Foreign market size and firm innovation Evidence for developing countries manufacturing firms

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Utilizing data for developing countries manufacturing firms we construct and estimate the impact of an exogenous foreign market size measure on firm innovation on the extensive margin. Our data allows us to differentiate between innovative outputs, that is innovation through the introduction of new/improved products or production processes. We find an overall positive impact of foreign market size on a firms probability to innovate in both dimensions. This effect is more prominent for product innovation. We also find different heterogeneous effects. First, we find that firms atop the productivity distribution are more likely to innovate via products when foreign demand expands. Our evidence also suggests that accessing foreign markets spurs innovation. Given that entering foreign markets is costly we find evidence that in countries with better credit availability firms innovate more on the product dimension when world demand increases and that for introducing new processes an industry's dependence of external funds reduces this type of innovation. One key difference between our findings and previous literature for developed countries is that we find an average positive effect of the foreign demand shocks. Our results are consistent with a dominance of the escape competition effect over the rent dissipation effect.

1 Introduction

Both economic theory and evidence have emphasized productivity as the key driver of long term growth (Solow 1958, Romer 1986, among many others). Thus, prosperity is highly linked to the growth of productivity. Because of this, economists have derived increasingly more sophisticated methodologies to estimate both aggregate and firm-level productivity. Indeed, the field has improved considerably from the study of output per worker (Salter 1959) as the measure of productivity, specially with the work of Olly and Pakes (1996) and the subsequent improvements to their Total Factor Productiviy (TFP) estimates (Levinhson and Petrin 2003, Woolrdige 2009).

Common sense, theoretical models and empirical evidence suggest that one of the key inputs that may increase firm productivity is innovation. That is, one can easily understand innovation as one input of a larger function that determines the efficiency of the resource usage of a firm. Now, one must also understand that innovation is relative to a firm's current situation. This means that a firm innovates simply by upgrading its products or technology but this does not imply that the firm must be the actual inventor of said technology. For example, in the middle ages every time somebody installed a sewing machine, such as the mule jenny in their house to be able to sew more garments, said firm is innovating on its technology. The same can be said for a firm that copies or introduces foreign products on their markets.

Then by definition innovating is a risky endeavor. A firm may spend countless resources on developing a new product or process and come up empty handed. Because of this uncertainty one would expect that a firm should have a very good reason to embark itself in knowledge or technology creation. Economic theory has postulated that one the the key drivers of firm innovation is that it is profit increasing (Schumpeter 1942, Arrow 1972). Then larger markets should lead to more profits being obtained after innovating (Acemoglu and Lin, 2004).

Economists have found that this is not necessarily true. A larger market may also provide incentives for more firms to enter it, thus competition intensifies and profits fall (Aghion et al. 2005, Aghion et al. 2018). Then there are two competing effects; one that spurs innovation through a rise in the expected post-innovation profits and one that deters innovation because the rise in expected profits intensifies competition. This two are called the escape competition effect and the rent dissipation effect, respectively. Basically, the key component that determines the impact of the market size on innovation depends on the firms apropiability of the post-innovation profits.

Our study focuses on changes in foreign market size, also called export opportunities in the literature (Steinwerder and Shu, 2019), and how they affect innovation. This implies that enlargements of foreign markets may induce local

innovation on exporters and non-exporters. Indeed, Lileeva and Trefler (2010) show that increases in foreign market size not only impact exporting firms, it may also lead firms to start exporting and adopting new technologies. This is supported by the findings of Bustos (2011), which finds that more accessible foreign markets spur technology adoption by firms, for both exporters and non-exporters. This does not mean that export status does not affect the firm behaviour, Pavcnik (2002) shows that trade liberalization for Chilean firms affected firms differently depending on the openness or market orientation of the industry in which they operated.

Firms can also innovate in a variety of ways such as the introduction of new or improved products. For example, foreign competition may induce local firms to innovate to improve the quality of their goods so that they're demand doesn't fall (Sutton 2007). Another explanation is that more consumers may demand more varieties of products (Desmet and Parente 2010). Whereas, firms may wish to innovate through the creation of more efficient production process or by buying new technology, which in turn reduces production costs. This innovation becomes more attractive when the market is larger because the expected benefits of being more efficient are larger (Aghion et al. 2005, Aghion et al. 2018). It is important to differentiate between this types of innovations, because of the different policy implications that they may have.

We estimate the impact of increases in the size of foreign markets on firm innovation on the extensive margin. To do this we utilize a comprehensive data set of almost 18,000 manufacturing firms from over 30 developing countries. Our data allows us to differentiate between two kinds of innovation; the introduction of new or improved products or processes, which in turn allows us to discriminate to some extent about different mechanisms that may drive our results. Our data also incorporates non-exporting firms into our analysis, which may be induced to innovate given increases in world demand or new export opportunities (Lileeva and Trefler 2010, Bustos 2011).

To identify a causal impact of increases in external demand on a firm's innovative output we follow closely on the measures introduced by Mayer et al. (2016) and Aghion et al. (2018). We construct a foreign market size measure with data that is aggregated at two digit ISIC industry-country level, which should not be dependant on the innovative outputs of any individual firm, thus, we are able to identify a causal effect from changes in world demand to the innovation of a firm.

We find a positive impact of increases of foreign market size on a firm's probability to innovate on both product and production processes. We also find that accessing foreign markets has a positive yet diminishing impact on the probability to introduce new products and processes when the scope of external markets increases. We interpret this in the light that entering exports markets is costly (Melitz 2003, Bernard and Jensen, 2003) and thus firms that have al-

ready accessed this markets have lesser incentives to innovate because they have already entered the markets.

Our findings also show an heterogeneous effect regarding firm productivity in a similar way to Aghion et al. (2018). We find that firms in the top decile of the productivity distribution have a larger incentive to innovate via products when foreign demand expands. Still the overall, impact of enlargements of external markets remains positive, even when taking into account this heterogeneous effect. This suggests that the escape competition effect would dominate the rent dissipation effect. Given this last result we explore the possibility that the reason the escape competition effect isn't offset by the rent dissipation effect on average is through differences in credit availability.

Borrowing from a large literature that stresses the importance of paying costs to enter export markets and the impacts that reductions on this costs have on innovation (Melitz 2003, Bernard and Jensen 2003, Bustos 2011), we test and find that the easier it is for firms to get credit in a country the larger the positive impact of the increases in foreign market size on product innovation and the more dependent a firm is on external funding the less likely it is to upgrade its production techniques. Thus, we interpret the dominance of the escape competition effect on the fact that a large number of firms have a difficulty obtaining the necessary funds to enter the foreign market.

