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INTERNATIONALIZATION CHOICES AND ITALIAN FIRM PERFORMANCE
DURING THE CRISIS
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Internationalization choices and Italian firm performance during the crisis

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Abstract

In this paper we focus on the relationship between internationalization choices and performance of Italian firms during the first period of the financial crisis (2007-2010). Making use of a new database matching four firm-level datasets provided by the Italian National Statistical Institute (ISTAT), we firstly build a 6-class taxonomy of firms' internationalization activities. Secondly, we estimate firms' performance – in terms of employment and value added dynamics – as a function of internationalization forms. In particular, we assess the effects of the shifts across the taxonomy classes on firms' performance, also estimating Propensity score and Heckman selection models in order to control for endogeneity and sample selection problems.

Descriptive analyses confirm that firms adopting more complex forms of internationalization (e.g. offshoring, or exporting worldwide) are more efficient and export a wider range of goods than traditional exporters. Indeed, over the period 2007-2010, Italian firms moved (on average) towards more complex forms of internationalization. Empirical analysis found that these upward changes are associated to positive employment and value added dynamics at firm level, also in a period characterised by the 2009 trade collapse.

These findings put additional emphasis on the issue of the diversification of both products and markets as a goal to be pursued by firms even in times of crisis, as the current ones, to remain competitive and make profits.

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1. Introduction

In the first decade of the twenty-first century, the reduction of trade barriers and the participation of East Asian economies to international trade led to an increase of competitiveness in the international markets. The growing demand from emerging markets was a key factor in supporting the overall economic growth in almost all European countries. Following the sharp fall in 2009, the recovery of international trade largely benefited those countries most ready to exploit opportunities provided by the external demand, in a framework where domestic demand was sluggish or decreasing. The issue of the faster growth of the firms characterized by an advanced degree of internationalization comes up again, especially in the current phase, as competitiveness is now considered a key factor for the adjustment in the euro area (Altomonte *et al.* 2012).

The economic literature highlighted the existence of a positive relationship between competitiveness and the degree of internationalization at the firm level. Better firm performance, in term of productivity and profitability, is usually associated, on average, to more "complex" internationalization strategies. Moving towards most advanced forms of internationalization could therefore strengthen firm competitiveness and, ultimately, countries' economic growth potential. This aspect seems further more relevant during a recession, when the domestic demand languishes.

The aim of this paper is to investigate the relationship between firms' internationalization choices and their performance during the first phase of the financial crisis, characterised by the trade collapse and the consequent recovery. To this aim, we use an innovative database resulting from the integration of both statistical surveys and administrative data on Italian enterprises. The dataset refers to two non-consecutive years (2007 and 2010), which corresponds to the periods, respectively, before and after the first hit of the global financial crisis. It includes observations for over 90,000 Italian internationalized companies. Using the wide range of information of this dataset, we build a detailed taxonomy of the internationalization forms for the Italian firms, according to the degree of engagement in external trade activities.

On such bases, we firstly we present the structural characteristics of firms belonging to every class identified. Second, in the empirical analysis, we estimate the determinants of firms' competitiveness during the first phase of the Great Recession. The aim of the investigation concerns the relations between the adoption of a given internationalization form and firm performance, where the latter is measured in terms of the dynamics of value added and employment.

The paper is organized as follow. The next section reviews the main theoretical and empirical contributions on the issue of internationalization choices and firms' performance (mainly productivity). The description of the taxonomy of Italian exporting firms and some descriptive evidence on their performance during the crisis is discussed in Section 3. The econometric strategy is presented in Section 4. Section 5 reports and comments the estimates results. Section 6 contains some final remarks. A detailed description of the dataset is presented in the Appendix.

2. Literature review

In the last decade, the theoretical and empirical literature on international trade and firm performance developed very rapidly. In particular, the topic of productivity gained a prominent position. This is due, on the one hand, to the central role played by firm-level productivity in a

couple of very influential theoretical works; on the other hand, to the growing availability of firm-level dataset.

On the theoretical ground, in their influential paper Bernard and Jensen (1995) document a significant exporter productivity premium in US manufacturing industries: exporters are more productive that non-exporting firms of the same size and the same narrowly defined industry. Indeed, differences in firms productivity are also at the heart of the numerous theoretical models originated in the following decade from the seminal paper of Melitz (2003) (e.g. Melitz and Ottaviano 2008, Chaney 2008, Bernard *et al.* 2011), according to which only more productive firms can cover the sunk costs required to profitably operate in the international markets. These models focus on the export behavior of firms and shoved more and more scholars to micro-level investigations of this topic. Despite the study of productivity has been a core topic in economics for a long time, empirical investigations on the determinants and consequences of firm-level productivity differentials are of a more recent vintage due to the growing availability of suitable datasets.

Several micro-econometric empirical studies developed in latest years focused on the determinants of efficiency differential between exporters and non-exporters. Specifically, the self-selection (foreign markets entry costs represent a barrier that less productive firms are not able to overcome) and the learning-by-exporting hypothesis (knowledge flows from international buyers and competitors help to improve the post-entry performance of exporters) have been widely investigated. Along the same lines, the relationship between importing and productivity recalls both arguments, a positive impact of productivity on importing[1] and the positive effect of importing on productivity[2] (Castellani *et al.* 2010, Altomonte and Békés 2010, Muuls and Pisu 2009). Indeed, a large body of works, taking advantage of the richness of information contained in new available datasets, focused on the differences in productivity between firms involved with different degree in international trade, distinguishing firms as only exporters, only importers, two-way traders (both importing and exporting at the same time) and firms operating only in the domestic market.

