Local context and exports: an analysis with a matched sample of firm–province data

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\textbf{ABSTRACT}
New–new international economics literature argues that firm characteristics have a primary impact on their ability to export. However, a parallel strand of the literature highlights the role of context where firms operate. This paper studies the export performance of about 4300 Italian manufacturing firms between 2000 and 2013. The results show that, even by controlling the effect of firms’ characteristics, features of the local context where firms operate – such as the distance from foreign markets, the level of social capital, the efficiency of the public sector, the degree of financial development and the extent of agglomeration economies – have a significant impact on firms’ export.

\textbf{KEYWORDS}
export decision; export share; local context; firm heterogeneity

\textbf{INTRODUCTION}

Two well-established facts in international trade literature are that firms are extremely heterogeneous within countries and industries, and that internationalization is an endogenous process, with firms self-selecting into exporting depending on their characteristics. Several studies also argue that firms benefit from the geographical environment and the surrounding industrial context in which they operate (Dunning, 1998; Giovannetti, Ricchiuti, & Velucchi, 2013; Robertson & Chetty, 2000). Differences between and within regions, countries, cultures and societies have not been attenuated by globalization (Meyer, Mudambi, & Narula, 2011; Rugman, 2003) and the local context – i.e., factors such as institutions, human and infrastructural resources, culture etc. – continues to be a key factor affecting firms’ ability to become international.\textsuperscript{1} Location advantages, such as a higher level of human and social capital and better functioning institutions, have a significant impact in shaping the firms competitiveness and, in turn, their export performance (Benfratello & Bronzini, 2010; Bougheas, Demetriades, & Morgenroth, 1999; Francois & Manchin, 2013; Levchenko, 2007).

Ascertaining that local context affects firms’ exports can have important policy implications. However, despite its relevance, the empirical evidence on the impact of local characteristics on firms’ export performance is still lacking in both a regional or a macro-regional perspective.\textsuperscript{2}

In this paper we present the results of an empirical analysis on the impact of local context on firms’ exports, where the geographical unit of observation is at the level of Italian provinces. Italy is a good case study in which to analyze the role of local characteristics because its provinces are characterized by substantial differences in both economic and social development.\textsuperscript{3} Notwithstanding, the only determinant of firms’ internationalization that has been thoroughly studied are local spillovers within industrial districts, following Becattini (1990).\textsuperscript{4} A noticeable exception is provided by Giovannetti et al. (2013), who also control for infrastructure endowment.

The analysis is based on a sample of more than 4300 Italian manufacturing firms over the period 2000–13. The data are of very high quality and come from the ‘Indagine sulle imprese industriali e dei servizi’ (Invind), an annual survey managed by the Bank of Italy on a stratified sample mimicking the structure of the Italian manufacturing sector and its geographical characterization. The aim is to examine the local-context determinants of export performance, controlling for firm-level characteristics, with a
specific focus on the characteristics of the economic and social environment where firms operate. We concentrate on five sets of characteristics: the distance from foreign destination markets; the level of social capital; the efficiency of the public sector; the development of banking markets; and the extent of agglomeration economies.

The approach poses two main problems. Firstly, local characteristics can affect firms’ export performance directly and indirectly. We have a direct effect, for example, when lower transportation costs associated with higher proximity to foreign destinations make it easier for a firm to access foreign markets. On the other hand, we have an indirect effect when local characteristics may affect some determinants of firms’ exporting activity, such as the skill level of its workforce or its innovativeness. In our empirical framework we do our best to control for a range of observable firm characteristics in order to limit the impact of the indirect effect on the estimates, but we cannot exclude that some additional indirect effect goes through unobservable firms’ characteristics. Secondly, we face a self-selection problem, which comes by if firms with ‘better’ unobservable characteristics self-select into areas with ‘better’ local characteristics. For example, firms that are more likely to export may be willing to locate in areas in which the cost of exporting is lower. If this were the case, the estimated impact of local characteristics would overstate its true effect by reflecting also the positive effect of self-selection based on unobservable firms’ characteristics. While these two problems limit our ability to measure precisely the direct impact of local characteristics on firms’ export performance, the analysis still provides interesting information on the overall effect of local environment on the average export performance of firms in a given area, a relevant issue from the point of view of regional development.