This study contributes to the literature on two fronts; first, we are able to identify causal and heterogeneous effects of changes in external demand on developing countries manufacturing firms innovation. Second, our data allows us to distinguish between different mechanisms by which the innovative process of the firms takes place. This goes in contrast to more recent literature which emphasizes the use of patent data that does not allow for this distinction.

This paper is structured as follows; in the upcoming section we give a brief overview of the literature regarding innovation, market size and trade. The next section analyzes and describes the most relevant aspects of our data set. Then we provide definitions of some key variables and our empirical specifications, as well as our approach to deal with possible identification issues. Lastly, we end the paper with some concluding remarks on our results.

2 Conceptual framework

The economic literature has emphasized the fact that in order for a profit maximizing firm to have incentives to partake in a risky endeavor such as innovating, the latter must seem ex-ante profitable. Basically, firms will only innovate if the expected returns of introducing the innovation are enough to upset the costs associated with it. This yields the immediate response that the relationship between enlargements of the size of markets must spur innovation, given that

larger markets are associated with more profit opportunities. Thus, we should expect to find more innovation when markets grow.

But the above claim has been disputed, for example, Schumpeter (1943) stated competition was a deterrent for innovation, whereas Arrow (1962) postulates the opposite, that a more competitive environment should foster more innovation. Given that larger markets spur firm entry, then the relationship between market size and innovation gets murkier. This meant for Schumpeter that the monopoly faced the most profitable situation when it came to capitalizing on innovation rent, even when cannibalizing profits was possible. Whereas, Arrow hold that firms that face a more competitive environment, and hence receive lesser rents, have more incentives to innovate given that they may accrue larger benefits with respect to their current situation.

Both of these ideas where reconciled with Aghion et al. (2005) seminal work in which a non-linear relation ship between competition and innovation was theorized and found empirically using patent data of UK firms. The non-linearity arises due to the existence of two competing effects; the escape competition effect and the rent dissipation effect. The first effect promotes innovation, given that when markets enlarge firms have an incentive to innovate to be able to incur in larger profits. The second effect deters innovation given that larger markets produce firm entry and thus competition intensifies. This implies that depending of which effects dominates, we could see a positive or negative relation between innovation and increases in market size, which would be mediated by changes in competitive intensity. Hence, the important concept related to increases in market size and its impact on it's incentives to firm innovation is the apropriability of the expected post-innovation profits.

An important prediction of the statements above imply that such heterogeneity on firm responses to increases of market size should be affected by other firm characteristics. Aghion et al. (2005) model and evidence show that initially more productive firms are more prone to innovate given that they escape competition easier. With these concepts at its heart the economic literature regarding the increases of external markets, either by tariff reduction or direct increases of world demand, has found that when firms take a hold of new export opportunities they tend to innovate more.

A growing literature has tackled the issue of modeling and theorizing the effects of globalization and the ever expanding world markets and its impact on innovation, while using the above concepts as its base of analysis. In the theoretical models the largest distinction one can see between different approaches is the mechanisms that spurs innovation when the market increases and thus the innovation output varies. Sutton (2007) proposes that an increase in market scope produced by trade spurs firm innovation through the introduction or improvements of products that cross a minimum quality threshold. This is relevant for domestic firms, given that if the ratios between domestic and foreign

quality is too low, then their demand falls considerably and they get pushed out of the market.

Another relevant mechanism that may spurs product innovation is simply that larger markets with more consumers are able to support a larger product space, then firms innovate via products to capture a larger portion of said market. In Desmet and Parente (2010) model's when consumers have a Hotelling-Lancaster preferences and a of love of variety, the larger the market, i.e. the more consumers, the more varieties of products firms can sell. This model also implies that there is a positive relationship between a firms size and its proclivity towards innovation, given that they are able to divide innovative fixed costs among more products. Even though, to the best of our knowledge there is no specific evidence with regards to this last statement, the fact that larger firms innovate more is a standard result in in the literature.

However, not all innovation is done through products, in fact, a considerable amount is done to improve existing technologies or generate new technology. This is what is known as process innovation, and is also a key component in some theoretical models that rationalize a firm decision to innovate when the market enlarges. Aghion et al. (2018) model links innovation and market size by proposing a model in which firms face a trade-off in the investment in new technology when the market increases, in the form of the escape competition and the rent dissipation effects mentioned above. The intensity of both effects is dependent on the initial productivity of the firm, and they predict that initially more productive firm can escape competition more effectively and thus are more prone to innovate.

Bustos (2011) produces a trade model with heterogeneous firms with endogenous technology selection. Her model also predicts that larger markets spur technology innovation in more productive sectors, with the key difference that in her model not all firms are exporters ex-ante, and some firms may invest in better technology to be able to export. Then, larger markets, produced by a trade liberalization, lead to more firm innovation. The model also predicts that firms with medium level of productivity of technology are more prone to innovate than the most productive firms, which does not go hand in hand with Aghion et al. (2018).

Aghion et al. (2018) find a positive impact of larger foreign markets on firm innovation for initially more productive firms, whereas the opposite is true for the initially less productive ones. On the other hand Bustos (2011) findings suggest that Argentinean firms on the median and above productivity quartiles are affected innovation wise by this changes in market size. This gives a large amount of support to the initial productivity heterogeneous effect postulated in the literature. Lileva and Trefler (2010) utilizing data from canadian firms that where affected by the CUSFTA find that new exporters and previous exporters are more likely to both introduce new products and to adopt more modern

technologies, while this effect is the largest for the least and less productive exporters. Basically, given that exporters tend to be more productive and better performing firms they are able to capitalize in a larger way on the enhancements of the export opportunities presented to them.

Some other related work studies the impact of foreign market size increases on firm productivity in developing countries, such as Iacovone et al. (2012). They find that there is a positive effect on firm labor productivity derived from more open markets produced by NAFTA and that this effect is greater for the firms that operate a the technological frontier. Mayer et al. (2016) utilizes a similar methodology to Aghion et al. (2018) and finds that labor productivity increases when foreign demand enlarges, but this effect is only significant for multi-product firms. This results can easily be reconciled with the above if ones take into account that multi-product firms tend to be more productive. Coelli et al. (2018) report findings that support the thesis that larger external markets spur innovation. Using data from 60 countries during the world wide liberalization episodes of the 90's they find that close to 7% of the increase in knowledge was due to this growth in export opportunities.

