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Firms' export decisions: self-selection versus trial-and-error

Mohammad Movahedi and Kiumars Shahbazi

Abstract

In this paper, a conceptual theoretical model is developed to better integrate various dimensions of the firms' decision to export. The model sheds light on the affirmations of the founding models of the 'new theory of international trade', in particular the role of productivity and sunk costs of exporting in the firms' export decision. It also takes into account two stylized facts that seem difficult to be reconciled with the implications of the founding models: 1) many domestic firms, regardless of their productivity level, enter foreign markets every year with little sales and cease all exporting activities in less than a year; 2) several of high-productivity firms choose to only serve their domestic market.

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Keywords Firm heterogeneity; self-selection; sunk cost of exporting

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1 Introduction

This paper proposes a conceptual theoretical model for concurrently studying the two competing and complementary mechanisms that may explain the decision to export by firms: 1) a self-selection mechanism by which firms choose the productivity improvement option specifically for their future entry into export markets, and 2) a trial and error mechanism whereby firms test their export profitability before entering a market.

Statistically, only few firms export their products and exporting firms are on average more productive (Wagner, 2012; Wagner, 2007; Greenaway and Kneller, 2007). To explain these two facts, the basic models of 'New New Theory of International Trade' (NNTIT) are based on two elements. The first element is the heterogeneity of firms in terms of their level of productivity, and the second is the sunk costs of exporting (Melitz, 2003; Bernard et al., 2003; Yeaple, 2005). According to the NNTIT, the decision to export or not depends on the profits that the firms expect to generate by exporting. This decision mainly depends on the firms' productivity level and the sunk costs of exporting, both of which are assumed to be exogenous. More specifically, the NNTIT indicates that for given export costs, only a sufficiently high level of productivity can generate a positive export profit and can favor the decision to export. The firms enter a foreign market by selling optimal production quantities such that export profits recover the sunk costs of exporting. Finally, although export costs may hinder the entry of a firm into an export market, they can also be a barrier to exit from an already engaged export market. Therefore, by taking into account productivity levels and sunk costs of exporting, if the expected export profit is positive, a firm will opt for an intensive and continuous export.

However, two major findings have been discussed in the literature on the topic: 1) the heterogeneity of firms in terms of innovation as a determining factor of the relative productivity advantage for exporters (Cassiman et al., 2010; Bellone and Guillou, 2011), and 2) sell into export markets usually is short-lived and occurs with small values regardless of firm-level productivity (Albornoz et al., 2012; Nguyen, 2012; Eaton et al., 2012). These two findings seem difficult to be reconciled with the implications of the NNTIT.

In this work, an approach is proposed to integrate the two abovementioned observations. This model can help to moderate, or in some circumstances to reverse, the role of productivity in the firms' export decision compared to what is entailed from the NNTIT. It allows considering other elements that are likely to affect the firms' export decision: the willingness to export on the part of the firm manager (Movahedi et al., 2017) and the confidence of the firm in the success of its export project.

The rest of this article is structured as follows. Section 2 analyzes the central assumptions of the standard models of self-selection into an export market whereby productivity is the key determinant. In Section 3, the proposed model is developed by rationalizing both the role of productivity and trial and error of exporting in the firms' export decision. In Section 4, we discuss the implications of our model. Finally, conclusions are presented in Section 5.

2 Literature review

As we will discuss hereafter, two major findings in recent empirical micro-level research in international economics seem inconsistent with the assumptions of the selection models that were first developed by Melitz (2003) and are characterized by the role of sunk costs of exporting.

On one hand, the export process can be a gradual or dynamic process, unlike the basic models such as Melitz where the firm does not export or export some optimal quantities. In fact, many firms start to sell into export markets small quantities and then adjust their decision based on their market experience. A large number of them stop selling abroad in the short term, while few surviving exporters have a tendency to gradually increase their presence in international markets (Albornoz et al., 2012).

For example, each year in France, about 25% of exporters are new often with a very marginal presence in international markets. Almost 21% of exporters abandon their export activity every year. Thus, the retention rate among new exporters is very low. Close to 60% and 80% of them abandon their export activities, respectively, after one year and three years (data of French Customs, 2012). The new French exporters who survive, tend to expand their presence in terms of the quantities and the number of markets served (Buono and Fadinger, 2012). Lawless (2009), Schmeiser (2012), Amador and Opromolla (2013), Sheard (2014), Cebeci and Fernandes (2014), Van Biesebroeck et al. (2016) made similar observations, respectively, for Ireland, Russia, Portugal, Sweden, Turkey and Canada.