Common findings from this literature are the following. First, two-way traders are the most productive group of firms, followed by only importers and exporters, while firms operating only in the domestic market come last (see Wagner 2012 for a detailed survey). In some cases, the availability of firm-level data on foreign direct investment allows for the inclusion of multinational firms as a more complex category of internationalization (i.e. firms that have a foreign participation or that are controlled by a foreign owner, see Altomonte *et al.* 2012). This latter group is usually at the top of the productivity ranking. Second, an evidence of self-selection seems to emerge: only the firms showing higher productivity levels in the years before starting to export can afford fixed entry costs of selling abroad. Third, firms of different countries show common features as regards their structural characteristics: internationally active firms are usually bigger (in terms of number of employees), show higher turnovers, larger capital stock and sell a wider range of goods with respect to both domestic firms and enterprises which adopt less complex form of internationalization.

More recently, in addition to the relationship between trade and productivity, also other aspects of firm's performance have been investigated: the link between export activity and wage (exporters pay higher wage with respect to non-exporters), export and profitability (exporter firms are more

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[1] Self-selection hypothesis: there are sunk costs of importing due to the learning and acquisition of customs procedures
[2] Learning-by-importing: importing intermediate or capital goods makes a firm more productive by enabling it to access to higher quality inputs and/or to extract technology embodied in imported goods.

profitable than non-exporters), international trade activity and firm survival (exporters have a higher probability to survive, see Wagner 2013).

As for Italy, there are several works concerning the relationship between firm internationalization and different aspects of competitiveness: innovation (Castellani and Zanfei 2007), workforce composition, earning levels and wage inequality (Serti *et al.* 2007), productivity, (Benfratello and Razzolini 2007), learning by exporting hypothesis (Castellani 2002), knowledge output (Pittiglio *et al.* 2009)

More in general, empirical evidence for Italy seems to confirm the results found for other countries. On the one hand, exporting firms are generally larger, more productive, more innovative, more profitable and more capital-intensive than non-exporters and pay higher wages; on the other hand, a comparison among different forms of internationalization shows that firms involved in more "complex" forms are in general more efficient than firms involved in "simpler" kinds of activities. The former have, on average, a higher propensity to R&D and innovation, tend to adopt better management practices, are more likely to hire skilled workers, have the financial strength to invest in capital and new technologies.

Moreover, the increasing competitive pressures on foreign markets coming from low wage countries have had a significant impact on the Italian economy. The analyses conducted on firm-level data in various countries all suggest that firms in advanced economies can escape those new competitive pressures by increasing their R&D expenditure, improving their products' quality, hiring high-skilled workers. In the case of Italy, non-technological innovations – related to marketing, branding, distribution networks, post-sales assistance – have proved to be important in strengthening firms' competitiveness in the post-euro era (Bugamelli *et al.* 2010).

However, firm size is an important condition for operating on foreign markets. The role of size becomes increasingly important with the degree of sophistication of international activities, starting from exports, the simplest form, to commercial agreements, technical and production agreements and, finally, direct investment (Bugamelli *et al.* 2000). Firm size is strictly related to productivity: as theoretical literature on firm heterogeneity has shown, larger firms can easily afford sunk costs related to international activity. Larger firms are usually more efficient and productive having, *ceteris paribus,* a higher propensity to R&D and innovation, tending to adopt better management practices and having easier access to capital markets to invest in new technologies (Amatori *et al.* 2011). This aspect is particularly important in Italy due to the small average size of exporting firms.

Although the relationship between internationalization forms and productivity has been analyzed widely also in the case of Italian firms, our contribution to this strand of literature is twofold. Firstly, using rich micro level information taken from several ISTAT databases, we are able to describe in a more detailed way the different forms of foreign activities. Secondly, in analyzing the behavior of Italian internationalized firms during a phase characterized by the trade collapse, we are able to answer to the following questions: do the crisis affected the relationship between internationalization forms and performance? Do the way Italian firms participate in the international competition changed during the first stage of the crisis? If so, how does it changed? How these changes affected the firm performance between 2007 and 2010?

In the following Section we describe how we build the taxonomy of internationalization forms of Italian firms; then we analyze the distribution of firms in these classes and their structural characteristics, also looking at the changes of internationalization modes during the crisis.

3. Italian firms and internationalization: some descriptive evidence

3.1 A taxonomy of internationalization of Italian firms

Following Altomonte *et al.* (2012), we provide a taxonomy of internationalization strategies of Italian firms consisting in six mutually exclusive classes, each indicating a different mode of operating in foreign markets. Five classes are related to the trade internationalization, the other one is related to the internationalization of production.

Going from the most complex form of international activity to basic one, the first class ("MNE") includes both Italian firms that have foreign subsidiaries and those controlled from abroad. In the second class ("global") firms exporting to at least five extra-EU areas are considered. The third class includes firms that both import and export ("two-way traders"), while firms carrying on only import activity are considered in the fourth class ("only importers"). The fifth class ("only exporter") includes firms essentially exporting towards EU markets and/or up to four extra-EU areas (i.e. neither importing nor undertaking any kind of productive internationalization). Finally, the sixth class includes the so-called "Marginal exporters", namely the firms exporting less than 5% of their turnover. The inclusion of this latter type of firms needs to be explained a bit more in detail.

In this kind of analysis, the gains from internationalization activities in terms of productivity, efficiency, employment dynamics etc. are usually measured by comparing the performance of firms involved in some form of foreign activity with the performance of those selling only in the domestic market. Unfortunately, our dataset includes only information on firms operating abroad; however, there are a large number of firms showing only a very low share of turnover exported. When such firms are "only exporters", they are barely distinguishable from domestic enterprises. In this vein, we named firms exporting less than 5% of their turnover as "marginal exporters" and included this group in the descriptive analysis for sake of comparison. They will also be taken as a benchmark in the econometric strategy.

For each year, each firm is assigned to a single class. If a firm has more than one characteristic among those selected for the assignment along the scale of internationalization, it is attributed to the higher class (e.g., if a firm is controlled from abroad, does not have import activity and only exports towards EU Member States, then it is allocated to the "foreign control" class).