One important caveat on the literature is the use of different measures of firm innovation. Some studies employ patent data whereas other utilize self-reported measures of innovation taken via survey. The main advantages of utilizing patent data is that it should have less of a measurement error, given that patents are objective whereas survey responses are subjectively. Nonetheless, not all patents have an innovation behind them, some are used to diminish competition (Salant 1984). Moreover, patent data does not allow to distinguish between different kinds of innovation, which can diminish the interpretation of the results. This last point is extremely important for policy makers in developing countries, given that, the relevant market failures that must be addressed to spur firm innovation may be different depending on the mechanism by which said innovation is taking place.

3 Data

For our firm-level data we utilize data from the World Enterprise Surveys (WES) from the World Bank. One of the key features of this data is that the design of the survey and the sampling utilized in its confection is common to all the countries. This allows for an adequate comparison between firms across countries, giving us more reliable information than a harmonyzed data set from different innovation surveys. This yields a rich firm-level longitudinal data set, that possesses information on firm-level characteristics on a multitude of dimensions. It contains innovative output data, such as whether the firm has or hasn't introduced a new productive process or a new product. We also have information pertaining exports, imports and employment among others. This allows us to

construct and control for many relevant firm characteristics related to innovation decisions.

It is important to note two characteristics of our measures of firm innovation. First we use dummy variables as to whether a firm introduced new or significantly improved products or production process, thus, all of our analysis is constrained to the extensive margin. In that sense, we are not able to distinguish between firms that introduce more than one new product/process, which imparts a boundary on the conclusions that can be extracted form our results. Basically, we are able to interpret our results in the sense that a firm may innovate or not, but we also bundle together highly innovative firms with a firms that only introduced a new product of process.

Second, given that our innovation measures are related to innovation outputs rather than innovative efforts or inputs we are not able to analyze the innovative efforts of different firms, but rather all of our conclusions are drawn from successful innovation. This is relevant given that we can only interpret our results on observed innovation and not in innovative efforts, so if a firm destined a large amount of their income or equity to innovation and they did not succeed, our estimates will only reflect their failure and not their efforts.

Our trade data comes from the COMTRADE data set by the United Nations which is a repository of official international trade data. Finally, we use financial accessibility data from the Doing Business project sponsored by the World Bank and the external financial depedence of Rajan and Zingales (1993). Our final data set contains information of 18,212 manufacturing firms operating in 23 industries from 38 different developing countries for the period 2006 to 2013. As table 1 shows the amount of firms varies from different countries. This means that larger countries with a bigger manufacturing sector will represent a larger proportion of the data. In that regard, the country whose firms are more predominant in the data is Mexico which has little over 10% of the total number of firms and only 5 other countries have a share of over 5%. This yields a relatively unconcentrated data set with an HH index of 1607, which means that it is unlikely that one country's firms would drive our results.

It is also interesting to note that our data reflects country productive specialization patterns. For instance, none of the countries has firm participating in all of the industries, although, some countries are very close. It is of note that for all of the Latin American and the Caribbean countries in our sample, the number of industries is lesser in comparison to the other countries in our sample. Part of this can be explained by the lesser diversification of manufacturing production of this countries and of their lesser developed manufacturing sectors, while part of it is surely explained by the stratified sampling of the survey. Then again, both of these arguments share the common thread that a large numbers of Latin American countries have followed a commodity or natural resource export productive model rather than a manufacturing one.

When analyzing the data aggregated at the industry level (2 digit ISIC revision 3.1) one can see that there is great heterogeneity between different industries. The first panel of figure 1 shows that there is a large heterogeneity with respect to average firm size between industries, measured as the logarithm of the number of employees. One can see that the manufacture of basic metals (industry 27) has the largest average firm size, whereas, the smaller average firm size is found in the electric product manufacturing (industry 36). The second larger average firm size correspond to the manufacturing of paper and paper products industry (industry 31). As it can bee seen this are industries which have a very small use of high technology, in fact, close to three quarters (76%) of our sample correspond to low level or mid level of intensity of use of high technology, according to the OECD taxonomy (Hatzichronoglou, 1997).

At the same time one can see that there is a large heterogeneity in the propensity of exporting of different industries (second panel of figure 1), whilst the propensity of importing inputs is much more homogeneous (third panel). This result is very common in the literature, given that for a firm to export is much harder and costlier than to import. As is to be expected, the correlation of both of these measures is relatively high at the industry level, close to 0.73. We understand this in the sense that some industries are more open to foreign markets than other. This does not mean that the same firms in a given industry are both exporting and importing, actually, the correlation of a firm being an exporter and a importer of inputs is relatively low (0.24), which is due to the fact that much more firms import than export.

As mentioned, a large amount of the firms in our sample operate in industries associated with a low usage of high technology, which makes them less propense to innovate. As the fourth panel of figure 1 shows, there are is a high concentration of innovative firms in certain industries while the share of innovators is much lower in other industries. These results in conjunction with the above are very natural, in the sense that it is to be expected that there would be a large amount of heterogeneity across industries in the sample (Bartelsman et al, 2009).

Table 2 shows key firm characteristics conditional on both a firm's export and innovative status. As has been found in the literature, innovators are less numerous than non-innovators and tend to be larger. It is important to note that there are differences between the numbers of firms that introduce new products and new process, which implies that some firms introduce new products and others introduce new process, so that there is variation among groups of innovators. Basically, it is not the same to introduce a new product than it it to introduce a new process. In contrast, large part of the literature utilizes patent data without differentiating between different kinds of innovations. This in turn implies that one can interpret the results extrapolated from that data in any given way. Although, the use of patent data also has its benefits, namely that it should be freer from measurement or reporting errors while also allowing to

test hypothesis on both the extensive and the intensive innovative margins.

Firm employment seems to be related positively with innovation but this difference would seem to be mainly explained from the fact that a firm is an exporter rather than if it is an innovator. That is, exporting firms tend to be larger. This goes in line with the export premium that is commonly observed throughout trade literature (Bernard and Jensen 1999). When looking at the relation between initial productivity, which is measured as added value of labour, it seems that more productive firms become exporters as well as innovators. The nexus between exporting and productivity seems particularly strong, given that the average firm that doesn't innovate but does export is more productive than the average innovator of non-exporting firms. Although, the more productive firms both export and innovate. This patterns paint the picture that there should be a strong link between accessing foreign markets and innovation.

4 Empirical strategy

In this section we discuss how we define our measure of foreign market size and also our identification strategy, both aim to address the endogeneity issues that arises between the size of the foreign markets a firm may be able to access and the firm innovative output. Indeed, there exists a problem of reverse causality; do larger foreign markets spur innovation or does the innovative status of a firms determines which market size is relevant to it? Lastly, we define our econometric specifications to quantify the impact and heterogeneous effects of our measures of market size on firm innovation.