The recent trade models argue that firms move into exporting with small quantities and out of exporting entirely after a short time in order to learn about their profit potential in foreign market (Eaton et al., 2012; Albornoz et al., 2012) and to compensate for the decline in domestic demand of their products (Blum et al., 2013). While rich in other dimensions, in these models, 1) export profitability across markets is mistakenly supposed perfect, i.e. firms learn fully about their profitability in foreign market even by selling very shortly, small quantities and at one market, and 2) an unlikely explanation is advanced for the large number of firms that enter exporting for a year and then never export again.

However, the widespread ephemeral behavior of firms in foreign market, often aroused by an order received effortlessly, are not the result of long-term, thoughtful and carefully constructed strategy, and so it do not allow firm to learn fully its profitability in foreign market. In our opinion, this simple round trip should not be considered as a real export but as a trial and error of exporting which can raise the level of confidence in the future export projects.

On the other hand, selection models put a great emphasis on high productivity which should be obtained by the firms to start exporting. This indicates that the non-exporting firms have a low productivity. However, some studies show that not all productive firms have a tendency to export (Lileeva and Trefler, 2010). This may be the case for firms located in domestic market where demand is relatively high enough to have a good productivity and a high profit. For example, the International Export and Productivity Study Group (ISGEP, 2008), based on a comparative study of 14 countries, including 11 developed and 3 developing countries, found that the high domestic market size (as measured by the GDP) significantly reduces the

proportion of exporting firms. Indeed, this proportion is low in relatively larger countries[1] because companies can expand their activities by obtaining a larger part of the domestic market in a less expensive and risky way. This result is consistent with model predictions of Hallak and Sivadasan (2013) that high productivity firms prefer to increase their sales in the domestic market instead of investing in exports.

These observations suggest that export to international markets would not solely depend on high productivity in order to compensate the exogenous sunk costs of exporting. It also depends on an export strategy which can be for example associated with trial and error of exporting. The trial and error of exporting allows probing the market thanks to the information and knowledge acquired in the field. Indeed, the trial and error of exporting aids the firms in assessing the opportunities, understanding the new managerial practices, evaluating the firm's competitive advantages, and building a new relationship network. The company can better appreciate the risk associated with exporting and better define its commitment to foreign markets.

The basic selection model does not sufficiently take into account the lack of information and knowledge on foreign markets. The lake of information is one of the biggest export barriers signaled by the Small and Medium-sized Enterprises (SMEs) (OECD, 2009). From the top five export barriers, three of them are related to information issues (see Table 1, Items 2, 3 and 4). This problem is a repeatedly echoed in previous studies as an exporting challenge of SMEs (Leonidou, 2004).

The information deficit leads to a higher risk perception by the firm manager, which delays international outreach. The firm can acquire information on foreign markets in two complementary ways: by market research or by trial and error of exporting. Market research allows firms to obtain information before the decision to export. Knowledge about foreign markets can also be acquired *ex post* through the trial and error of exporting, this means through a low commitment to an export market but sufficient to collect information on the market in which the firm wants to develop.

Our problem is to better integrate the two previously described observations: a productive firm does not necessarily have an interest in exporting and the export process can be a gradual and/or a discontinuous process (i.e. entry, exit, low export quantities).

The main contribution of the proposed model is to differentiate export strategies in order to endogenize sunk costs of exporting. Indeed, the sunk costs depend, in this model, on the firm's willingness to export, its information level on the markets in which it wishes to export, and finally its current productivity. The endogeneisation of these sunk costs explain the limited

Table 1: The top five barriers to exporting (OECD, 2009)

1.	Shortage of working capital to finance exports
2.	***Identification of opportunities abroad***
3.	***Limited information to locate / analyze markets***
4.	***Inability to contact potential overseas customers***
5.	Obtaining reliable foreign representation

Ranked according to their relative impact

[1] For example, in the United States only about 4% of companies export (Bernard et al., 2007).

number of firms in the export markets according to "finiteness property" (Shaked and Sutton, 1983; Sutton, 1991). Indeed, in the main export markets, particularly strong quality competition generates an increase in sunk costs leading to a limited number of firms able to exist at Nash equilibrium.

3 The proposed model

We start from a more precise analysis of the export process. We consider the phase preceding the actual export during which a firm carries out a feasibility study and gathers the necessary investment commitments for exporting (design, development, capacity, adaptation).

To evaluate the profitability of export, the firm must first perform a feasibility study. This preliminary diagnosis must determine whether the export objective is realistic and whether the risks to be taken do worth it. Such a study evaluates the benefits and costs of exporting for the firm, estimates the availability of the internal resources and the accessibility to the external resources, specifies the supply and target market(s), and considers the opportunities for foreign partnerships. This first step must identify if the firm should begin export activities or not. To improve the quality of the decision, the feasibility study must be accompanied by expert advice from outside the firm.

If the decision to continue is made, the firm must design and develop an export plan to enter the practical phase. The export plan must be based on the feasibility study to clarify and formalize the firm's product-country-partner strategy and to evaluate the expected returns on investments. The execution of the plan involves realizing the market studies, arranging a financing plan, and forming partnerships with foreign companies. Likewise, the firm must invest in consulting and training, recruiting export specialists, increasing production capacities, and adapting the products for the foreign market.