The results of the analysis confirm that local context has a statistically and economically significant impact on firms’ export performances, even controlling for observable firm characteristics. This is true at both an extensive margin, i.e., the likelihood of a firm accessing foreign markets, and an intensive margin, i.e., the incidence of exports on firms’ total sales. Several checks confirm the robustness of the results with respect to different econometric specifications and alternative measures of the degree of internationalization.

The paper is organized as follows. The next sections review the recent literature on the determinants of firms’ export performance which are relevant to the analysis, as well as describing the data used and their sources, presenting the empirical methodology, illustrating the main results of the econometric analysis and concluding.

RELATED LITERATURE

A first strand of the literature related to the present work deals with geographical and socioeconomic characteristics. According to the literature based on gravity models (Anderson & van Wincoop, 2003; Pöyhönen, 1963), geographic localization and transport and communication infrastructures impact on the ability of countries to participate in the global production network (Bougheas et al., 1999; Limao & Venables, 2001).

Finally, the present contribution is also related to the vast literature on the links between firms’ characteristics and their export performance (Wagner, 2012, 2016). A large number of empirical contributions have shown that the characteristics of exporting and non-exporting firms are indeed different: exporters are more productive, larger, have a higher share of skilled workers, pay higher wages, have more years of activity and a higher innovative capacity than non-exporters (Bernard & Jensen, 2004), supporting the predictions of the theoretical model of Melitz (2003). Firms’ internationalization is also associated with a higher capital intensity, reflecting firms’ technology (Basile, 2001; Egger & Kesina, 2013; Wakelin, 1998), and a stronger propensity to innovate (Becker & Egger, 2013; Damijan, Kostevc, & Polanec, 2010), in terms of both inputs (intensity of research and development – R&D) and outputs (product and process innovation). And a recent
strand of the literature has also shown that credit availability has a significant impact on export performance.9

In general, working in foreign markets entails fixed and variable costs well in addition to those necessary to serve the domestic market. This has the important implication that internationalization raises the financial needs of firms, making them more dependent on external sources of financing. The theoretical and empirical literature has confirmed this link (Chaney, 2016; Manova, 2013). In a partly related area, older firms have easier access to the funding means necessary to enter foreign markets and have a greater experience in the business and, therefore, higher productivity (Majocchi, Bacchiocchi, & Mayrhofer, 2005).

The ample international evidence on the link between firms’ characteristics and export performance is also confirmed in the case of Italy. Castellani (2002) and Serti and Tomasi (2008) provide evidence that productivity positively affects both the intensive and extensive margins of exports of Italian firms. Minetti and Zhu (2011) confirm that the extensive and intensive propensities to export are smaller for credit-rationed firms. Basile (2001), Becchetti, De Panizza, and Oropallo (2007), D’Angelo (2012) and Sterlacchini (2001) find that innovation and agglomeration of firms in geographically restricted areas are very important competitive factors explaining firm-level heterogeneity in the export performance of Italian firms.

**DATA AND DESCRIPTIVE STATISTICS**

Data on exports and other firm characteristics were obtained from the Invind survey, conducted every year by the Bank of Italy,10 while data on local-context characteristics were obtained from different sources. For a description of the variables used in the empirical analysis and their sources, see Appendix A in the supplemental data online.

The sample includes 4326 firms observed over the period 2000–13, of which about 80% were exporters at least in one year, but only 5% exported every year. On average, the sample includes nine observations per firm. About 33% of firms in the sample have between 20 and 49 employees (small firms), whereas the remaining 67% includes medium-sized firms with more than 50 employees.

The measure of the extensive margin of export is a dummy variable (\textit{du} \textit{export}) taking the value of 1 if the firm exported at time \(t\), and 0 otherwise. The intensive margin (\textit{share} \textit{export}) is the share of exports over total sales in each year. Following the literature reviewed above, several firm-level controls are included in the empirical model: (1) \textit{employees}, the average number of employees in the current, previous and following year; (2) \textit{age}, the years of activity since a firm’s foundation; (3) \textit{productivity}, total sales over year-end employees; (4) \textit{capital intensity}, investment in tangible assets over year-end employees; (5) \textit{share of white collars} over blue collars; and (6) \textit{legal status}, a dummy indicating limited liabilities corporations.