4.1 Foreign demand measure

As the data shows, exporting firms are more likely to innovate than non-exporting firms, thus, there seems to exist a link between a firm innovative capabilities and whether it access foreign markets or not. However, this doesn't address the issue that arises when trying to establish causation; does the prospective increase in profit associated with larger foreign markets spur innovation or do better performing firms, which are more likely to innovate, have access via innovation to larger markets? To solve this issue we follow Mayer et al. (2016) and Aghion et al. (2018).

To this end we construct an exogenous foreign market size definition similar to the above studies with a difference in the aggregation of the data. Both Mayer et al. (2016) and Aghion et al. (2018) have customs data on exports of different french firms, which allows them to construct exogenous market size measures for each particular exporting firm, based on the initial export intensity of each firm to different destinations. Given that we do not possess such dessagregated date, we instead construct a market size measure at the ISIC 2

digit level utilizing trade data from UN COMTRADE.

Let X_{ijcdt} be the exports of the firm i on industry j from country c to destination d on time t. Then, if we sum on all i,d and c we would have $\sum_c \sum_d \sum_i X_{ijcdt} = X_{jt}$, which corresponds to the world exports of industry j at time t. That corresponds to the potential market size any firm from industry j can access, which may be affected via the initial term X_{ijcdt} by the individual decision on innovation of any given firm, specially if a firm is a leader in any market or industry. To purge the measure of this issue we use a method similar to Mayer et al. (2016) and Aghion et al. (2018) by subtracting from the above term the exports from country c of industry j in which firm i operates, thus we have:

$$X^*_{jct} = log[X_{jt} - X_{jct}]$$

Which corresponds to an exogenous measure of foreign market size, given that it acts as a proxy for the world demand for industry j. This measure is exogenous on firm's i innovative decisions given that exports from country c are excluded from the calculation. As one can see, this measure is quite aggregate given that for every firm in industry j in country c at time t the foreign market size is the same. In here lies the aforementioned aggregation difference with the previous literature because in our case we assume that increases in market size are equal for all firms, which the previous literature avoids.

The other main issue of this way of measuring external demand is that we are using a very aggregate variable. Indeed, as mentioned above it is constructed at the 2 digit level of the ISIC nomenclature. This yields that firms that produce different goods will be encapsulated in the same variable, for example a firm producing food manufactures is treated the same as one that produces beverages. In that sense, we loose some precision on our estimates than if the measure would be constructed at a less agregate level (which we can't do) or would we be able to create a firm specific one as Aghion et al. (2018) or Mayer et al. (2016) do.

4.2 Empirical specification

To estimate the impact of the market size measure constructed above on the innovation of firm i on industry j on country c at time t, we estimate a Linear Probability Model (LPM). We choose this methodology because the interpretation of the interactive terms is more direct than if we use a probit or logit estimation. We start with the following base specification:

$$I_{ijct} = \alpha_1 X^*_{jct} + \delta Z_{ijct} + \lambda_j + \lambda_{ct} + \varepsilon_{ijct}$$

Where I_{ijct} corresponds to whether the firm introduced a new or significantly improved product/production process or not. This measure of innovative outcomes are standard in the innovation literature and allow us to differentiate

between different types of innovation. For example, if innovation in the developing world follows a quality ladder process, then we would expect α_1 to only be significant when our dependent variable is the introduction or improvement of product, in contrast if the process follows a cost reduction explanation then the coefficient would only be significant when the left side variable is the introduction or improvement of a production process. This bypasses the main issue surrounding the usage of patent data, which is that it doesn't allow to differentiate between types of innovation.

Two important caveats that must be specified for this measures of innovation are the following; first, we are measuring innovative outputs instead of efforts or inputs. In that sense, our results must be interpreted with regards to successful innovation and not to the efforts a firm may try to innovate. Also, our innovation measures do not differentiate between firms that introduced one or more significantly improved products/production processes, we can only determine whether a firm is an innovator or not. Thus, the conclusions drawn form this study are limited to the extensive margin of innovation and not to the extensive margin.This is important because this may not allow us to differentiate between different explanations or mechanism which may spur innovation on one dimension. For example, our data does not permit us to differentiate between Sutton's (2007) quality ladder explanations for the introduction of new or improved products or Desmet and Parente (2010) product space innovative mechanism.

We also control for two sets of fixed effects λ_j and λ_{ct} which correspond to industry and country-year fixed effects respectively. The vector Z_{ijct} contains control variables related to the innovative decisions of a firms these are also standard in the literature; firm size, productivity and dummy variables that take value 1 regarding a firms exporter/importer status. To control for a firm's size we use the logarithm of that firms number of employees, this is important given that economic theory and evidence predict that larger firms are more likely to innovate. Basically, firms that are larger tend to be better performers than other firms (Bartelsman et al. 2009), which raises the degree of appropriability of the gains derived from innovating and thus they are more likely to innovate.

In the spirit of Aghion et al. (2005, 2018) we control for a firm's productivity level, in this case value added of labour. This also aims to control for the fact that more productive firms are more likely to reap the benefits of innovation given their superior efficiency. To control for both foreign knowledge transfers and foreign market access we use dummy variables that take value 1 of the firm exports/imports and 0 if it doesn't. It is important to note that we don't have data on the previous export or import status of the firm, which may be relevant when we study the intertemporal nature of innovation. Nevertheless, it is documented that exporters are more likely to keep exporting (Bernard and Jensen 1999), thus, this lack of previous information may not be very impactful. In a sense, all of our control variables pertain to possible firm related advantages

with regards to the appropriability of the returns to innovative outputs.

To test for heterogeneous responses to foreign demand shocks we include an interactive term between the exporter dummy and or measure of foreign market size. It is important to distinguish our work form Lileeva and Trefler (2010) who study the impact of an increase in foreign market size for new exporters in Canada, as they utilize an exogenous shock to tariffs to predict which firms start to export. Given that we do not posses that kind of desagregated data, we are not table to focus solely on new exporters, thus, we estimate the impact of foreign market size on all firms. Given the strand of trade literature that emphasizes the importance of costs associated with the entrance to foreign markets we expect firms that already access them to have a head start from ones that don't, so we expect the interactive term to be positive.

Similarly to Aghion et al. (2018), we test whether more productive firms are able to capitalize in a larger way on increases of external markets. To do this we interact our measure with the firm's productivity, which we define as the value added of labour. We expect this coefficient to be positive which would mean that initially more productive firms are able to escape competition more effectively, which in turn makes them more likely to innovate given that they posses a larger degree of profit appropriability.

