

## **Reply to the Referee 2 Report**

**We would like to thank the referee 2 for the careful reading and the valuable comments that helped us to improve the manuscript. Hereafter, the item-by-item response for each comment is provided.**

### **1. Main concerns**

Although the paper is very likely the first attempt to model a difficult issue, to my opinion it fails to give a satisfactory answer to the main question it addresses: the reconciliation of the two following stylized facts: i) flows of entry and exit to/from export markets are substantial; and ii) entry in export market is gradual, i.e. firms start exporting small quantities and, if they survive, quickly expand their exports.

To my understanding the model neither addresses the issue of exit and it does not pose any testable hypothesis on quantities exported.

Furthermore, the paper is poorly written, needs an English revision and notation is confuse (e.g. firms' export effort level should always be either  $\alpha$  or  $a$  but not the two of them).

### **Response 1:**

**First, in a new version, we need to clarify the purpose of the paper and clarify what is meant by export.**

**We thank the reviewer for raising this point out. The objective is to propose a conceptual model for a better understanding of the firm's decision to enter into the foreign market. To do this, we relied on the theoretical model of Melitz (2003) where a firm that plans to export is a firm that assesses that it is profitable for it to export or that its export project is profitable. But what does it mean 'export'?**

**In this work, we consider that export is the sustainable sale of a fairly large quantity of production abroad, which requires incurring significant resources in export project, including human resources, adaptation of products and standards, construction of partnership networks, etc.**

**The sale of a marginal and occasional quantity which is often aroused by opportunity (e.g. an order received effortlessly which one would not refuse) should not, in our opinion, be considered as a real export, because it does not appear, most often, be the result of long-term, thoughtful and carefully constructed strategy that is fully integrated into the business. On the other hand, this firms' experience in international trade can give a better confidence in the export project and plays a role alongside the suitable productivity in the export decision.**

**The sunk costs of exporting can be considered as a barrier to export only when the export is accompanied by significant investment for the firm.**

**Therefore, under the presence of sunk costs of exporting, a firm with suitable productivity and high confidence (explained by its occasional sales abroad) in its export project commits to the export.**

**Regarding the second comment of the referee, in a new version, we will take care over the text and proofread the paper by a native English speaker.**

## 2. Comments

1. All along the papers, the authors change the way in which they refer to firm's export effort level what produces great confusion. Sometimes they call it  $a$  and another times they call it  $a$ .

### **Response 2:**

**In light of the referee 2's comment, this typo will be corrected in a new version.**

1. The paper aims to add to the literature on self-selection suggesting that, in addition to productivity, other factors such as the firm's export effort level ( $a$ ) and the confidence that the firm has in the success of the project ( $\rho$ ) may be relevant in firms' export decision. However, the authors do not consider the direct impact of productivity but their indirect effect through domestic profit. In page 5, the authors say that firms' normal profits depend on productivity. In page 8, the authors say "a high willingness to export is associated to a higher level of profitability and therefore a higher level of productivity". It seems that the authors are implicitly assuming that high profits are necessarily associated to high productivity. Nevertheless, it should be considered that high profits could be the result of both high efficiency and/or market power. Therefore, a higher  $\Pi_0$  is not necessarily associated to higher productivity.

### **Response 3:**

**In our paper, according to the model of Melitz (2003), the productivity firm heterogeneity means that a more productive firm can offer a lower price, produce larger quantities and reap higher domestic profits. To clarify better, in a new version, we will reformulate our sentence in page 8. Indeed, all other things being equal, for the same domestic profit ( $\Pi_0$ ), a higher  $\alpha$ , is associated with a higher expected profit from both domestic and export sales ( $\hat{\Pi}_{ex}$ ).**

2. The authors assume "ex-ante costs associated with export project are endogenous". But, is it realistic to assume that all sunk export costs are endogenous? Very likely sunk costs such as the costs associated to learn about the sanitary or phyto-sanitary restrictions to be met to export to a given country are exogenous sunk costs (like this, there is possible to think about others). Which are the implications of the existence of exogenous sunk costs in your model?

