposed to be correlated with the cost of setting up an export operation. In terms of the number of export destinations, the firm is able to use the experience of exporting to a market to reduce the effective cost of entering further markets, though as more markets are entered the potential for further such gains is reduced. Therefore, the fixed cost is decreasing but convex in the number of export destinations. Furthermore, the reduction in the fixed cost that results from the experience of having entered a market is larger in absolute terms the larger is the subsequent export destination, so that at least some of the reductions benefit depends on the size of the market that is subsequently entered. We therefore have the following conditions for the fixed cost function:

$$f_s^X > 0 \quad f_{ss}^X < 0 \quad f_{sd}^X < 0$$
$$f_d^X < 0 \quad f_{dd}^X > 0$$

The model is assumed to run over a series of discrete time periods, with one period's delay being necessary for the benefits of experience to accrue[6]. This means that if several markets are entered simultaneously, the firm is not able to use the experience of entering any of these

[6] This setup is able to explain a single-period delay between entering consecutive export markets. An assumption that reductions in the fixed costs of entering other markets would continue to accumulate over more than one period would yield a model capable of explaining longer delays before entry into further markets. However, this would essentially yield the same prediction as the framework used in this paper, with more productive firms entering export markets more rapidly.

markets to reduce the fixed cost of entering the others. Therefore, there exists a trade-off between entering any given export market immediately to begin receiving the revenue stream earlier, and delaying entry to an export market until other markets have been entered to gain from the reduced fixed cost. This setup is able to explain why different firms within the same economy would employ simultaneous as well as gradual patterns of market entry, while also being able to explain why firms would enter markets in different orders.

3. Optimal export market entry

Taking into account the potential revenues from exporting to each destination and the function of fixed costs of entry, the firm devises its optimal strategy for which markets to enter and when to enter these markets. The firm's decision may be expressed as a dynamic programming problem. The state variables in this problem are $\{y_{i,t-1}\}_{i=1}^{I}$, where $y_{i,t}$ is an indicator variable for the firm exporting to country *i* at time *t*, while the control variables are $\{y_{i,t}\}_{i=1}^{I}$. The Bellman equation for this problem is:

$$V\left(\{y_{i,t-1}\}_{i=1}^{I}\right) = \max_{\{y_{i,t}\}_{i=1}^{I}} \left\{ \sum_{i=1}^{I} \pi_{i,t} + \beta V\left(\{y_{i,t}\}_{i=1}^{I}\right) \right\}$$

$$s.t. \quad \pi_{i,t} = \begin{cases} \pi(s_i) - f^X(s_i, d_t) & if \quad y_{i,t-1} = 0 \quad y_{i,t} = 1 \\ \pi(s_i) & if \quad y_{i,t-1} = 1 \quad y_{i,t} = 1 \\ 0 & if \quad y_{i,t} = 0 \end{cases}$$

$$d_t = \sum_{i=1}^{I} y_{i,t-1}$$

As there is no uncertainty in the model, it is never optimal to drop out of an export market once the firm has entered, as the revenue in each period must be positive for the firm to enter in the first place. The policy function yielded by the dynamic programming problem can therefore be expressed as a vector *E* of integer values representing the period in which each market is entered. In particular, the firm is defined to enter market *i* in period E_i, where by convention $E_i = \infty$ if the firm does not enter the market. The discounted payoff of the strategy *E* is therefore:

$$\Pi = \sum_{i=1}^{m} \beta^{E_i} \frac{\pi(s_i)}{1-\beta} - \sum_{t=0}^{\infty} \sum_{i=1}^{m} I_{(E_i=t)} \beta^{E_i} f^X(s_i, d_t)$$

Substituting in the expression for single-period revenue, this simplifies to:

$$\Pi = a^{1-\sigma}\frac{\phi}{1-\beta}\sum_{i=1}^{m}\beta^{E_i}s_i - \sum_{t=0}^{\infty}\sum_{i=1}^{m}I_{(E_i=t)}\beta^{E_i}f^X(s_i,d_t) \quad (1)$$

Equation (1) clearly predicts that more productive firms adopt more aggressive export market entry strategies. To see this, observe that the second term in (1), which combines the discounted fixed costs of entry, is independent of the firm's productivity level. The first term in (1) multiplies the firm's productivity factor by the sum of discounted revenue streams, which is clearly larger for entry into more markets, a larger market, or for earlier entry into any given market; that is, a more 'aggressive' strategy. Comparing any given pair of potential strategies, the difference between the payoffs from the more aggressive strategy and the less aggressive strategy is an increasing function of productivity. Therefore, if both of the strategies are optimal for some set of firm productivity levels, then the more aggressive strategy must be optimal for a higher set of productivity levels. This implies that, if we ignore those strategies that are not optimal for any level of productivity, the aggressiveness of all remaining strategies must be monotonically increasing in the levels of productivity for which they are optimal.