Given the theoretical and empirical importance of foreign market accessibility in the trade literature (Melitz 2003, Bernard and Jensen 1999), we also test whether differences in financial accessibility impacts firm innovation through the access to foreign markets. Given that exporting is costly it is paramount for a firm to be able to finance its inclusion in the foreign markets. Thus, an increase in foreign market size may be more profitable for firm's that have better access to credit.

To test this mechanism we include interactive terms between our world demand proxy and the access to finance indicator from the Doing Business and another interaction between the variables above and the external financial dependence of firms by Rajan and Zingales (1996), which aims to control for the differences in external credit for different industries. This last indicator is closely related to the technological differences between industries, given that external financing is often used to purchase expensive or large production technologies.

5 Results

5.1 Baseline results

The estimations of our base specification are shown on table 3. We find a positive and statistically significant relation between both of our innovation variables

and our measure of foreign demand proxy. Although, both are significant the impact of increases in external demand seems to be much larger for the introduction of new or improved products, about two to two and a half times the impact on the other innovation measure. This result supports the thesis that the innovative process that is present in developing countries is more similar to either a quality ladder (Sutton 2007) or a product space explanation (Desmet and Parente 2010).

Qauntitatively speaking the positive coefficient is quite large, in fact, an increase of 1% of world demand for one industry is associated with a an increase of over 25 percentage points in the probability to introduce or improved a product, whereas the average impact on the introduction of new process is close to 10 percentage points. Both coefficients may differ significantly in size, but both have a large degree of quantitative relevance. At the same time, given that our explanatory variable has a small amount of variation, one could look at the impact of an increase in a standard deviation rather than an increase of a 1%. As a matter of fact, this yields a larger coefficient.

Still, given that this is a LPM the coefficients are more suited to be understood by sign and significance than the point estimate itself, although one can infer that the effect for a significant increase of world demand for an industry relates to a high change in the probability of a firm innovating in the product dimension, and that this same effect is significant but lesser for the introduction of new or improved production processes.

Interpreting our results in the view of the more traditional innovation literature one can see the implications of finding positive coefficients associated with increases in market size for our innovation dummies. This can be understand as that on average the escape competition effect dominates the rent dissipation effect. This can be interpreted as the fact that introducing better products is either greatly profitable and firms are not deterred to innovate even in the face of more competitors or that not enough firms enter the foreign market to reduce the expected profits related to the innovative outputs. In contrast, one could think that the rent dissipation effect is larger for firms introducing new or better production processes than the escape competition one, given that the size of the parameter is much smaller. Still, both estimations of our base model point to a dominance of the escape competition when the foreign market enlarges.

The coefficients that accompany the control variables all have the expected signs and are highly significant. More productive firms are more likely to innovate, as are larger firms as well. This indicates that firm characteristics that are associated with better performance have a positive impact on the probability to innovate in any dimension, that is better performers have a larger degree of appropriability of the gains of innovations and, thus are more likely to introduce new/improved products/production processes.

Although we associate positively performance related characteristics with innovation, we are not able to discriminate if better performers innovate more because they put more efforts into it (R&D expenditure for example) or because they are better managed, thus, they have a larger probability of success. As mentioned in past sections, this is one of the limitations of the definition of our variables. Truthfully, one can come up with many different explanations as to why better performers innovate more, but as is standard in the literature they do.

As expected, firms that participate in foreign markets are much more likely to innovate. This holds for both firm exporting their products and for firms that import productive inputs. This result is standard in the literature and is attributed to international transfers of technology (Gorodnichenko et al. 2008). Basically, accessing foreign markets has a positive and highly relevant quantitative impact on a firms probability to innovate, indeed, exporters are close to 5 percentage points more likely to innovate and importers are close to 10 percentage points more likely to innovate than non-importers. This adds up to almost a 15 point difference in the probability to introduce new/improved products between firms that participate in both exporting goods and importing, with relation to firms that compete locally and use only domestic inputs. All in all, it is clear that accessing foreign markets has a large impact on firm innovation.

We further test for the existence of an heterogeneous response between exporting and non-exporting firms. This is due to the existence of entry costs to foreign markets (Melitz 2003, Bernard and Jensen, 2003), given that, exporters already have sunk them and thus should have a larger degree of apropriability of the possible gains that stem from innovation. Both Tables 4.1 and 4.2 shows our results for the estimation of this heterogeneous effect, by adding an interactive term between a firms proportion of sales related to exports and our external market size proxy, while also controlling for a firm export status. We find that enlargements of external demand have a lesser impact on firms that exports a larger share of their sales[1]. Although, it may seem a bit counter intuitive, firms that have already established themselves as exporters have less incentives to innovate than firms that are trying to penetrate foreign markets. At the same time, the overall impact of exporting is always positive on innovation as is the impact of increases in foreign market size, even when a firm only sells abroad.

It is still interesting to note that the overall impact of an expanse in foreign market size remains positive. This follows the thesis that the escape competition effect dominates the rent dissipation effect, which can be interpreted as that expanses in foreign demand do not generate enough competition for rents to fall significantly, even when accounting for the fact that firms experience

[1]Not shown here, is that this effect is non-linear, but when accounting for this effect the impact is non-significant, so it averages out

different levels of exposure to foreign markets. In that sense, it is more quantitatively relevant the size of the increases of foreign demand and whether the firm is already exporting or not.This goes in line with the explanation that there are costs associated with entering different foreign markets, and that exporters should perceive the rents derived from innovation to capitalize on larger external markets as relatively larger than non-exporters. This reinforced by our findings of a non-linear effect, although non significant, when including the interactive term between market size and the square of the exports share.

When looking at the size of the coefficients found, it would seem even when controlling for the interaction between the exposure to foreign markets, that firms are close to twice as much more likely to innovate via products rather than processes. This in turn, could be seen as that the quality ladder explanation for innovation when competing in a global economy or a product space explanation may be the driving forces for innovation in the globalized economies of the developing world. Our identification strategy and the way our variables are constructed do not allow us to differentiate between this two possible explanations or other ones for that matter to understand the mechanisms behind these findings.

The rest of our coefficients remain highly robust when accounting for the heterogeneous response across firm export status. It is readily apparent that firms whose characteristics are associated with better performance are more likely to innovate. This results holds for both types of innovation, which goes in line with the standard results found in previous literature.

Table 5 contains our results when testing for the existence of an heterogeneous effect between firm productivity and the changes in world industry specific demand. We find that independent of the specification, the effect of productivity when taking into account an heterogeneous behaviour between said variable and market size is only significant for product innovation. This also, removes the significance of the incidence of rises in foreign demand on the probability of introducing new or improved production processes. Hence, we will only refer to the estimations when the dependent variable is product innovation. Our results go in line with the ones found by Aghion et al. (2018), that is the more productive a firm is the more it is inclined to innovate when foreign markets expand.