On the basis of the taxonomy described above, in the next section we analyze the relationship between participation in foreign markets and the performance; moreover, we measure the effect of the changes occurred in the internationalization strategies between 2007 and 2010.

3.2 Internationalization and firm's performance during the crisis

Different forms of internationalization are related to different performance (Tables 1 and 2). In 2010, the internationalized firms in our sample are mostly "two-way traders" (32.9%) and "only exporters" (24.4%), while most advanced forms of internationalization account for a very limited share of firms: the enterprises controlled by a foreign owner and the Italian MNEs represent 3.4% of the total. This group, however, shows a larger average size in terms of employees (208.1), compared to the significantly lower average size (9.7 employees) of "only exporters". Furthermore, the MNEs export a wider range of goods and serve on average a larger number of markets. It can also be noted that labor productivity – measured in terms of value added per employee – increases as we move from the simplest forms of internationalization to the most complex ones. By contrast,

the share of export turnover – a proxy for the firm's degree of openness to the international activity – is higher for the global firms than for MNEs. In 2010, firms showing a more complex form of internationalization show a more pronounced diversification of production, measured in terms of the number of exported goods. At the same time, these companies are neither the most profitable, nor those with the greatest degree of openness in international trade. Finally, the "marginal exporter" firms are more numerous (and slightly more productive) than the Only exporters, and show a very limited participation in the international competition also in terms of range of exported products (about 2) and in terms of average sectors where each of them exports (less than 2).

The internationalization strategies of the Italian firms changed somewhat during the crisis. A first clue of these transformations can be assessed in terms of the movements between the internationalization classes as reported in the transition matrix (Table 3). The main diagonal indicates the persistence in the same internationalization class between 2007 and 2010, while the values below (above) this diagonal show the transitions towards less (more) complex categories. In particular, more than 56,000 firms are present in the sample both in 2007 and in 2010. Of these, about 67% do not change internationalization's strategy between the two years.

The degree of persistence rises as we move towards the most advanced classes of the taxonomy. Furthermore, also the changes of status are significant: 19.3% of the sample (around 11,000 firms) moved upwards between the two years, especially from the "only exporters" and "only importers" classes to "two-way traders" (about 1,775 and 2,998 units, respectively). On the contrary, about 7,500 firms (13.3% of the sample) shifted downwards, mostly from "global" to the "two-way trader" status.

Moreover, about 1,600 firms changed their status from "marginal exporters" to "two-way traders", and around 1,200 shifted from "marginal exporters" to "only exporters". It is to be noted, however, that for "marginal exporters" would be possible to become "two-way traders" just by starting importing, and to pass to the "only exporter" group just increasing their share of exports on total turnover to more than 5%.

All in all, these evidences show that in the years of the "great recession" the Italian internationalized firms accounted for a positive "net movement" towards more complex forms of presence in international markets. Small- and medium-sized firms appear well positioned in the scale of internationalization: in fact, a large number of companies of this type lie in the intermediate category of the two-way traders. We also argue that a sub-sample of firms moved towards more complex forms of internationalization over the period 2007-2010 as an attempt to contain the effects of the crisis. These findings may be considered as a first empirical insight on a positive relationship between the degree of participation in international trade and overall firm's performance. Whether or not the upwards (downwards) shifts determined positive (negative) effects on firms' employment and value added growth is a matter to be addressed on an empirical ground.

4. Empirical analysis: econometric strategy

The aim of this section is to verify if the shifts (or persistence) have had an impact on firm performance, here measured in terms of employment dynamics and value added growth. We deal with this issue firstly estimating an OLS model, and successively "correcting" for possible endogeneity and self-selection bias effects, by applying propensity score matching and Heckman correction procedures.

4.1 OLS

For each cell of Table 3, we estimate the following OLS model (1),

$$Y_i = \alpha_i X_i + \cdots + \beta_{ij} Z_{ij} + \gamma_{ik} W_{ik} + \delta_{ir} Q_{ir} + \vartheta_{is} R_{is} + \varepsilon_i, \tag{1}$$

where i ($i = 1\dots n$) denotes the firm; Y_i is the firm's performance variable (respectively, the percentage change in employees and value added at firm level between 2007 and 2010); X_i is the (logarithm of) the level of the corresponding dependent variable in 2007; Z_{ij} ($j = 1\dots16$) is a set of dummy variables indicating changes or persistence in firm's internalization form; W_{ik} ($k = 1, 2$) are dummy variables indicating, respectively, whether firm i-th is medium- or large-sized; Q_{ir} ($r = 1, 2, 3$) are dummy variables indicating the location of the firm by NUTS1 Region (North-East, Centre, South respectively); R_{is} ($s = 1\dots\dots42$) are industry-specific dummy variables (Nace.Rev.2, 2-Digit).

However, this kind of analyses is typically affected by selection bias. This occurs because firms internalization decisions are non-random and the outcomes of choices not made are never observable. There are two sources of possible bias. "Selection bias due to observables" arises from sample differences that researchers can observe but fail to control (like firm size and firm growth). "Selection bias due to unobservables" arises from the unobservable and thus uncontrolled sample differences that affect firms' decisions and their consequences. In both cases OLS estimate are definitively biased. In the literature two econometric tools has been developed to overcome this problem: the propensity score matching (PSM) method – to mitigate selection bias due to observables – and the Heckman inverse-Mills-ratio (IMR) method, to address selection bias due to unobservables.

More in details, the PSM method requires "conditional independence", which means that the selection or self-selection of participant (treated firm) vs. non-participant (untreated firm) can all be explained by observable factors. The estimated treatment effect using PSM can only be generalized to "common support," meaning the portion of the population that can meaningfully decide whether to participate. The IMR method, on the other hand, deals with selection on unobservable factors. Because IMRs are derived from truncated bi-normal distributions, it is only appropriate if the first-stage choice decision is modeled in probit, and the second stage outcome is modeled in a linear regression, and if the unobservables in the two stages are bi-normally distributed[3]. When these conditions are not met, adding IMR to the second stage does not correct the selection bias that researchers intend to correct[4].