Province-level determinants of exports are chosen based on the previous literature and on data availability. A first characteristic considered is geographical distance from foreign destination markets, weighted by the gross domestic product (GDP) of main destination countries of Italian exporters (\textit{distance}).11 A second set of characteristics measures social capital: the average age of the population (\textit{population age}), which we include because different generations typically share different values; the level of opportunism in 1950 and 1960 (the principal component of the number of protests for promissory notes and checks and patrimony crimes); and the number of blood bags donated per 1 million inhabitants (\textit{donation}). The third set of characteristics includes measures of the efficiency of the public sector: the number of days needed to complete a first-degree trial court (\textit{judicial efficiency}); the amount of trade credit of private manufacturing firms towards the public administration (\textit{trade credit public sector}); the share of households waste that is recycled (\textit{recycling}); two indexes measuring respectively the efficiency of public sector on spending in education (\textit{education efficiency}) and in childcare and healthcare (\textit{child and health care efficiency}).

Next, we include two measures for the development of the banking sector: the share of deposits over GDP (\textit{deposits/GDP}) and the number of bank branches per 1 million inhabitants (\textit{bank branches}).

Finally, we consider three measures of agglomeration economies. The first (\textit{Marshallian externalities}) is a standardized measure of the specialization of a sector in a province (Marshall, 1890), constructed following Glaeser, Kallal, Scheinkman, and Shleifer (1992) and Paci and Usai (2000) as the fraction of the province’s employment that a sector represents in that province, relative to the share of the whole sector in national employment. Its variability is at the province-sector-year level. A positive and significant sign of its coefficient is interpreted as evidence of the fact that exports arise within those sectors in which the production of the province is specialized.

The second indicator (\textit{Jacobian externalities}) measures the degree of production diversity within each Italian province, constructed as the reciprocal of the Gini coefficient (Jacobs, 1969; Paci & Usai, 2000). A positive coefficient indicates that a higher level of diversification of the provincial system favours export activity.

Finally, \textit{export externalities} is a variable calculated as province averages of exports from the Invind data, available at the firm level, to account for positive effects associated with the interaction with other exporting firms in the local context.

Table 1 reports the averages of location-specific characteristics, distinguishing between provinces where the incidence of exports over total sales is above and below the sample median. It confirms that firms have a higher incidence of exports if they are in provinces that are closer to markets of destination, so that they incur in lower transportation costs. A higher degree of internationalization is also associated with higher levels of social capital, and opportunism. A more efficient public sector, where the share of household waste that is recycled is higher, education and
## Table 1. Descriptive statistics of provincial- and firm-level indicators.

| Variables                  | Observations | Provinces | Mean | SD  | Minimum | Maximum | t-test | Significance |
|---------------------------|--------------|-----------|------|-----|----------|---------|--------|--------------|
|                           |              | Low export intensity |      |     |          |         |        |              |
| distance                  | 52           | 4010      | 344  | 3276| 4523     |          | 10.2   | ***          |
| population age            | 52           | 42.35     | 2.24 | 38.00| 47.00    |          | 5.0    | ***          |
| opportunism               | 52           | 0.28      | 0.92 | −1.53| 2.39     |          | −5.0   | ***          |
| donation                  | 52           | 17.43     | 15.36| 0   | 69.26    |          | −6.1   | ***          |
| judicial efficiency       | 52           | 362       | 116  | 145 | 616      |          | 4.8    | ***          |
| trade credit public sector| 52           | 0.01      | 0.02 | 0   | 0.09     |          | 1.2    | ***          |
| recycling                 | 52           | 0.08      | 0.09 | 0.01| 0.38     |          | 8.6    | ***          |
| education efficiency      | 52           | 0.96      | 0.07 | 0.77| 1.10     |          | −6.5   | ***          |
| child and health care efficiency | 52  | 0.94    | 0.28 | 0.48 | 1.73     |          | −2.3   | ***          |
| deposits/GDP              | 52           | 0.34      | 0.05 | 0.25| 0.44     |          | −3.9   | ***          |
| bank branches             | 52           | 4.17      | 1.40 | 2.22| 7.43     |          | −10.0  | ***          |
| Marshallian externalities | 52           | 0.81      | 0.07 | 0.62| 0.95     |          | −9.7   | ***          |
| Jacobian externalities    | 52           | 1.70      | 0.14 | 1.48| 2.04     |          | −9.7   | ***          |
| export externalities      | 52           | 7.48      | 0.85 | 5.57| 10.02    |          | −10.7  | ***          |