According to previous literature this is to be expected given that initially more efficient firms are able to escape competition more effectively and thus have higher incentives to innovate. In other words, more productive firms are able to capitalize in more efficient ways on larger markets. Thus, their degree of apropriability of the rents produced by innovation is larger. What is of note between our estimations in relation to previous ones, is that the impact of productivity becomes positive far later on the productivity distribution. To give an example, in our estimations the effect is positive for close to 10% of the firms, whereas for Aghion et al. (2018) it was for half of the firms. We

also test and report estimations when looking for a non-linearity in the impact of productivity and found it to be statistically but not quantitatively significant.

As has been regular with our previous findings the evidence suggests that for the innovation introduced via products the escape competition effect remains much larger than the rent dissipation effect. Hence, it would seem to be that the impact of the rises in external demand, propel firms to innovate more and this effect is even larger for the top 10% of firms, whose productivity crosses a certain threshold. This means that even though the rent dissipation is not as severe, firms that are more productive tend to have an advantage that allows them to escape competition more effectively. Lastly, this estimations also suggest that the way firms in developing countries innovate may resemble a quality ladder or product space process rather than a cost reduction one.

This last results may seem a bit counter intuitive, in the sense that the heterogeneous effect presented here comes from a model which is focused on cost reduction. Alas, that is true, but the empirical evidence used to support such model (Aghion et al. 2018) is based non-differentiated patent data, which in turns makes it seem plausible that our results and some that came before are product driven rather than by cost reduction. Even though, the earlier literature focused on the two effects previously mentioned, without distinguishing between types of innovation.

We test whether a country's financial markets development is a relevant mechanism by which the increases of foreign market operate with regards to innovation. The intuition behind this is simple, as has been mentioned repeatedly, a large literature on trade has found that exporting or accessing foreign markets is costly (Melitz 2003, Bernard and Jensen 2003). Thus, a firms capacity of appropriating the possible profits that comes with increases in foreign markets size must be accompanied by the capacity of that firm to enter the market. Given that financial development has a direct relation with a country's development, it isn't surprising that for many countries in our list the credit score variable from the World Bank is relatively low.

Table 6 shows the results of our estimations for testing the credit availability hypothesis. Our estimations show that the deepening of financial markets affects product innovation directly, whereas the interactive term between external market size, credit availability and external financing dependence is significant for introducing new processes. Basically, the more credit is available in a country the more likely a firm is able to innovate when external demand increases, but for introducing new processes it depends on technological issues whether does firms can use the the credit to fund this innovation. Thus, when foreign demand expands, firms that depend more heavily on external financing due to the technology employed in that industry are less likely to innovate.

This result is relevant given that the larger part of the innovation-market

size literature analyzes the phenomena for developed countries, which tend to have more developed financial markets. Taking this last result into account makes sense that our prior estimates with regards to the direct effect of the foreign market size being positive, that is the dominance of the escape competition effect over the rent dissipation effect. Since access to finance is important and more scarce in developing countries, the possibility that firms are able to pay the entry costs to the foreign markets is reduced, thus, the rent dissipation effect is lessen because the credit constrains lessens competition. In a world with perfect financial markets we would expect this coefficient to be non-relevant, given that financing wouldn't be an issue for firms whose market size is large enough. This implies that better credit availability impacts innovation not only through direct financing of innovative firms but also through their access to the foreign market.

As it has been recurring during most of our estimations, the coefficients accompanying the control variables are quiet robust to the testing of the different heterogeneous effects found by this study. It is important to note the importance of firm size and of the access to foreign markets, given that this three coefficients have particularly large impacts on a firms probability to innovate, independently if it is done by introducing new products of processes. The robustness of this results if also standard in the literature, and should be expected given that our foreign market size measures are exogenous.

Finally, we estimate the joint impact of all of the heterogeneous effects together, to asses the robustness of the prior results. First, one can see that for product innovation the direct effect remains both positive and highly significant, whereas the significance drops slightly for process innovation. This in turn, yields even more evidence supporting the thesis that the rent dissipation effect is not strong enough to offset the escape competition effect.

Secondly, of all of our heterogeneous effects only the credit availability term remains statistically significant for product innovation and for processes innovation the productivity heterogeneity remains significant and does the financial dependence term. This implies that even when accounting for all the seemingly relevant partial effects, in the aggregate for introducing new products financing is key, whereas the technology used in an industry seems to be the most relevant factor when introducing new processes.

6 Concluding remarks

The evidence on the impact of market size effects on innovation is relatively scarce for developing countries, more so when taking into account the dynamics of how the enlarged markets may lead non-exporting firms to introduce innovative products or processes. At the same time, the literature has found a large amount of heterogeneity on firms behaviour and characteristics, which renders it important to try to understand how accessing larger markets may

impact firms differently. The latter is fundamental, given that a large part of the developing world has made significant efforts to open itself to the world. Then it becomes paramount to analyze the different impacts that the entry and subsequent changes of this different markets affect development relevant firm behaviour such as innovation.

This paper contributes on the above by utilizing a data set of manufacturing firms from developing countries an estimating the impact of foreign market size on firms innovation while differentiating by different innovative dimensions. We also test for the existence of different heterogeneous effects found in previous literature. Constructing an exogenous measure of foreign market size we find that increases in external demand spur both product and process innovation. More so, we find that more productive firms are more likely to innovate through products when the size of foreign demand increases. Both of this results suggest that there exists a significant dominance of the escape competition effect over the rent dissipation effect, and that the cream of the crop firms, the more productive firms, escape competition more easily and, thus have larger incentives to innovate.

We also find that exporters are more likely to innovate in both dimensions, and that the impact of enlargements of world demand diminishes the larger the share of exports are of sales. This result goes in line with a large body of trade literature which finds that accessing foreign markets is costly, thus exporting firms have a larger degree of apropriability of innovative profits and thus they have larger incentives to innovate. Hence, financial markets may have a large impact in the capability of different firms to be able to innovate when foreign demand expands, given that, financial aid may not be only relevant to fund innovation itself but to enter the foreign market size. We find that firms operating in countries with more available credit have a larger probability to introduce a new product when foreign market's size increases and that for processes innovation the technological differences between industries is highly relevant, firms more dependant on external sources of funding are less likely to innovate when foreign demand expands.