In our case, we are interested in studying the export behavior of Italian firms during the first phase of the crisis, characterized by exceptional events like world trade collapse and the drying up of financial flows. In this context, we can suppose that unobservable firm's characteristics (e.g. firm management ability to cope with crisis, financial stability and structure, financing needs etc.), other than observable ones, could have affected the internalization choices and the probability to switch among different form of selling abroad. For this reason, we present here results from both PSM and Heckman procedures as a sensitive check to verify the robustness (sign, statistically

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[3] Wooldridge (2002, p. 562-563) states that the binormal distribution assumption can be relaxed for the second-stage error term if its mean conditional on the first-stage error term (which has to be normal) is linear. However, except for binormal distributions, few bivariate distributions satisfy this condition.

[4] In this article we assume that all relevant observable variables are identified and reliably measured, and that the form of their relations is correctly specified. The success of mitigating selection bias depends on model specification and variable measurement even if the estimation method is appropriate. When the IMR method is not applicable, as long as the model is parametric, it is possible to estimate treatment effects by full information maximum likelihood estimation (FIML).

significance, quantification and direction of bias correction) of OLS results but we are especially interested at Heckman results.

4.2 PSM

Firstly, we applied the propensity score matching (PSM) procedure.[5] As it is well-known, this technique basically allows to compare an observable outcome – in our case: the firm's performance after its shift across the taxonomy – with a non-observable one – i.e. the performance of the same firm if it had not shifted – by approximating this latter with the performance of an appropriate counterfactual.

The PSM matches shifting firms (the so-called "treated" group) with non-shifting companion firms which, on the basis of its observable characteristics, had a similar ex-ante probability of switching, but eventually did not (the "control" group). In other words, we select a set of firms as similar as possible to the observable shifting firms, apart from the fact that they did not shift. This set of firms is the counterfactual, the performance of the shifting group we compare to, so as to eventually measure the "average treatment effect on the treated" (ATT), i.e. the difference in the performance for firms shifting across taxonomy, had they not shifted.

More formally, in principle the ATT is defined as follows:

$$ATT = E[Y(1) - Y(0) \mid D = 1] = E[Y(1) \mid D = 1] - E[Y(0) \mid D = 1] \qquad (2)$$

where $Y(1)$ is the outcome of a shifting firm i given it shifted (it is "treated"); $Y(0)$ is the outcome of i given it did not shift; $D = \{0, 1\}$ is the decision of shifting ($D = 1$) or not shifting ($D = 0$).

Since the term $E[Y(0) \mid D = 1]$ is unobserved, the PSM procedure approximates it by identifying the control group. The PSM estimator for ATT is often defined as the mean outcome difference of treated and control firms matched by PSM. In other words, the counterfactual outcome in Equation (1) is proxied by the average outcome of control firms selected by PSM.

So that the propensity score matching estimator can generally be written as:

$$PSM = E(P(X) \mid D = 1) = \{E[Y(1) \mid D = 1, P(X)] - E[Y(0) \mid D = 0, P(X)]\} \qquad (3)$$

where $P(X)$ is the propensity score, that is the probability of being treated. In our case, the propensity score is given by the following probit model:

$$\Pr(Int_{ij} = 1) = \Phi \left(\alpha_i VA_i + \beta_{ij} ADD_i + \gamma_{ik} W_{ik} + \delta_{ir} Q_{ir} + \vartheta_{is} R_{is} + \varepsilon_i \right) \qquad (4)$$

Where Int_{ij} is the firm transition between classes of internationalization j or the persistence in the same class j ($j = 1\ldots5$); VA_i is the (logarithm of) the level of value added in 2007; ADD_i is the (logarithm of) the level of firm's employees in 2007; W_{ik} ($k = 1, 2$) are two dummy variables indicating, respectively, whether firm *i*-th is medium- or large-sized; Q_{ir} ($r = 1, 2, 3$) are dummy variables indicating the location of the firm by NUTS1 Region (North-East, Centre, South respectively); R_{is} ($s = 1\ldots\ldots42$) are industry-specific dummy variables (Nace.Rev.2, 2-Digit).

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[5] For a review of the propensity score matching and its variants, from both a theoretical and practical viewpoint, see among others, Wooldridge (2002), Blundell and Costa Dias (2002), Caliendo and Kopeinig (2005).

The estimator is unbiased under three conditions. The first condition requires that after matching by propensity scores, the selection of treatment and non-treatment can be considered random. Intuitively, it means that the selection bias is caused by observables, not unobservables (that affect both treatment selection and treatment outcome). This is the "conditional independence", or a weaker condition of "mean independence". The second condition requires that at the propensity scores used in matching, both treatment and non-treatment selections are possible ("common support" condition). The third condition is balancing, that is, the distributions of covariates are approximately similar for the treated and control groups after PSM.

4.3 Heckman selection model

Heckman (1979) proposes a two-stage approach to evaluating programs for which the treatment choices are binary and the program outcomes depend on a linear combination of observable and unobservable factors. His approach is to estimate the choice model in the first stage and add a bias correction term in the second-stage regression. After further restricting unobservables to multivariate normal distributions, he derives the bias correction variable in the form of inverse Mills ratio (IMR).

The application of the Heckman approach is feasible as we extend our dataset to include the firm-level information concerning a specific sub-sample of exporting firms: those who were exporting in 2007, but were no longer observed as exporting firms in 2010. We denote those firms as "exiting" companies, and we assume they represent the share of internationalized firms which was not so resilient to the effects of international crisis so to exit from the international markets.

As a result, this sub-sample of enterprises is only observed in just one year of the two years of the considered time span and, specifically, in 2007 i.e. at the beginning of time interval. The sub-sample of exiting enterprises consists of about 20,500 firms, with an average size of 16 employees.