The *ex-ante* investments associated with the export project (feasibility, design, development, capacity, and adaptation) is assumed as endogenous sunk costs since their magnitude is mainly chosen by the firm and can change a firm's demand.

Finally, the profitability of an export project is evaluated by assuming that:

1) the export project consists of a two-phase sequence: a feasibility phase (noted by C for the feasibility cost) and investment phase (noted by I for the *ex ante* investment in design, development, capacity or adaptation dedicated to export). By its nature, the objective of a feasibility study is to determine whether the project is economically viable before incurring significant expenditure. Therefore, we assume that the cost of a feasibility study is not too high to affect the choice to continue or abandon the export project ($C < I$).

2) the investment phase is conditioned on the results of the feasibility study. We denote $\rho \in]0,1]$ as the likelihood of the firm continuing the export project which depends on the result of the feasibility study. We assume that ρ depends on the level of information that the firm has on an export project. The value of ρ will be higher if the firm has already exported or tried to export especially into the near market in terms of cultural or/and geographical contexts (Ellis, 2007), or if the firm has favorable information on export projects conducted by neighboring

firms. 'Tried to export' is a notable case in which the firm has experimented exporting (*trial and error of exporting*) in order to gain a greater confidence in its ability to earn profit abroad. For example, Kneller and Pisu (2006) found that UK firms with some export experience are more likely to enter new export markets. Similar observations have been made in other countries such as Ireland (Lawless, 2009), Argentina (Albornoz et al., 2012), Russia (Schmeiser, 2012), Turkey (Cebeci et al., 2014), Portugal (Amador and Opromolla, 2013), and Sweden (Sheard, 2014).

3) Parameter $\widehat{\Pi}_{ex}$ denotes the firm's expected profit from both domestic and export sales.

4) Parameter Π_0 denotes the firm's assured profit without export or the firm's normal profit from domestic sales. According to the model of Melitz (2003), we assume that the firm's normal profit, Π_0, depends on its productivity. Indeed, a more productive firm can offer a lower price, produce larger quantities and reap higher domestic profits.

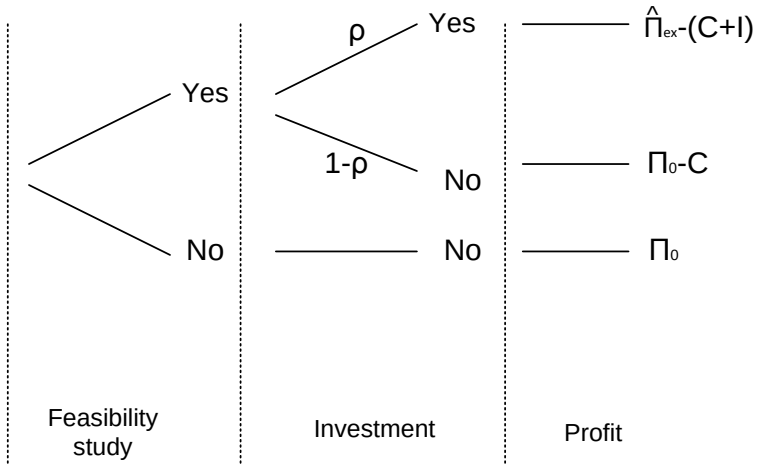
The export project and firm's profits can then be represented using a decision tree (see Figure 1).

Finally, applying the criterion 'mean-variance', a non-exporting firm plans to export if:

$$\underbrace{\rho\left(\widehat{\Pi}_{ex} - C - I\right) + (1-\rho)(\Pi_0 - C)}_{expected\ profit\ from\ the\ export\ project} \geq \Pi_0$$

So, if:[2]

$$\widehat{\Pi}_{ex} \geq \Pi_0 + \frac{C}{\rho} + I \tag{1}$$



$\widehat{\Pi}_{ex}$: expected profit with export; Π_0: domestic profits; C: feasibility cost; I: investment.

Figure 1: The decision tree concerning an export project

[2] $\rho\left(\widehat{\Pi}_{ex} - I\right) - C \geq \rho\Pi_0 \rightarrow \rho\widehat{\Pi}_{ex} - (\rho I + C) \geq \rho\Pi_0 \rightarrow \rho\widehat{\Pi}_{ex} - \rho\Pi_0 \geq \rho I + C.$

We assume that firms prefer self-financing to invest in their export projects (external financing is more expensive than self-financing). This assumption is in line with some empirical studies such as Bellone et al. (2010) suggesting that the firms enjoying better financial health are more likely to become exporters. Also, limitations in finance and related physical resources have continued to be highlighted as a leading barrier to the internationalisation of SMEs (OECD, 2009). Therefore, the expenses associated with the feasibility study (*C*) and with the investment (*I*) depend on the current financial capacities of the firm.