Analyzing all these results in conjunction yields a possible explanation for the large dominance of the escape competition effect over the rent dissipation effect found in this study. Given that developing economies have less profound financial markets firms have a harder time paying the costs of entering foreign markets, thus the rent dissipation effect is smaller. It is important to also note that all of our results can only be interpreted in a innovate or not way, that is on the extensive margin of innovation and not on the intensive one. Also their are interpreted in the sense of innovation outputs and not efforts, that is realized innovation, and so we cannot observe the innovation efforts deployed by firms.

Last but not least, we find that when external markets enlarge, firms in developing countries innovate more prominently via products rather than pro-

cesses. This implies that models related to a more competitive environment spurring innovation in quality, such as a quality ladder, or just the fact that a larger market with consumers who value variety supports a larger product space are able to explain the mechanism found above. This in turn shows that models that assume innovation outputs that lessen costs have a lesser fit on the data and reported behaviour of manufacturing firms in developing countries.

This paper is a first approach at understanding the empirical side of the impact of markets sizes on firm innovation for the developing world and non-exporting firms as well as exporting ones. Given that, we would desire for further research on this matter to take into account the intensive margin and to produce stylized models that may help our understanding of how this dynamics work and also to keep pushing empirical research forward.

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8 Annex

Table 1: Country and industry breakdown

Country	Number of firms	Number of industries
Albania	149	17
Argentina	1199	10
Armenia	194	16
Azerbaijan	214	17
Belarus	186	18
Bolivia	451	9
Bosnia and Herzegovina	164	18
Bulgaria	156	16
Chile	1278	10
Colombia	1240	10
Croatia	156	15
Ecuador	350	8
El Salvador	526	9
Estonia	51	9
Georgia	199	16
Guatemala	598	12
Honduras	350	11
Hungary	162	20
Kazakhstan	318	18
Kyrgyz Republic	171	17
Latvia	149	20
Lithuania	151	15
Macedonia, FYR	199	17
Mexico	2085	10
Moldova	195	18
Mongolia	208	16
Montenegro	71	16
Nicaragua	433	12
Panama	292	15
Paraguay	245	10
Peru	986	10
Poland	250	19
Romania	304	18
Russian Federati	1768	20
Serbia	200	18
Tajikistan	199	15
Turkey	1795	18
Uruguay	570	10
HH index	1607	

Notes: Industries are set at 2 digit ISIC rev 3.

Figure 1: Industry level data breakdown

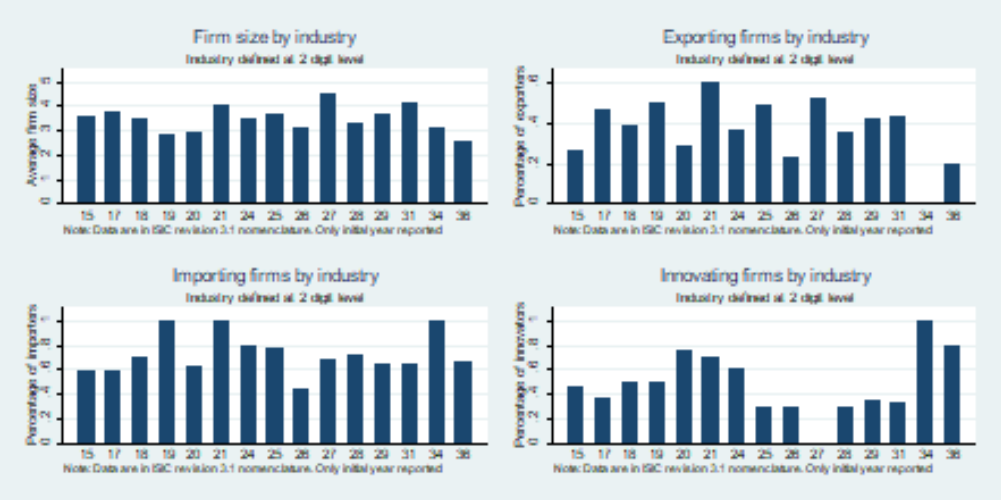

Table 2: Descriptive statistics by firm export status

	Exporters		Non-exporters	
	Product innovators	Non - Product innovators	Product innovators	Non - Product innovators
Firms	3,262	3,425	4,485	7,040
log(Employment)	4.35	4.29	3.2	3.06
Productivity index	9.73	9.71	9.01	8.94
Exports	33.13	47.11	0	0
	Exporters		Non-exporters	
	Process innovators	Non - Process innovators	Process innovators	Non - Process innovators
Firms	2,988	3,699	4,102	7,423
log(Employment)	4.37	4.28	3.2	3.07
Productivity index	9.76	9.69	9.08	8.95
Exports	35.56	44.11	0	0

Notes: All rows except for the Firms rows correspond to the mean of the variable. Productivity index corresponds to labour productivity, measured as value added per worker. Exports corresponds to the percentage of sales that are exported.

Table 3: Base specification results

	(1)	(2)	(3)	(4)
	Product innovation		Process innovation	
log(Foreign Market Size)	0.2322***	0.2734***	0.0610	0.1073**
	(0.0621)	(0.0560)	(0.0519)	(0.0453)
log(Productivity)		0.0046*		0.0097***
		(0.0025)		(0.0025)
log(Size)		0.0289***		0.0333***
		(0.0052)		(0.0052)
Exporter		0.0420***		0.0551***
		(0.0111)		(0.0142)
Importer		0.1286***		0.0858***
		(0.0135)		(0.0100)
Constant	-4.1795***	-5.2508***	-0.8034	-2.0154**
	(1.2372)	(1.1235)	(1.0341)	(0.9004)
Observations	13,360	13,357	13,360	13,357
R-squared	0.2799	0.3092	0.2446	0.2724

*Notes: Clustered standard errors at the industry-year level in parenthesis. Significance; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All estimations have country-year and industry fixed effects. Both importer and exporter are dummy variables.*

Table 4.1: Heterogenous response between export status

	(1)	(2)	(3)	(4)
	Product Innovation		Process Innovation	
log(Foreign Market Size)	0.2532***	0.2824***	0.0868	0.1203**
	(0.0551)	(0.0553)	(0.0545)	(0.0491)
log(FMS)xExporter	-0.0183	-0.0167	-0.0108	-0.0104
	(0.0153)	(0.0155)	(0.0171)	(0.0177)
Exporter	0.4741	0.3755	0.3368	0.2640
	(0.3094)	(0.3136)	(0.3410)	(0.3521)
log(Productivity)		0.0035		0.0072***
		(0.0023)		(0.0021)
log(Size)		0.0288***		0.0332***
		(0.0052)		(0.0052)
Importer		0.1281***		0.0858***
		(0.0134)		(0.0100)
Constant	-4.6390***	-5.4081***	-1.3638	-2.2304**
	(1.0979)	(1.1075)	(1.0862)	(0.9738)
Observations	13,483	13,480	13,483	13,480
R-squared	0.2902	0.3098	0.2580	0.2732