Once we augment the initial dataset with the sample of "exiting" enterprises, the outcome variable (respectively, the percentage change in employees and value added at firm level between 2007 and 2010) is partially observed - as the corresponding information for the "exiting" companies is missing. Thus, the dependent variable is censored. This implies a violation of the Gauss-Markov assumption of zero correlation between independent variables and the error term. Specifically, if the process underlying the selection process (the decision to shift upward or downward along internationalization modes) is determined (at least partially) by the same variables which explain firms' performance, then the unobservables in both models are correlated and we have biased estimates in an OLS model.

In this case, the identification of the selection process is required, and it relies on finding specific explanatory variable(s) that are related to the selection process but do not enter the model for firms' performance (exclusion restriction). The estimated parameters in this first stage are used to calculate the inverse Mills ratio, which is computed as

$$\text{IMR} = \sigma \frac{\phi(T\pi)}{\Phi(T\pi)} \tag{5}$$

where T are the first stage regressors, ϕ is the standard normal density function and Φ the standard normal cumulative distribution function. This represents the first step of Heckman (1979) two-stage estimation procedure. The second stage is estimated on a sub-sample of usable

responses (the same of OLS in eq. 1) obtained selecting the firms for which the outcome variable is observable (thus excluding "exiting" firms).

The selection bias to be corrected by the IMR method has two components: one related to the treated group and the other related to the untreated group. The magnitude of each component increases with the covariance between the unobservables in the choice model and the unobservables affecting treatment outcome. Of course, when these unobservables are not correlated, there is no selection bias from unobservables. These covariances are estimated from the second-stage regression[6].

In both stages, we have the same covariates in the choice model and the treatment outcome regression. However, in the first stage the choice model needs a variable that should be correlated with the probability of being selected (in our case: of being shifted along the taxonomy). We use the (logarithm of) firm age at 2007 (Lage) expressed like the number of years from its born (up to 2007).

Ceteris paribus, we assume that an older (younger) firm should have more probabilities to shift upward (downward) along internationalization modes because they are generally more (less) productive. This is mainly due to learning effects related to increases in the knowledge and know-how of an organization, to investments in research and development (leading to product or process innovations), to investments in human capital (attention for human resource management practices in general, and firm-provided training in particular, (see Paauwe 2004).

In the first stage, we estimate the following probit model, similar to (3):

$$\Pr(Int_{ij} = 1) = \Phi\left(\alpha_i VA_i + \beta_{ij} ADD_i + \gamma_{ik} W_{ik} + \delta_{ir} Q_{ir} + \lambda_i Lage + \vartheta_{is} R_{is} + \varepsilon_i\right) \tag{6}$$

but with Lage as additional regressor. Lage is always statistically significant and with expected sign: positive in the cases of upward shifts, negative in the case of downward shifts

The second stage consists in carrying out a OLS regression similar to that in equation (1) but augmented with (5) as additional explanatory variable:

$$Y_i = \alpha_i X_i + \cdots.. \beta_{ij} Z_{ij} + \rho_i \sigma \frac{\phi(\pi_i T_i)}{\Phi(\pi_i T_i)} + \gamma_{ik} W_{ik} + \delta_{ir} Q_{ir} + \vartheta_{is} R_{is} + \varepsilon_i, \tag{7}$$

This equation needs to be explained a little more in detail. It says that the regression line for y on X will be biased upward when   is positive and downward when   is negative, since the inverse Mills ratio is always positive. The size of the bias depends on the magnitude of the correlation, the relative variance of the disturbance   , and the severity of the truncation.

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[6] The error correction variable is in the form of IMR only when: (1) the outcome regression is linear, (2) the choice model is probit, and (3) the unobservables in the first and second stages follow bivariate normal distributions. When these requirements are not satisfied, the error correction variable will be in other forms and adding IMR to the outcome regression will not correct the selection bias that researchers intend to correct.

5. Empirical analysis: results and comments

The results are reported in table 4a and 4b, ordered by decreasing value of OLS coefficients (first column). All the estimates are expressed in terms of difference from the class of "marginal exporters", taken as a benchmark.

The regressors are generally statistically significant and show the expected sign. Limiting our comments to the variable of interest, the following effects emerge. Firstly, upwards shifts are generally associated with positive and significant effects on both measures of performance: firm moving towards more advanced forms of internationalization increased their value added and employment. At the same time, downward shifts tend to be associated to a decrease in value added and employment. In general, the wider is the shift across internationalization classes, the larger is the effect on performance, both for upward and downward moves.

In particular, it is worth noticing that firms that experienced a downgrade performed worse than the firms that during the same period remained "marginal exporters" (i.e. exported less than 5% of their total turnover in both years). This can be explained looking at the dynamics of the Italian business cycle: between 2007 and 2010 exports shrank by 11,6% (and in the same period imports decreased by -6%), while domestic demand decreased much less (-3.2%).[7] Therefore, the first part of the crisis hit more severely the firms more exposed to the international trade.

Secondly the persistence in the same internationalization class between 2007 and 2010 is generally accompanied by a better performance in terms of value added, except for the case of a persistence in one of the least advanced form of international activity (only exporter). This incidentally is consistent with the fact that during the harsher years of the crisis, an upgrade of the internationalization mode was virtually a way for the firms to preserve their competitiveness. On the employment side, this effect is less evident; an increase in the number of employees characterizes the persistence in the "global" and "Two-way trader" classes, while no significant effects are associated to the persistence in "MNE" and "Only importer" classes. Again, the firms that remained "only exporters" showed worse performance in employment dynamics with respect to firms that remained substantially focused on the domestic market ("marginal exporters").