In addition, we assume that export expenditures and investments depend on the firm' export effort level (measured by $\alpha \in]0,1]$). The effort is directly related to the export desire of the company's management. This desire of management is embodied in the fact of export culture acquired through experiments or trial and error in exporting (taste for foreign languages, opening to the outside world). Thus, the amounts invested in the export project (*C* and *I*) are supposed to depend on the effort level that the firm employs to export (α), the financial capacities (Π_0) and ρ which measures the confidence that the firm has in the success of the project. Therefore, for a given ρ, a higher α *or* Π_0 makes a higher investments, and when $\alpha, \Pi_0, and\ C$ are given, a higher ρ makes a higher investment. In other words, a higher (respectively weaker) confidence in the success of the export project presumes making a favorable (respectively unfavorable) impact on the investment (*I*).

On the other hand, if $\widehat{\Pi}_{\mathrm{ex}}$ is negative, the firm makes a negative expected profit from both domestic and export sales and therefore it continues to serve only the domestic market. Thus, the minimum level required to make non-negative expected profit is defined as $\widehat{\Pi}_{ex} = 0$.

If we put the function $\widehat{\Pi}_{ex}$, which takes the arguments $C, I, \Pi_0, \alpha, \rho$, equal to zero, $\widehat{\Pi}_{ex}(C, I, \Pi_0, \alpha, \rho) = 0$, so $\frac{dI}{d\Pi_0} > 0$, $\frac{dI}{d\alpha} > 0$, $\frac{dI}{d\rho} > 0$, (likewise for C) and $\frac{dI}{dC} < 0$. The profitability condition of the export project can therefore be rewritten as follows:

$$\widehat{\Pi}_{ex} \geq (1 + \alpha)\Pi_0 \tag{2}$$

Indeed, the firm plans to export if it considers that profit with export is greater than the profit without export, that is, if the firm's expected profit from both domestic and export sales is greater than the opportunity cost (current profit) and the investment made.

We also assume that the expected profit with export ($\widehat{\Pi}_{ex}$) depends on the expenditure on feasibility phase and the investment phase (*C* and *I*). We assume that the more the firm invests in the export project, the better it can get prepared and can therefore expect a higher export profit. Moreover, we have seen that the feasibility study and *ex ante* investment depend on the normal profit Π_0, the export effort α and the confidence in the success of the project ρ. Therefore:

$$\widehat{\Pi}_{ex} = f(\alpha, \rho, \Pi_0) \qquad \text{with } \alpha\Pi_0 = \frac{C}{\rho} + I \tag{3}$$

and

$$\frac{\partial \widehat{\Pi}_{ex}}{\partial \alpha}, \frac{\partial \widehat{\Pi}_{ex}}{\partial \rho} and\ \frac{\partial \widehat{\Pi}_{ex}}{\partial \Pi_0} > 0;\ \frac{\partial^2 \widehat{\Pi}_{ex}}{\partial {\Pi_0}^2} < 0$$

Finally, the profitability condition can be rewritten as follows:

$$\widehat{\Pi}_{ex} = f(\alpha, \rho, \Pi_0) \geq (1+\alpha)\Pi_0 \tag{4}$$

As indicated in the Eq. 3, the second derivative of the function $\widehat{\Pi}_{ex}$ is negative in its domain. So, $\widehat{\Pi}_{ex}$ is a concave function. Therefore, it can be defined by the standard logarithm function which respects all the properties of $\widehat{\Pi}_{ex}$ function., We proposed, for a given firm, the expected profit function in order that the latter crosses the Eq. 4 (profitability condition) in two points, as shown in Figure 2, as follows:

$$\widehat{\Pi}_{ex} = f(\alpha, \rho, \Pi_0) = \rho log\left[((1+\alpha)\Pi_0)^{(1+\alpha)} - \alpha^{\beta}\right]^{\beta(1+\alpha)} + \beta \tag{5}$$

where β denotes a strictly positive parameter that captures the impact of non-controlled variables on the profitability of the export project, for example, the size of the industry or group membership. Therefore, we can consider that all other things being equal, a high β for a firm belongs to a sector of activities with a strong export culture or for a subsidiary of an international group.

Thus, the heterogeneity in our model is not limited to productivity but also integrates the firm's export strategy: the desire to export from the firm manager (α) and the confidence of firm in the success of the export project (ρ).

4 Results and discussion

For any given α, the Eq. 2 and Eq. 3 set a profitable area of an export project determined by a minimum domestic profit point ($\Pi_{0,min}, \widehat{\Pi}_{ex,min}$) and a maximum domestic profit point ($\Pi_{0,max}, \widehat{\Pi}_{ex,max}$) (see Figure 2).[3] For a domestic profit below the minimum profit ($\Pi_{0,min}$), the firm does not have the financial resources to make a profitable export project. Also, a high domestic profit generates a high export opportunity costs that can make the export project unprofitable (this is the case if the domestic profit is greater than the maximum profit).