The prediction that the order of the optimal strategies' levels of aggressiveness is the same as their levels of productivity implies that, in general, more productive firms will enter a larger number of markets in the long-term, which fits with empirical evidence (De Loecker, 2007). However, the prediction here is richer, with the number of markets entered, the size of those markets, and the pace of entry each being generally higher for more productive firms.

In part, the model predicts that more productive firms will enter markets more rapidly, with the most productive firms entering all markets simultaneously. The benefit of delaying entry to a further export market at any point in time is that if the firm waits until it gains experience from the other markets, then the fixed cost it faces of entering the market will be reduced. However, this benefit is offset by a period of foregone revenue. The fixed costs do not depend on the firm's productivity, while revenue is directly related to productivity, so the more productive firms have relatively less incentive to delay export market entry and therefore enter export markets more rapidly.

It can be inferred from (1) that firms do not necessarily enter the export markets in the same order, but rather firms with different productivity levels may enter different arrays of markets

or the same markets in different orders. The model therefore offers an explanation for why the theoretical prediction of a uniform order of market entry by Lawless (2009) was only partially confirmed by the data. Furthermore, the model represents the contrasting incentives that the firm has either to enter smaller markets first, in order to gain exporting experience at a relatively low cost, or to enter larger markets first, in order to receive more revenue in the near-term, and is therefore able to generate either type of pattern. This aspect of the model differs from that of Lawless (2009), which includes only the latter incentive and therefore has all firms, other factors being equal, always choosing to enter the larger market first. A pattern of market entry that progresses from smaller to larger markets could be inferred from the theory of Rauch and Watson (2003), who predict that less productive exporters would begin by exporting small volumes. This may either occur by exporting progressively larger amounts to the same markets, by entering progressively larger export markets, or some combination of both.

By comparing the payoffs from the different strategies, it becomes obvious that there may be at most one market for which it is optimal in the long-term for some firms to export to that market alone. To see this, consider an optimal strategy for a given market, which by definition must yield a payoff that is positive and greater than the payoff from any other strategy for firms within some range of productivity levels. Any other candidate for an optimal single-market strategy involving a higher range of productivity levels may be ruled out as, once this market had been entered, more productive firms would also find it profitable to enter the market from the original strategy. By the same reasoning, it would not be possible for a strategy involving another market to be optimal for firms with lower productivity levels, as this would imply that the original strategy could not have been optimal. Therefore, there may only be one optimal single-market strategy. Though heterogeneous transportation costs and the difficulty of isolating long-term single-market exporters in cross-section data make the picture less clear in reality, this result helps to explain why a large proportion of the single-destination exporters in the French data analysed by Eaton, Kortum and Kramarz (2004) exported to the same destination (Belgium).

In fact, this reasoning can be extended to prove that it would never be optimal for two firms in the economy to export to mutually exclusive sets of export markets in the long-term. If we consider the set of export markets and the order of entry of one firm, another firm that was more productive but did not enter any of these markets in the long-term would be foregoing

profit, while the firm we are considering would also be foregoing profits if a less productive firm had a profitable strategy that did not involve any of these markets[7]. This implies, for instance, that if some firms only enter one market in the long-term, then this market must be one of those entered by all of the firms that enter several markets. On the other hand, if some firms enter only two markets in the long-term, all firms that enter more than two markets must enter at least one of these markets, though not necessarily both. Therefore, there exists something that tends towards an ordering of export markets, with a small number of markets entered by many firms and probably with some correlation in the order of entry, though without a rigid ordering of market entry for all firms.