However, as mentioned earlier, in such analyses the OLS estimates are inevitably biased and sensitive procedures are necessary in order to check and correct the selection bias. In this respect, the last two couples of columns in Table 4a and 4b report the results of PSM and Heckman estimates for the value added and employment changes associated to shifts across different internationalization models between 2007 and 2010.

The differences between OLS coefficients and PSM and Heckman estimates show that a self-selection problem does affect the relationships between the firm's internationalization choice and its performance during the first phase of the crisis. However, on the basis of the considerations of par. 4 about the exceptional nature of the international trade trends in the 2007-2010 period, the Heckman estimates better capture the sign and size of the real effect associated to shifts across the internationalization forms.

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[7] Moreover, according to the confidence indicators, on the one hand most entrepreneurs thought that the recession would be transitory, so that in the aftermath of the crisis most of them reacted by trying to maintain the current employment level, also using the instruments provided by the Italian labour law (e.g. the "Cassa Integrazione Guadagni"). On the other hand, households kept their consumption levels basically unchanged, also decreasing their saving rates. For a detailed analysis on these developments see ISTAT (2011).

The significance of the effects revealed by OLS is always confirmed by Heckman estimates for both the value added and employment dynamics. Moreover, the Heckman correction has also the expected direction, both for upgrades (the effect of upward shift across internationalization modes on firms' performance is revised downward) and downgrades (the effect of downward shift across internationalization modes on firms' performance is revised upward).

The OLS estimates tend to overstate the effects of internationalization upgrades: in 2007 older firms – that generally show a better performance – had a higher probability to shifts towards more complex forms of internationalization. At the same time, a share of younger exporting firms – likely those somewhat weaker –left international markets as a consequence of the effects of international crisis. As those firms are not observed in 2010, OLS estimates are upward biased due to the fact that the sample of firms is selected towards surviving and more effective enterprises. We control for selection bias by considering the characteristics of "exiting" companies in 2010: as a consequence, the "true" effects of the upgrades on the firms performance in 2007-2010, as measured by the Heckman coefficients, are lower. On the opposite, when downward shifts are considered across internationalization modes, the OLS estimates tend to underestimate the effects of the internationalization downgrades: in 2007 the younger (and weaker) firms had a higher probability of shifting downwards across the taxonomy. Also in this case, selection bias is controlled for the subsample of exiting firms. The estimated parameter regarding those transitions is generally significant and negative so that the "true" effects of the downgrades are revised upwards compared to OLS estimates.

However, the differences in magnitude of coefficients between OLS, PSM and Heckman estimates are very low, so revealing that the self-selection bias itself is significant but the corresponding effect quantitatively modest. A possible explanation for this relies on the exceptionality of the period considered: the 2008-2009 trade collapse, which followed the financial crisis, acted as a virtually exogenous shock for all firms operating internationally.

As far the magnitude of the effects is concerned, the Heckman estimates confirm an important result: not only do the upward shifts foster firms' performance, but their effects are larger the longer are the "jumps" across the internationalization classes. Furthermore, it should be bear in mind that, for every row of tables 4a and 4b (i.e. for every shift or permanence across the taxonomy), the Heckman coefficients indicate the difference between the changes in employment and value added of firms that implemented that shift or persistence, and the changes in employment and value added of firms that remained "marginal exporters". In this vein, the most remarkable contributes to the dynamics of value added between 2007 and 2010 are due to the movements from "Only importer" to "Global" (over +75% on average with respect to "marginal exporters"), from "Only importer" to "MNE" (about 31%), from "Two-way trader" to "Global (+21%), and from "Only exporter" to "Global" (+21%)**.** On the contrary, shrinking its own degree of internationalization caused a decrease in the value added especially when a firm shifted from "Global" to "Only importer" (-94%), from "Global" to "Only exporter" (-18.8%), and from "Two-way trader" to "Only exporter" (-11%).

It is also noteworthy that maintaining the internationalization form unchanged had a positive effect especially when the internationalization form is relatively "complex", such as the persistence as a "Global" (+15.4% in value added on average with respect to remaining "marginal exporter"), "Two-way trader" (+12%) and "MNE" (+10.4%). Contrarily, firms that between 2007 and 2010 persisted in the "Only exporter" class experienced a -7.2% in the dynamics of value added with respect to the change in value added of marginal exporters. In other terms, this choice led firms to perform even worse than the firms whose activity remained basically confined in the domestic market.

The effects on the employment dynamics are somewhat similar. In this case too, the largest increase in the number of employees benefited the firms shifting from "Only importer" to "Global" increased (+55.7% on average with respect to the employment dynamics experienced by "marginal exporters"), from "Only importer" to "MNE" (+15.1%), from "Two-way trader" to "Global" (+8.4%), and from "Only exporter" to "Global" (+8.6%). On the other hand, the decrease in employment is particularly remarkable for firms shifting from "Global" to "Only importer" (-120%), from "MNE" to "Only exporter" (-15.2%), and from "Global" to "Only exporter" (-14%). As for the persistence, it has positive effects when involve firms "Global" (+3.9%) and "Two-way trader" (+2.2%), and negative effects in correspondence of firms remaining "Only exporters" (-4.5%), while the employment dynamics of firms persisting in the "Only importer" and "MNE" classes was not significantly different from the one of "marginal exporters".

To sum up, on the basis of our estimates, during the first (and harsher) stage of the crisis, the ability to preserve or intensify their international activity helped Italian firms have a good performance on the domestic market both in terms of value added and employment dynamics.

6. Concluding remarks

This work lies in the wake of the recent empirical literature that studies the relationship between internationalization forms and firm's performance. The analysis is carried out with a new database that covers the universe of Italian firms trading abroad; the observation period consists of two non-consecutive years (2007 and 2010), and includes the effects of the global financial crisis. Following the suggestions coming from literature, we present a taxonomy of classes of internationalization, ranging from the basic strategies ("marginal exporters" and "only exporters") to the more complex forms (internationalization of production).