Therefore, we can now characterize the several export decisions of a firm. First, using Figure 3, we can compare a firm with high willingness to invest in exports (high-α, specified by α_1) to a firm with a low willingness (low-α, specified by α_2) by assuming an identical ρ ($\rho_1 = \rho_2$).

A high willingness to export (high-α), for the same domestic profit (Π_0), is associated with a higher expected profit from both domestic and export sales ($\widehat{\Pi}_{ex}$). The expected profit increases with an increase in α. In contrast, a firm with a strong desire to export (high-α) but with

[3] Figure 2 is a representation of Equations 4 and 5: $\rho log\left[((1+\alpha)\Pi_0)^{(1+\alpha)} - \alpha^{\beta}\right]^{\beta(1+\alpha)} + \beta \geq (1+\alpha)\Pi_0$. For given α and ρ values, there are the values of Π_0 for which the export project is profitable. For example, for $\alpha = 0.1, \rho = 1$, and $\beta = 2$ the two curves intersect in $\Pi_{0,min} = 0.51$ and $\widehat{\Pi}_{ex,min} = 0.38$, and in $\Pi_{0,max} = 6.05$ and $\widehat{\Pi}_{ex,max} = 6.52$. For $\alpha = 0.9$, $\rho = 0.8$ and $\beta = 2$ the two curves intersect in $\Pi_{0,min} = 0.68$ and $\widehat{\Pi}_{ex,min} = 1.24$, and in $\Pi_{0,max} = 10.59$ and $\widehat{\Pi}_{ex,max} = 18.35$.

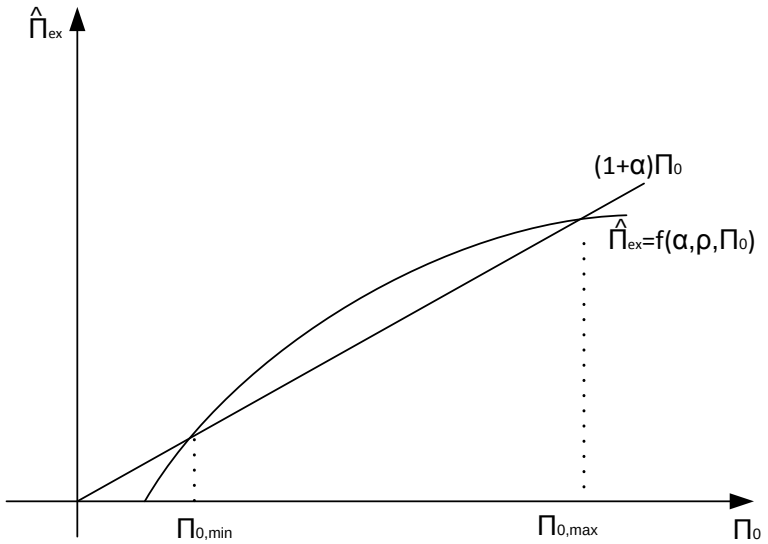


Figure 2: Profitability zone for α and ρ

insufficient productivity (productivity associated with a profit below $\Pi_{0,min}$) will not find it profitable to export.

As shown in the Figure 3,[4] the profitability range corresponding to the first case (high-α) is shifted to the right with an enlargement of this range. In other words, the range $\Pi_{0,min,a1} - \Pi_{0,max,a1}$ is wider than the range $\Pi_{0,min,a2} - \Pi_{0,max,a2}$. Among the firms with a high level of profitability, those with low-α still prefer to remain solely focused on the less expensive and less risky domestic market and do not feel the need to export. In contrast, the firms with high profitability and high-α are more likely to project into the export.

If the actual profit is very low, regardless of the level-α (low-α or high-α), the firm does not have the necessary means to absorb the sunk costs of exporting and enter foreign market.[5]

In addition, we can demonstrate that a firm investing heavily in exports will have no interest in moving out of export activities given the *ex ante* is an irreversible investment. This case is in line with the classic explanation of the selection models that, firstly, the threshold for export profitability is fairly high and secondly, a small number of firms enter into export markets. However, Melitz-style models assume that, for the same level of productivity, all firms have the same desire to export (assumes α constant) and the same confidence in the success of their export project (assumes ρ constant). They assume that the level of willingness and confidence are high enough, so only productivity plays a role in the firm's export decisions.