[7] This finding would hold even if adaptation were highly country-specific, so that firms could adapt their products in different 'directions'. Though there may be a strong tendency for firms that adapt their products to one country with a certain technological requirement, language, or taste to carry on to export to other similar countries, the argument that if one of these sets of markets is profitable for one firm then it must also be profitable for a more productive firm still holds. The situation would be different, of course, if firms were somehow heterogeneous in their capacity to adapt their products to different markets, or if there were differences in transportation costs that made access to different export markets heterogeneous across firms.

4. Two-market problem

In order to understand the factors that affect the firm's decision, it is useful to observe the simplified situation with two potential export destinations: a smaller market of size s_1 and a larger market of size s_2. Due to discounting and the fact that the benefits in terms of a lower fixed cost for entering other markets are fully realised after one period, it is never optimal for the firm to wait before entering the first market, nor to wait more than one period before entering the other market. Therefore, the optimal strategy must be one of: (1) enter neither market; (2) enter market 1 in the first period but do not enter market 2; (3) enter market 2 in the first period but do not enter market 1; (4) enter market 1 in the first period and then market 2 in the second; (5) enter market 2 in the first period and then market 1 in the second; or (6) enter both markets immediately. The discounted profits of these six strategies are:

$$\Pi^1 = 0$$

$$\Pi^2 = \frac{\phi a^{1-\sigma} s_1}{1-\beta} - f^X(s_1,0)$$

$$\Pi^3 = \frac{\phi a^{1-\sigma} s_2}{1-\beta} - f^X(s_2,0)$$

$$\Pi^4 = \frac{\phi a^{1-\sigma}}{1-\beta}\left[s_1 + \beta s_2\right] - f^X(s_1,0) - \beta f^X(s_2,1)$$

$$\Pi^5 = \frac{\phi a^{1-\sigma}}{1-\beta}\left[\beta s_1 + s_2\right] - \beta f^X(s_1,1) - f^X(s_2,0)$$

$$\Pi^6 = \frac{\phi a^{1-\sigma}}{1-\beta}\left[s_1 + s_2\right] - f^X(s_1,0) - f^X(s_2,0)$$

As discussed above, only one of the strategies with long-term entry into only one market may be optimal for some nonempty set of productivity levels. For simplicity then, but without leaving out too much in the way of intuition, I choose to focus on one of these cases, where entering only the larger market (strategy 3) is not optimal for any level of productivity. This narrows our scope to a maximum of five optimal strategies, which must be ordered 1, 2, 4, 5, 6 in increasing levels of productivity. Figure 1 displays the different strategy payoffs over a

range of the productivity parameter $a^{1-\sigma}$ for a scenario in which each of these five strategies are optimal for some levels of productivity[8].