Descriptive analysis shows that firms featuring more complex form of internationalization present higher levels of productivity, as well as a more pronounced diversification of production measured in terms of the variety of exported goods. Indeed, the internationalization strategies of Italian firms changed during the period of the crisis in order to implement defensive strategies aimed at curbing the real effects of the recession. Over the period 2007-2010 firms changed their presence on foreign markets moving (on average) towards more complex forms of internationalization.

Econometric analyses, also correcting for possible selection bias, confirm that these changes helped firms preserve their competitiveness during the harsher years of the crisis. Firms that moved upward along the classes of internationalization modes between 2007 and 2010 performed better (in terms of dynamics of value added and employment) with respect firms only focused on domestic market, also in a period characterised by a sharp fall of external demand. Also a persistence in the more complex internationalization classes has been accompanied by a better performance (except in the case of "Only exporters" class) while downward shifts tend to be associated to a decrease in competitiveness. The magnitude of the selection bias is very small, probably because the 2009 trade collapse acted as a truly exogenous shock for all enterprises operating on the international markets.

The issue of the potential growth of Italian firms associated with an increased degree of internationalization comes up again, especially in the current phase, as a crucial issue central to the chances of recovery for Italian economy. The diversification of both products and markets, therefore, should be an objective to be pursued. To be "global" increases the likelihood to remain competitive, make profits and survive even in times of crisis.

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Appendix. Dataset description

The focus of our analysis is to evaluate the relationship between Italian firms' internationalization and their probability to exit the market during the period of financial crisis. The main structural features of firms, their exporting performance and their involvement in international trade need to be considered. Since all this information is not available using a single data source, our dataset is obtained through the integration of four firm-level datasets provided by the Italian National Institute of Statistics (ISTAT).

First of all, the reference statistical source is given by the ISTAT structural business statistics surveys (SBS), providing information on firms' structure (value of production, turnover, operating costs, wage and salary, value added, tangible and intangible fixed assets). Currently, they include all the companies with at least 100 employees (so called SCI survey) and a large "rotating" sample of firms with less than 100 employees (PMI). PMI datasets essentially includes the variables appearing in the firm's income statement but not those from the balance sheet statement.

Firm-level trade data are drawn from custom trade statistics (COE). COE is a census type statistics (based on administrative data) and represents an harmonized source of data about imports,

exports and trade balance. It collects information on firms operating in Italy and tracks the value and quantity of goods traded by Italian firms with both EU (intra-EU trade) and non-EU operators (extra-EU trade). Specifically, for each firm and time period, COE contains information on the value and the volume of goods traded (exported and imported) by each pair of product/destination market.

We manage this information as follows. First, origin/destination markets are grouped into 11 geographical areas[8]. Second, export/import flows by firm/destinations/origin are aggregated with respect to firm's scope, so that only the information on the number of products by firm/destination/origin market is retained[9]. Overall, the revised structure of COE dataset is as follows: i) firm-level exports/imports towards/from 11 specific destination/origin area are available; ii) the number of product exported is provided for each pair of firm/destination markets.

Information about multinational firms is provided by FATS database, that reports firm-level data on both the foreign-controlled enterprises operating in Italy (inward FATS statistics) and Italian non-resident foreign affiliates (outward FATS statistics). It is worth noticing that, merging FATS and COE datasets, we include in our dataset only multinational firms located within national boundaries, i.e., Italian firms with foreign affiliates and foreign-owned branch operating in Italy.

The firm-level matching of the information contained in the above statistical sources is achieved using the ISTAT Business Register (BR), that present a unique association between the ISTAT "company code" and firm's VAT code[10].

Furthermore, the matching procedure drops out the subsample of companies operating exclusively in the domestic market. It follows that our database consists of a sample of exporting firms (both in the manufacturing and services sectors) with several degrees of participation to the international trade.

The dataset used for the empirical analysis consists of matched firm-level information for two separate periods, 2007 and 2010, denoting, respectively, the beginning of the global financial crisis and a temporary recovery of the business cycle. For each year, it includes more than 90.000 statistical units. According to 2010 sample data, enterprises employed about 4.4 million workers and exported goods for about 293 billion of euros (over 85% of total Italian exports).

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[8] The world market is divided into eleven areas: European Union 27; non-EU European countries, North Africa, other African countries, North America, Central and South America, Middle East, Central Asia, East Asia, Oceania, Other territories and destinations.
[9] The number of products is computed according to the 8-digit code of the Combined Nomenclature (CN), the classification system adopted in the COE database.
[10] A set of production units common to BR, SBS and COE databases is obtained as follows. Firstly, BR and COE databases are matched using the VAT code and using the unique pair of VAT-BR codes for each trader. Secondly, COE and SBS, are then matched using the BR code "company-code" as common information. It should be considered that the relation between SBS and COE is of the type one-to-many, since for each record in SBS (firm *i* in year *t*) it is possible to identify more than one correspondence in COE, due to the greater detail of export flows by both destination markets and product scale.

Table 1 - Forms of internationalization and firms' characteristics (2010)

Forms of internationalization	Number of firms	Number of employees	Average turnover (thousands euros)	Average size (employees)	Average productivity (value added per employee)	Average profitability (Ebitda/value added)	Average degree of openness (Export/turnover)	Number of marginal exporters (Export/turnover <= 5%)
MNE	3,094	643801	82,253.09	208.1	108.16	34.63	37.51	505
Global	11,459	1294964	42,001.08	113.0	65.07	34.38	46.73	455
two-way traders	29,894	135547	17,696.09	45.3	57.07	39.85	18.43	13761
Only importers	22,197	724377	10,349.24	32.6	60.84	45.94	0	0
Only exporters	11,091	107886	2,033.11	9.7	41.78	46.11	32.84	0
Marginal exporters	13,127	224076	5,188.42	17.1	47.53	37.17	1.26	13127
Total	**90,862**	**4,350,000**	**17445.88**	**47.88**	**54.6**	**40.84**	**17.43**	**27848**