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[4] Cf. previous note, for identical φ and β ($\rho = 1$ *and* $\beta = 2$), taking successively, $\alpha_1 = 0.9$ (high-α) and $\alpha_2 = 0.1$ (low-α). In the first case (high-α) the two curves intersect in $\Pi_{0,min} = 0.69$ and in $\Pi_{0,max} = 14.12$, and in the second case (low-α) the two curves intersect in $\Pi_{0,min} = 0.51$ and in $\Pi_{0,max} = 6.05$.

[5] $\Pi_{0,min,a2}$ is expected to be less than or equal to $\Pi_{0,min,a1}$. Whereas our parameterization led to $\Pi_{0,min,a2} > \Pi_{0,min,a1}$ in Figure 3, we remind that this superiority of $\Pi_{0,min,a2}$ compared to $\Pi_{0,min,a1}$ is very negligent (e.g. 0.61 compared to 0.51 for the extreme value).

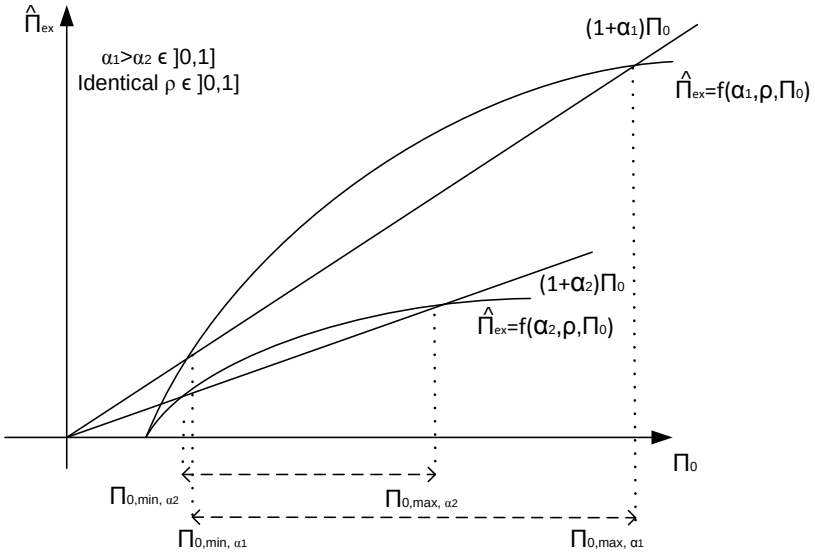

Figure 3: Profitability zone for two different values of α

Therefore, we enrich the Melitz-style models by considering the willingness to export as a heterogeneous characteristic, so there can be a range of α making different relationships between profitability and the export decision. For a given level of productivity, we can associate a level of parameter α making export profitable or not. Moreover, our model shows that for a given level of willingness to export, too high productivity can make the export unprofitable. In this case, the opportunity cost of exporting is too high to make the export project unprofitable.

Moreover, Figure 4[6] compares two groups of firms: high-ρ (ρ_1) and low-ρ (ρ_2) for the same level of α. As shown in the figure, the profitability condition lines, $(1+\alpha)\Pi_0$, are identical for both firm categories because $\alpha_1 = \alpha_2$. However, as demonstrated in the figure, the expected profit curves are different for the two categories of firms: the upper curve represents the expected profits of firms with a high-ρ, while the lower one illustrates the expected profits of firms with a low-ρ. For the category of firms with a high-ρ (respectively low-ρ), firms with a profit between Π_{0,min,ρ_1}(respectively Π_{0,min,ρ_2}) and Π_{0,max,ρ_1} (respectively Π_{0,max,ρ_2}) enter foreign markets because their expected profit is higher than the profitability condition line, $(1+\alpha)\Pi_0$. Then, increasing the level of confidence in the success of the project, independently of productivity, creates the potential for some domestic firms to start exporting.

[6] Cf. Footnote 3; For identical α and β ($\alpha = 0.9$, *and* $\beta = 2$), taking successively $\rho_1 = 1$ (high-ρ) and $\rho_2 = 0.8$ (low-ρ). In the first case (high-ρ) the two curves intersect in $\Pi_{min} = 0.69$ and in $\Pi_{max} = 14.12$, in the second (low-ρ) the two curves intersect in $\Pi_{min} = 0.68$ and in $\Pi_{max} = 10.59$.