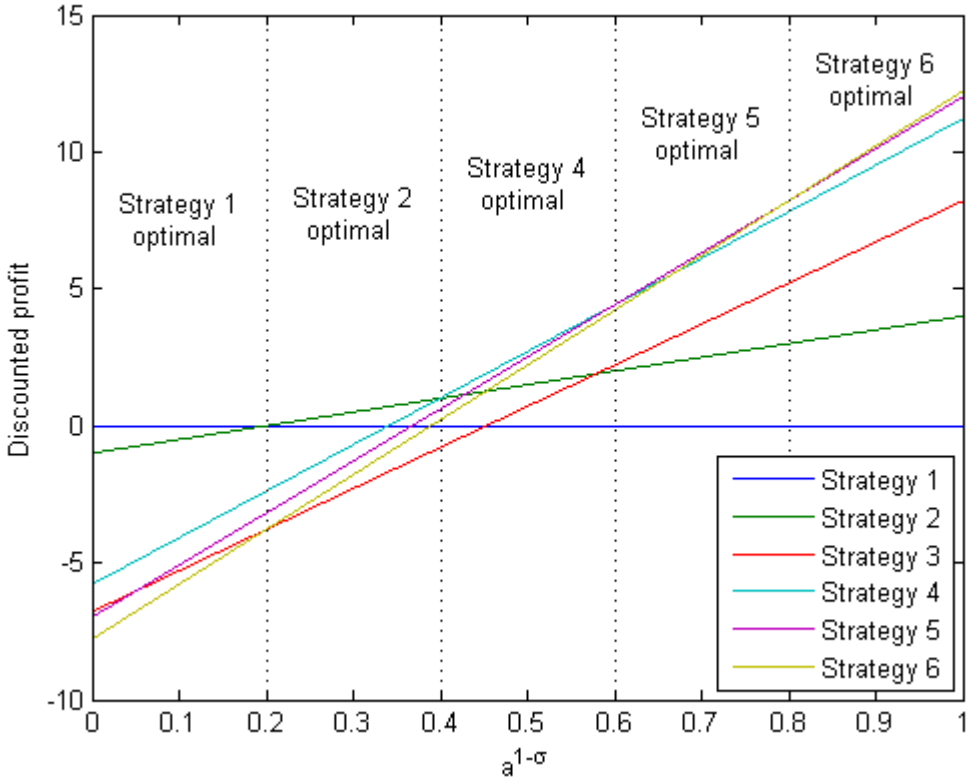

Figure 1. Strategy payoffs in 2-destination case.

The optimal strategy is simply that which yields the largest discounted future profit. In order to understand some of the intuition behind the model, we now consider the threshold levels of productivity for each strategy in this scenario. In each instance, the more aggressive strategy involves a level of productivity above the given threshold, in line with the findings above. To begin with, strategy 2 is preferred to strategy 1 if $\Pi^2 > \Pi^1$, or:

$$\frac{\phi a^{1-\sigma} s_1}{1-\beta} > f^X(s_1,0)$$

That is to say, whether exporting only to the small market is preferred to not exporting at all depends on the relative values of a number of parameters. Generally, exporting to the small

[8] The parameters in this example are $\beta = 0.8$, $\phi = 1$, $s = \{1,3\}$, $f^X(0,0) = 1$, $f^X(0,1) = 0.25$, $f^X(1,0) = 6.8$, and $f^X(1,1) = 6$.

market is preferred to not exporting at all if transportation costs are low, productivity is high, the size of the market is large (in terms of its effect on revenue rather than fixed costs), discounting is slight, and the fixed cost of entering the small market with no experience is low. Similarly, strategy 4 is preferred to strategy 2 if $\Pi^4 > \Pi^2$, or:

$$\frac{\phi a^{1-\sigma} s_2}{1-\beta} > f^X(s_2,1)$$

Here we are comparing the discounted profits from entering the smaller market and then the larger market with those from entering the smaller market alone. The problem, then, is to determine if positive profits are yielded from entry into the larger market once the smaller market has already been entered. Again there is a threshold level of productivity associated with this choice, but now with the size of the larger market and the fixed costs of entering that market second being pivotal. Considering now the two strategies where one market is entered in the first period and then the other market is entered in the second period, strategy 5 is preferred to strategy 4 if $\Pi^5 > \Pi^4$, or:

$$\phi a^{1-\sigma}[s_2 - s_1] > [f^X(s_2,0) - \beta f^X(s_2,1)] - [f^X(s_1,0) - \beta f^X(s_1,1)]$$

For it to be optimal to enter the larger market first, productivity must be above a certain threshold, but here the decision depends upon the relative revenues gained in the first period and the reductions in the levels of the fixed costs of entry. In the above inequality, the left hand side represents the difference between one period of revenue from the larger market and one period of revenue from the smaller market, while the right hand side represents the difference in discounted fixed cost reductions. The more productive a firm is, the more likely it is that the revenue difference exceeds the fixed cost difference, so that the larger market is entered first. Clearly then, if the reduction in fixed entry costs was an absolute amount that did not depend on the size of the market, the right hand side of the above inequality would be equal to zero and it would never be optimal to enter the smaller market first. Finally, strategy 6 is preferred to strategy 5 if $\Pi^6 > \Pi^5$, or:

$$\phi a^{1-\sigma} s_1 > f^X(s_1,0) - \beta f^X(s_1,1)$$

Here we are comparing the strategy of entering both markets immediately with that of entering the larger market and then the smaller market. Once again, there is a threshold level of productivity for employing the more aggressive strategy. The left hand side of the above

inequality represents the revenues received in one period of exporting to the smaller market, while the right hand side represents the discounted benefit of reducing the fixed cost of entry into the smaller market by deferring entry until after the larger market has been entered. The absolute reduction in this fixed entry cost for the smaller market should be relatively small and discounting relatively light for immediate entry into both markets to be optimal, as both of these would imply a lower benefit from staggering entry. This implies that a firm that discounts the future less chooses to enter more markets immediately, foregoing the benefits that come in the long-term from gaining experience before entering further markets.