### **Response 4:**

**To export, a firm has to overcome export costs. A distinction is made between *ex post* export costs and *ex ante* export costs. *Ex post* costs (customs fees, transport costs, etc.) are essentially variable costs insofar as they are associated with the amounts exported. *Ex ante* fixed costs are costs linked to the decision to export (feasibility study and market research expenditure, advertising expenditure, recruitment and consultancy costs, adaptation costs, etc.).**

***Ex ante* fixed costs are costs that are involved in the decision to enter export markets. These costs are essentially irreversible such as advertising or market research expenses. In addition, these irreversible costs can be considered endogenous insofar as they are associated with investments that increase the value of the firm's products for customers. As a result, the firm chooses the amount of irreversible investment according to the height of its export commitment. These costs more specifically cover the adaptation of products and services to foreign markets; they relate to the targeted export market, to the search for foreign importers, to the R&D, marketing, communication and advertising expenses, to the recruitment, training, and advice. It is the endogeneity of**

these irreversible costs that could explain the limited number of firms in the export markets according to "finiteness property" (Shaked & 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.

The main contribution of the model presented here is to differentiate export strategies in order to endogenize sunk costs of exporting. Indeed, the level of sunk costs depends in this model on the willingness of the firm to export, the information it has on the markets to which it wishes to export and finally on its current productivity.

3. The authors assume that firms just use self-financing to cover the expenses related to export projects. However, they do not give any references to empirical works or other theoretical papers backing up such assumption. If firms also resort to debt for financing export projects would your model be still valid? If firms can resort to external financing then  $C$  and  $I$  would depend not only on  $\Pi_0$ ,  $a$ ,  $\rho$ , but also on firm's ability to borrow. Which would be the implications for your model?

#### **Response 5:**

In light of the referee's comment, we will discuss more this assumption in the new version of the paper. The assumption of the self-financing to invest in export is aligned with an important number of empirical studies such as Bellone, Musso, Nesta & Schiavo (2010) in which firms enjoying better financial health are more likely to become exporters. Also, according to our survey carried out in 2013 on a representative sample of the 128 industrial SMEs in the French Normandy region, only 20.3% (7.8%) of the companies in our sample used (have the intention to use) aid for their export projects during the last three years of the investigation. Also, limitations in finance and related physical resources have continued to be highlighted as a leading barrier to the internationalisation of SMEs (OECD, 2009). Considering that financial markets are imperfect (i.e., self-financing and external financing are not equivalent, the latter being more expensive), it is postulated that firms prefer self-financing to finance their export projects.

4. There are other factors omitted in the discussion that could be important determinants of both  $C$  and  $I$  in your models, as for example the difficulty of the targeted export market (for example geographical or cultural distance).

#### **Response 6:**

We agree with the referee that the targeted export market is important determinants of both  $C$  and  $I$ . Trading to distant markets is more complex than trading in nearby markets culturally and geographically. Indeed, it is essential to anticipate risks, understand the business environment, cultural practices, and know your business partners to ensure the sustainable success of export development. Also, the experience gleaned in one market reduces the uncertainty attached to entering other, culturally similar markets, even if those markets are far from home (Ellis, 2007). In light of the referee's remark, it will be explained in the new version that  $\rho$ , the level of information that firm has on export project, is higher for the near markets in terms of cultural or/and geographical contexts.

5. In your model you assume that  $C$  is a function of  $y, \Pi_0, \rho$ , where  $\rho$  is the probability that the firm continues the export project. But it could be also the other way round, i.e.  $\rho$  could be a function of  $C$ . If  $C$  is quite high, it means that the firm has invested quite a lot of money in the feasibility studies, and this could increase the likelihood of investing in the export project as otherwise the firm loses all the sunk costs in which it has already incurred. Which are the implications of this in your model?

**Response 7:**

**By its nature, the objective of a feasibility study is to determine whether the project is economically viable before incurring significant expenditure. Therefore, it seems logical to assume that the cost of a feasibility study is not too high to affect the choice to continue or abandon the export project. This point will be clarified in the paper.**

6. What does it mean in the fourth paragraph of page 6 "if we put  $(C, I, \Pi_0, a, \rho = 0)$ . Explain where it comes from.