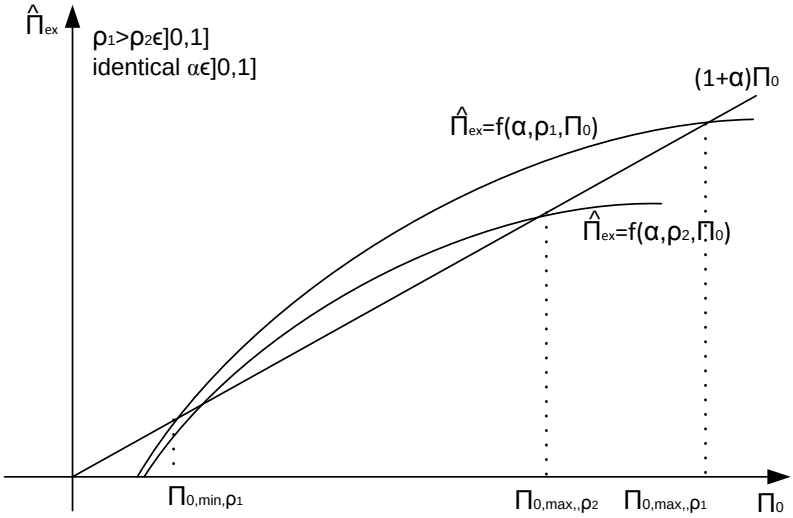

Figure 4: Profitability zone with two different values of ρ

5 Conclusion

We proposed a theoretical model that complements the characteristics of the NNTIT models. It can also explain stylized facts that contradict some implications of the NNTIT based on the existence of sunk costs to entry into export markets, i.e. low-productive firms continue to serve only the domestic market and high-productive firms enter in foreign market permanently and by exporting a considerable part of their production. The proposed model shows that:

1) The phenomenon of a low initial commitment to export and the phenomenon of exiting from export market are rational and not mere random phenomena. This model shows that export by achieving a low level of *ex ante* investment can be profitable for firms. In this case, a relatively low profit (thus a low productivity), corresponding to a low export opportunity cost, can allow a profitable export. The export experience is not very important but it allows the firm to acquire *ex post* information on the targeted export market. This information may allow the firm to gradually expand its export activities. In other words, the firm can choose to pay the sunk cost and a small initial operational loss in order to test its competitiveness. Finally, this case corresponds to a process of 'sequential exporting' (Albornoz et al., 2012) in which firms use their initial export experience to infer information on their future success. Furthermore, given the low opportunity cost, the firm can exit from foreign markets without recurring high export costs if it does not register the expected profits.

2) Trial and error parameters (α and ρ) determine the incentive to export. This means, an increase in α and ρ, increases the productivity ranges for which exporting is profitable. More specifically, the presence of these variables breaks the perfect correlation between productivity and the incentive to export. Indeed, for the same productivity, the differences in the

parameters α or ρ may result in various outcomes of exporting. Thus, unlike the NNTIT, the proposed model can explain why some productive firms do not export. This is the case of productive firms with a relatively low level of α. For example, an insufficient export experience or the lack of willingness of the firm manager can prevent the firm from entering a foreign market since the opportunity cost of this activity is deemed higher than the expected profit. The proposed conceptual model has a number of limits which identify avenues for future research and could extend this study. An important future direction is to calibrate the parameters of α and ρ with experimental data as well as associating these parameters with the characteristics of the firms and behavioral factors of their managers.

References

Albornoz, F., Calvo, H., Corcos, G., and Ornelas, E. (2012). Sequential exporting. *Journal of International Economics*, 88(1), 17–31. https://www.sciencedirect.com/science/article/abs/pii/S0022199612000220

Amador, J., and Opromolla, L. (2013). Product and destination mix in export markets. *Review of World Economics*, 149(1), 23–53. https://www.jstor.org/stable/42636091?seq=1

Bellone, F., and Guillou, S. (2011). Innovation et performance des exportateurs: une analyse empirique sur données d'entreprises françaises. *Economie et Prévisions*, 197(1), 45–61. https://www.cairn.info/revue-economie-et-prevision-2011-1-page-45.htm

Bellone, F., Musso, P., Nesta, L., and Schiavo, S. (2010). Financial constraints and firm export behaviour. *The World Economy*, 33(3), 347–373. https://onlinelibrary.wiley.com/doi/10.1111/j.1467-9701.2010.01259.x

Bernard, A., Eaton, J., Jensen, B., and Kortum, S. (2003). Plants and productivity in international trade. *American Economic Review*, 93(4), 1268–1290. https://www.aeaweb.org/articles?id=10.1257/000282803769206296

Bernard, A., Jensen, B., Redding, S., and Schott, P. (2007). Firms in international trade. *Journal of Economic Perspectives*, 21(3), 105–130. https://www.aeaweb.org/articles?id=10.1257/jep.21.3.105

Blum, B.S., Claro, S., and Horstmann, I.J. (2013). Occasional and perennial exporters. *Journal of International Economics*, 90, 65–74. https://www.sciencedirect.com/science/article/abs/pii/S0022199612001717

Buono, I., and Fadinger, H. (2012). The micro dynamics of exporting: evidence from French firms. *Temi di Discussione - Bank of Italy, 880*. https://ideas.repec.org/p/bdi/wptemi/td_880_12.html

Cassiman, B., Golovko, E., and Martínez-Ros, E. (2010). Innovation, exports and productivity. *International Journal of Industrial Organization*, 28(4), 372–376. https://www.sciencedirect.com/science/article/abs/pii/S0167718710000378