Source: authors' calculations on ISTAT data

Table 2- Forms of internationalization and firms' product diversification (2010) (mean)

Forms of internationalization	Product diversification					
	Number of sectors where the firms export	Number of sectors from which the firms import	Number of countries where the firms export	Number of countries from which the firms import	Number of exported goods	Number of imported goods
MNE	5.82	5.71	27.26	8.91	33.63	27.89
Global	4.69	4.3	30.39	6.76	26.24	21.09
two-way traders	2.53	3.52	6.13	4.2	9.21	15.01
Only importers	0	2.6	0	2.35	0	9.8
Only exporters	1.89	0	4.28	0	5.7	0
Marginal exporters	1.34	0	1.7	0	2.42	0
Total	**1.99**	**2.47**	**6**	**3.02**	**6.82**	**10.66**

Source: authors' calculations on ISTAT data

Table 3 - Transition matrix: shifts and persistence in the forms of internationalization between 2007 and 2010 (number of firms and percentages)

Forms of internationalization (2007)	Forms of internationalization (2010)						
	MNE	Global	two-way traders	Only importers	Only exporters	Marginal exporters	Total
MNE	2,139	318	292	61	31	44	2,885
%	74.1	11.02	10.12	2.11	1.07	1.53	100
Global	326	7,720	1,629	15	443	88	10,221
%	3.2	75.53	15.9	0.1	4.3	0.9	100
two-way traders	249	1,444	14,088	1,746	1,025	727	19,279
%	1.3	7.5	73.1	9.1	5.3	3.8	100
Only importers	48	31	2,998	7,159	130	329	10,695
%	0.4	0.3	28.0	66.9	1.2	3.9	100
Only exporters	34	449	1,775	83	3,478	654	6,473
%	0.5	6.9	27.4	1.3	53.7	10.1	100
Marginal Exporters	33	127	1,616	561	1,183	3,686	7,206
%	0.5	1.8	22.4	7.8	16.4	51.1	100
Total	2,829	10,089	22,398	9,625	6,290	5,528	56,759
%	5.0	17.8	39.5	17.0	11.1	9.7	100

Source: authors' calculations on ISTAT data

Table 4a – Effects of shifts and persistence in the forms of internationalization on firm's employment

Status		Effects on performance (marginal effects) –Employment		
		OLS	Heckman	PSM
From (2007)	to (2010)			
Only importer	Global	0.648***	0.557***	0.608***
Only importer	MNE	0.151***	0.151***	0.235***
Only exporter	Global	0.091***	0.086***	0.087***
Two-way trader	Global	0.085***	0.084***	0.072***
Only importer	Two-way trader	0.054***	0.044***	0.051***
Only exporter	MNE	0.053	0.048	0.024
Global	Global	0.039***	0.039***	-0.004
Only exporter	Two-way trader	0.032***	0.030***	0.034**
Only exporter	Only importer	0.032	0.032	-0.059
Two-way trader	Two-way trader	0.022***	0.022***	0.027***
Two-way trader	MNE	0.022	0.174	0.027
Only importer	Only importer	0.006	0.005	0.011
Global	MNE	0.000	0.000	-0.013
MNE	Global	0.000	0.000	-0.024
MNE	MNE	-0.010	-0.010	0.027
Global	Two-way trader	-0.030***	-0.030***	-0.085***
Only importer	Only exporter	-0.031	-0.033	-0.005
Two-way trader	Only importer	-0.044***	-0.044***	-0.047***
Only exporter	Only exporter	-0.045***	-0.045***	-0.038***
MNE	Two-way trader	-0.047*	-0.030	-0.100***
Two way traders	Only exporter	-0.070***	-0.070***	-0.005
MNE	Only importer	-0.070	-0.050	-0.027
Global	Only exporter	-0.144***	-0.140***	-0.206***
MNE	Only exporter	-0.175*	-0.152*	-0.07
Global	Only importer	-1.200***	-1.200***	-1.211***

Source: authors' calculations on ISTAT data

Table 4b – Effects of shifts and persistence in the forms of internationalization on firm's value added

		Effects on performance (marginal effects) –Value added		
Status				
From (2007)	to (2010)	OLS	Heckman	PSM
Only importer	Global	0.804***	0.753***	0.685***
Only importer	MNE	0.333***	0.310***	0.281*
Two-way trader	Global	0.220***	0.218***	0.161***
Only exporter	Global	0.219***	0.210***	0.158***
Two-way trader	MNE	0.187***	0.181***	0.116*
Only importer	Two-way trader	0.183***	0.166***	0.136***
Global	MNE	0.165***	0.167***	0.023
Global	Global	0.154***	0.154***	0.077***
Only exporter	Two-way trader	0.133***	0.129***	0.100***
MNE	Global	0.125***	0.136***	0.003
Two-way trader	Two-way trader	0.120***	0.120***	0.050***
MNE	MNE	0.104***	0.104***	0.044
Only exporter	Only importer	0.102	0.102	-0.009
Only importer	Only importer	0.063***	0.062***	0.037*
Global	Two-way trader	0.050***	0.050***	-0.019
MNE	Two-way trader	0.047	0.070	-0.040
MNE	Only importer	0.000	0.010	0.011
Two-way trader	Only importer	-0.012	-0.013	-0.054**
Only importer	Only exporter	-0.017	-0.023	-0.070
Only exporter	MNE	-0.031	-0.042	-0.016
MNE	Only exporter	-0.060	-0.010	-0.099
Only exporter	Only exporter	-0.072***	-0.072***	-0.050***
Two-way trader	Only exporter	-0.110***	-0.110***	-0.070
Global	Only exporter	-0.188***	-0.183***	-0.244***
Global	Only importer	-0.940***	-0.900**	-1.299***

Source: authors' calculations on ISTAT data