**Response 8:**

**Indeed,  $\hat{\Pi}_{ex}$  is a function which takes the arguments  $C, I, \Pi_0, \alpha, \rho$ . If  $\hat{\Pi}_{ex}$  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 profits in the export market is defined as  $\hat{\Pi}_{ex} = 0 \rightarrow f(C, I, \Pi_0, a, \rho) = 0$ . In order to take the comment of referee into account, we plan to clarify this point in paragraph 3 page 6.**

7. You should explain in detail from where equation 5 comes from.

**Response 9:**

**As indicated in the Eq.3, the second derivative of the function  $\hat{\Pi}_{ex}$  is negative in its domain. So,  $\hat{\Pi}_{ex}$  is a concave function. Therefore, it can be defined by the standard logarithm function (Eq. 5) which respects all the properties of  $\hat{\Pi}_{ex}$  function. The latter crosses the Equation 4,  $(1 + \alpha)\Pi_0$ , in two points, as shown in Figure 1. Clearly, the aforementioned equation represents the expected profit function and respects its properties.**

8. About the parametrization of your model. How do you choose the values of  $\alpha, \rho, \beta, \Pi_0$ ? Are your results robust to different values?

**Response 10:**

**Our proposed model was tested for the different values of the parameters  $a \in ]0, 1]$  and  $\rho \in ]0, 1]$  over the entire interval as well as their extreme value. The results will be presented in the appendix.**

9. About Figure 3. Understand this figure results quite difficult.

To start, the mess with  $a$  and  $a$  makes understanding difficult

Then, you should specify in the text that high- $a$  is  $a_1$  and low- $a$  is  $a_2$

Then, you should give an intuition explaining why the range  $\Pi_{0,min,a1} - \Pi_{0,max,a1}$  is wider than the range  $\Pi_{0,min,a2} - \Pi_{0,max,a2}$ .

Further, I do not understand what is going on in the interval  $\Pi_{0,min,a2} - \Pi_{0,min,a1}$ . In this interval, if we compare two firms with the same  $\Pi_0$  (that according to your assumptions will proxy for productivity), the firm with the low export effort level ( $a_2$ ) would export while the firms with the high export effort would not do it. Which is the explanation to this result? Is it dependent on your parametrization?

**Response 11:**

We thank the reviewer for raising these points out.

In light of the reviewer's 1<sup>st</sup> remark regarding the use of symbols, we will correct the mess of  $a$  and  $\alpha$  in the paper and specify that high- $a$  is  $\alpha_1$  and low- $a$  is  $\alpha_2$ .

With regard to the second comment of the reviewer, we think that the reviewer referred to the Figure 2. However, we will first explain the figure 3, and then address the reviewer question with regard to the Figure 3.

Figure 3 compares two groups of firms: high- $\rho$  ( $\rho_1$ ) and low- $\rho$  ( $\rho_2$ ) for the same level of  $\alpha$ . As shown in the figure, the profitability condition lines 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- $\rho$ , while the lower one illustrates the expected profits of firms with a low- $\rho$ . For the category of firms with a high- $\rho$  (respectively low- $\rho$ ), firms with a profit between  $\Pi_{0,min,\rho_1}$  (respectively  $\Pi_{0,min,\rho_2}$ ) and  $\Pi_{0,max,\rho_1}$  (respectively  $\Pi_{0,max,\rho_2}$ ) enter foreign markets because their expected profit is higher than the profitability condition line,  $(1 + \alpha)\Pi_0$ . In order to clarify the interpretation of the figure, we will specify in the text of the new version of the paper that high- $\rho$  is  $\rho_1$  and low- $\rho$  is  $\rho_2$ .

In contrast, Figure 2 compares the category of firms with high- $a$  and low- $a$  assuming an identical  $\rho$  ( $\rho_1 = \rho_2$ ). As shown in this Figure, among the firms with a high level of profitability, those with low- $a$  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- $a$  are more likely to project into the export. So, as we can see from Figure 2, the range  $\Pi_{0,min,a1} - \Pi_{0,max,a1}$  is wider than the range  $\Pi_{0,min,a2} - \Pi_{0,max,a2}$ .

Theoretically, if the profit is very low, regardless of the level- $a$  (low- $a$  or high- $a$ ), the firm does not have the necessary means to compensate the sunk costs of exporting and enter into foreign market. In addition, as mentioned by the referee,  $\Pi_{0,min,a2}$  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 2, 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, footnote 3, page 7). We should mention here that the interval  $\Pi_{0,min,a2} - \Pi_{0,min,a1}$  in the actual version of Figure 2 does not reflect the limited interval between these two values. In order to take the comment of referee into account, we will explain this limit of our parametrization and condition our model by  $\Pi_{0,min,a2} \leq \Pi_{0,min,a1}$  in the new version of

**paper. In addition, we will replace this generalized figure with the exact outcome of the Equation 5.**

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