Cebeci, T., and Fernandes, A.M. (2014). Micro dynamics of Turkey's export boom in the 2000s. *The World Economy*, 38(5), 825–855. https://onlinelibrary.wiley.com/doi/abs/10.1111/twec.12183

Eaton, J., Eslava, M., Krizan, C., Kugler, M., and Tybout, J. (2012). A search and learning model of export dynamics. *Manuscript*. https://ideas.repec.org/p/red/sed015/1535.html

Ellis, P.D. (2007). Paths to foreign markets: Does distance to market affect firm internationalisation? *International Business Review*, 16, 573–593. https://www.sciencedirect.com/science/article/abs/pii/S0969593107000790

Greenaway, D., and Kneller, R. (2007). Firm heterogeneity, exporting and foreign direct investment. *Economic Journal*, 117, 134–161. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1468-0297.2007.02018.x

Hallak, J.C., and Sivadasan, J. (2013). Product and process productivity: Implications for quality choice and conditional exporter premia. *Journal of International Economics*, 91, 53–67. https://www.sciencedirect.com/science/article/abs/pii/S0022199613000500

ISGEP (2008). Understanding cross-country differences in exporter premia: comparable evidence for 14 countries. *Review of World Economics, International Study Group on Exports and Productivity (ISGEP)*, 144(4), 596–635. https://link.springer.com/article/10.1007/s10290-008-0163-y

Kneller, R., and Pisu, M. (2006). The role of experience in export market entry: Evidence for UK. *University of Nottingham Research Paper No. 2006/48* . https://papers.ssrn.com/sol3/papers.cfm?abstract_id=951982

Lawless, M. (2009). Firm export dynamics and the geography of trade. *Journal of International Economics*, 77(2), 245–254. https://www.sciencedirect.com/science/article/abs/pii/S0022199609000099

Leonidou, L. C. (2004). An Analysis of the Barriers Hindering Small Business Export Development. *Journal of Small Business Management*, 42(3), 279–302. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1540-627X.2004.00112.x

Lileeva, A., and Trefler, D. (2010). Improved access to foreign markets raises plant-level productivity for some plants. *Quarterly Journal of Economics*, 125(3), 1051–1099. https://academic.oup.com/qje/article-abstract/125/3/1051/1903644?redirectedFrom=fulltext

Melitz, M.J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71, 1695–1725. https://onlinelibrary.wiley.com/doi/10.1111/1468-0262.00467

Movahedi, M., Shahbazi, K., and Gaussens, O. (2017). Innovation and willingness to export: is there an effect of conscious self-selection? *Economics: The Open-Access, Open-Assessment E-Journal*, 11 (2017-25): 1–22. http://dx.doi.org/10.5018/economics-ejournal.ja.2017-25

Nguyen, D.X. (2012). Demand uncertainty: Exporting delays and exporting failures. *Journal of International Economics*, 86, 336–344. https://www.sciencedirect.com/science/article/abs/pii/S0022199611001267

OECD (2009). *Top barriers and drivers to SME internationalisation*. OECD. https://pureportal.strath.ac.uk/en/publications/top-barriers-and-drivers-to-sme-internationalisation

Schmeiser, K.N. (2012). Learning to export: Export growth and the destination decision of firms. *Journal of International Economics*, 87(1), 89–97. https://www.sciencedirect.com/science/article/abs/pii/S0022199611001449

Shaked, A., and Sutton, J. (1983). Natural oligopolies. *Econometrica*, 51(5), 1469–1483. https://www.jstor.org/stable/1912285

Sheard, N. (2014). Learning to export and the timing of entry to export markets. *Review of International Economics*, 22(3), 536–560. https://onlinelibrary.wiley.com/doi/abs/10.1111/roie.12132

Sutton, J. (1991). *Sunk costs and market structure: Price competition, advertising, and the evolution of concentration.* Cambridge MA: MIT Press. https://mitpress.mit.edu/books/sunk-costs-and-market-structure

Van Biesebroeck, J., Yu, E., and Chen, S. (2016). The impact of trade promotion services on Canadian exporter performance. *Canadian Journal of Economics*, 48(4), 1481–1512. https://onlinelibrary.wiley.com/doi/abs/10.1111/caje.12148

Wagner, J. (2007). Exports and productivity: A survey of the evidence from firm-level data. *World Economy*, 30(1), 60–82. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9701.2007.00872.x

Wagner, J. (2012). International trade and firm performance: A survey of empirical studies since 2006. *Review of World Economics*, 148(2), 235–267. https://www.jstor.org/stable/41485795

Yeaple, S.R. (2005). A simple model of firm heterogeneity, international trade, and wages. *Journal of International Economics*, 65, 1–20. https://www.sciencedirect.com/science/article/abs/pii/S0022199604000418