5. Theoretical extensions

An obvious extension to the model presented in this paper would be to allow the transportation costs between the firm's location and the different export destinations to be heterogeneous. This would render the model more realistic, but would not necessarily add much in the way of insight. It seems obvious that an ordering of export destinations would exhibit a general trend from nearer markets to more distant markets and that in the long-term it is more likely that the firm exports to a market that is nearer than one that is further away, as predicted by Lawless (2009). Beyond this, many of the predictions would be the same: more productive firms would enter more and larger markets, and enter these more rapidly. However, it may be possible to gain further insight from the finer points of such a model.

It would also be possible to use a network approach to consider the experience that a firm gains from exporting to a given country to be more applicable to other countries that are close in geographic, cultural, or linguistic terms. It is costly to have labelling and support materials translated into a different language, for instance, but once this work has been done it may be applied to other markets that use the same language. There would therefore be different directions of adaptation that the firm could take, with the firm's decision to enter any particular market being influenced by the importance of the markets for which experience in that market would be beneficial. Such an approach could yield valuable insight beyond that gained from the analysis in this paper.

6. Conclusion

The model developed in this paper is capable of explaining a variety of export market entry strategies for firms in the same economy. This offers a theoretical explanation to the difficulty encountered by Lawless (2009) in explaining the existence of different patterns of entry by Irish firms. However, some components of a hierarchy are still predicted by the

model, with all firms that only enter one market in the long-term entering the same market, which loosely fits with the empirical findings of Eaton, Kortum and Kramarz (2004).

The model predicts that the firms employing different strategies will be increasing in productivity for generally increasing numbers of markets, sizes of markets, and speed of market entry. Though the prediction of a larger number of export destinations for more productive firms is not new, the prediction here is more nuanced. If verified empirically, the predictions of the model could add greater insight into the process by which firms enter export markets, indeed how firms become exporters.

References

Akerman, A., Forslid, R., 2008. Country size, productivity and trade share convergence: an analysis of heterogenous firms and country size dependent beachhead costs. CEPR Discussion Paper No. DP6545.

Aw, B., Chung, S., Roberts, M., 2000. Productivity and turnover in the export market: micro-level evidence from the Republic of Korea and Taiwan (China). The World Bank Economic Review 14 (1), 65–90.

Aw, B., Roberts, M., Xu, D., 2008. R&D investments, exporting, and the evolution of firm productivity. American Economic Review: Papers & Proceedings 98 (2), 451–456.

Bernard, A., Jensen, J., 1999. Exceptional exporter performance: cause, effect, or both? Journal of International Economics 47 (1), 1–25.

Bernard, A., Jensen, J., 2004. Why some firms export. Review of Economics and Statistics 86 (2), 561–569.

Bernard, A., Wagner, J., 2001. Export entry and exit by German firms. Weltwirtschaftliches Archiv 137 (1).

Clerides, S., Lach, S., Tybout, J., 1998. Is learning by exporting important? Micro-dynamic evidence from Colombia, Mexico, and Morocco. Quarterly Journal of Economics 113 (3), 903–947.

Das, S., Roberts, M., Tybout, J., 2007. Market entry costs, producer heterogeneity, and export dynamics. Econometrica 75 (3), 837–873.

De Loecker, J., 2007. Do exports generate higher productivity? Evidence from Slovenia. Journal of International Economics 73 (1), 69–98.

Eaton, J., Kortum, S., Kramarz, F., 2004. Dissecting trade: firms, industries, and export destinations. American Economic Review 94 (2), 150–154.

Lawless, M., 2009. Firm export dynamics and the geography of trade. Journal of International Economics 77 (2), 245–254.

Melitz, M., 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica 71 (6), 1695–1725.

Rauch, J., Watson, J., 2003. Starting small in an unfamiliar environment. International Journal of Industrial Organization 21 (7), 1021–1042.

Van Biesebroeck, J., 2006. Exporting raises productivity in sub-Saharan African manufacturing firms. Journal of International Economics 67 (2), 373–391.