*Notes: Clustered standard errors at the industry-year level in parenthesis. Significance; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All estimations have country-year and industry fixed effects. Both importer and exporter are dummy variables.*

Table 4.2: Heterogenous response between export status

	(1)	(2)	(3)	(4)
	Product Innovation		Process Innovation	
log(Foreign Market Size)	0.2206***	0.2515***	0.0671	0.1011**
	(0.0568)	(0.0540)	(0.0516)	(0.0446)
log(FMS) x Exports	-0.0001***	-0.0001***	-0.0000**	-0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Exporter	0.1546***	0.0893***	0.1324***	0.0685***
	(0.0146)	(0.0131)	(0.0141)	(0.0150)
log(Productivity)		0.0043*		0.0096***
		(0.0024)		(0.0025)
log(Size)		0.0299***		0.0336***
		(0.0049)		(0.0051)
Importer		0.1275***		0.0855***
		(0.0134)		(0.0100)
Constant	-3.9866***	-4.8113***	-0.9714	-1.8913**
	(1.1319)	(1.0841)	(1.0273)	(0.8877)
Observations	13,360	13,357	13,360	13,357
R-squared	0.2918	0.3117	0.2570	0.2726

*Notes: Clustered standard errors at the industry-year level in parenthesis. Significance; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All estimations have country-year and industry fixed effects.Both importer and exporter are dummy variables.*

Table 5: Heterogenous response through productivity

	(1)	(2)	(3)	(4)	(5)	(6)
	Product Innovation			Process Innovation		
log(Foreign Market Size)	0.1583**	0.2241***	0.1683**	0.0417	0.1155**	0.0822
	(0.0693)	(0.0670)	(0.0662)	(0.0579)	(0.0524)	(0.0581)
log(Productivity)	-0.1034**	-0.0750	-0.2031***	-0.0175	0.0236	-0.0552
	(0.0529)	(0.0487)	(0.0600)	(0.0412)	(0.0389)	(0.0584)
log(FMS) x log(Prod)	0.0068**	0.0044*	0.0141***	0.0020	-0.0007	0.0052
	(0.0027)	(0.0024)	(0.0036)	(0.0021)	(0.0020)	(0.0036)
log(FMS) x $log(Prod)^2$			-0.0000***			-0.0000**
			(0.0000)			(0.0000)
log(Size)		0.0288***	0.0286***		0.0333***	0.0332***
		(0.0053)	(0.0053)		(0.0052)	(0.0052)
Exporter		0.0412***	0.0418***		0.0552***	0.0556***
		(0.0110)	(0.0110)		(0.0143)	(0.0144)
Importer		0.1287***	0.1281***		0.0858***	0.0854***
		(0.0135)	(0.0134)		(0.0100)	(0.0100)
Constant	-2.8734**	-4.2663***	-3.4538**	-0.6341	-2.1793**	-1.6946
	(1.3872)	(1.3412)	(1.3204)	(1.1465)	(1.0420)	(1.1194)
Observations	13,360	13,357	13,357	13,360	13,357	13,357
R-squared	0.2825	0.3093	0.3101	0.2485	0.2724	0.2727

Notes: Clustered standard errors at the industry-year level in parenthesis. Significance; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. *All estimations have country-year and industry fixed effects. Both importer and exporter are dummy variables.*

Table 6: Credit constraints heterogenous effect

	(1)	(2)	(3)	(4)
	Product Innovation		Process Innovation	
log(Foreign Market Size)	0.2027***	0.2395***	0.0695	0.1123***
	(0.0576)	(0.0543)	(0.0461)	(0.0385)
log(FMS) x Credit availability	0.0009**	0.0009**	0.0004	0.0004
	(0.0004)	(0.0004)	(0.0003)	(0.0003)
log(FMS) x Credit x Fin. Dependence	-0.0000	-0.0000	-0.0002**	-0.0001**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
log(Productivity)		0.0048*		0.0086***
		(0.0027)		(0.0023)
log(Size)		0.0276***		0.0336***
		(0.0059)		(0.0049)
Exporter		0.0328***		0.0457***
		(0.0100)		(0.0115)
Importer		0.1121***		0.0757***
		(0.0142)		(0.0103)
Constant	-4.6443***	-5.6102***	-1.3495	-2.4801***
	(1.1617)	(1.0320)	(0.9278)	(0.8201)
Observations	10,512	10,509	10,512	10,509
R-squared	0.3179	0.3404	0.2779	0.3014

*Notes: Clustered standard errors at the industry-year level in parenthesis. Significance; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All estimations have country-year and industry fixed effects.Both importer and exporter are dummy variables. Credit score is increasing in credit availability to the credit sector. Both exporter and importer are dummy variables.*

Table 7: Global impact of heterogenous effects

	(1)	(2)	(3)	(4)
	Product Innovation		Process Innovation	
log(Foreign Market Size)	0.1904***	0.2159***	0.0423	0.0753*
	(0.0559)	(0.0579)	(0.0468)	(0.0426)
log(FMS) x Exporter	-0.0203	-0.0185	-0.0052	-0.0035
	(0.0124)	(0.0136)	(0.0144)	(0.0159)
log(FMS) x log(Prod)	0.0023	0.0026	0.0028**	0.0030**
	(0.0018)	(0.0017)	(0.0013)	(0.0012)
log(FMS)xCredit availability	0.0010**	0.0010**	0.0005	0.0004
	(0.0004)	(0.0004)	(0.0003)	(0.0003)
log(FMS) x CA x Fin. Dep.	-0.0000	-0.0000	-0.0002**	-0.0001**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Exporter	0.4909*	0.4013	0.2019	0.1138
	(0.2504)	(0.2726)	(0.2893)	(0.3193)
log(Productivity)	-0.0358	-0.0477	-0.0425	-0.0513**
	(0.0357)	(0.0332)	(0.0265)	(0.0245)
log(Size)		0.0276***		0.0335***
		(0.0059)		(0.0049)
Importer		0.1122***		0.0761***
		(0.0143)		(0.0103)
Constant	-4.6304***	-5.2231***	-1.0497	-1.7912*
	(1.0566)	(1.0354)	(0.9655)	(0.9006)
Observations	10,512	10,509	10,512	10,509
R-squared	0.3262	0.3407	0.2898	0.3016

*Notes: Clustered standard errors at the industry-year level in parenthesis. Significance; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All estimations have country-year and industry fixed effects. Both importer and exporter are dummy variables.*