| Variables                  | Observations | Firms | Mean | SD  | Minimum | Maximum | t-test | Significance |
|---------------------------|--------------|-------|------|-----|----------|---------|--------|--------------|
|                           |              | Exporters |      |     |          |         |        |              |
| export                    | 17,420       | 66.57  | 436.11| 0  | 20,900   |          | −20.2  | ***          |
| share_export              | 17,420       | 0.40   | 0.29  | 0  | 1.10     |          | −180.0 | ***          |
| employees                 | 17,420       | 375.88 | 1,168.1| 20 | 31,782  |          | −25.4  | ***          |
| age                       | 17,420       | 39.04  | 27.45 | 0  | 282      |          | −23.8  | ***          |
| productivity              | 17,420       | 329.86 | 693.77| 6.25| 30,885  |          | −8.9   | ***          |
| capital intensity         | 17,420       | 10.76  | 20.44 | 0.01| 527.37  |          | −0.3   | ***          |
| share of white collars    | 17,420       | 1.79   | 22.32 | 0  | 1635     |          | −3.9   | ***          |
| legal status              | 17,420       | 0.97   | 0.18  | 0  | 1        |          | −10.5  | ***          |

Notes: Summary statistics are calculated at the firm-level over the period 2000–13. Low export intensity and high export intensity indicate respectively provinces where the incidence of exports over total sales is below and above the sample median. Exporters are firms showing a positive value of exports for at least one year over the sample period. Non-exporters are firms showing always a zero value of exports for the entire sample period. Export, productivity and capital intensity are in thousands of euros. The t-test indicates the value of the mean-difference test. The approximate degrees of freedom for the t-test are obtained from Welch’s formula (1947). See Table A1 in Appendix A in the supplemental data online for variables definitions.

**Significance at the 5% level; ***significance at the 1% level.
child and health services are more efficient, and the judicial system takes less time to take final decisions, is also associated with a higher degree of internationalization. Finally, a more developed local banking sector is also associated with a stronger propensity to export.

Table 1 also provides statistics on firm-level characteristics. Export intensity for the subsample of exporting firms is 40%. Consistent with the literature, exporters are larger, more experienced, display a much higher labour productivity and a higher share of white collars over blue collars than non-exporters. Exporting firms show a higher average number of employees, are 10 years older that non-exporting ones and have a 30% higher labour productivity, with all differences statistically significant at the 1% level. The difference in capital intensity between exporters and non-exporters is not statistically significant.

Pairwise correlations, reported in Table A2 in Appendix A in the supplemental data online, confirm the evidence of Table 1. However, many province characteristics have a very high degree of bilateral correlation, suggesting that they proxy for very similar phenomena. To gauge a neater empirical view, we therefore conduct a multivariate analysis. Since the sample has repeated observations on provinces and years, the standard errors are clustered at the year and province level (Javorcik, 2004). Even though we have (unbalanced) panel data and exporting and firm characteristics vary over time, we are forced to estimate regressions (1) and (2) using a pooled estimator because local-context characteristics are time invariant (and, due to their very nature, they would have in any case a rather low time variability). We prefer a pooled estimator to a cross-section analysis because this allows one to control better for firm-level heterogeneity, including the high variability of the dependent variables previously described. Table B3 in Appendix B in the supplemental data online confirms that the results are broadly confirmed also using a cross-section specification. Additional robustness checks are also reported in Tables B1 and B2, also in Appendix B online.

**ECONOMETRIC ANALYSIS**

**Econometric specification**

To test the hypotheses that location characteristics affect firms’ export performance, we estimate two distinct econometric models for the extensive margin and for the intensive margin. In addition to the baseline specification, to better control for potential omitted variable problems, we also present results including firm-level and time-varying characteristics.

In the specification for the extensive margin, the dependent variable is dichotomous and only takes a value of 0 if firm \( i \) has not exported at time \( t \), and 1 if it has exported. A binomial model is therefore estimated, where \( i \) indexes for firm, \( p \) for province, \( s \) for sector of activity of the firm and \( t \) for time:

\[
d_{u, \text{export}_{ipt}} = \alpha + \left( \sum_k \beta_k \text{province char}_k \right) + \left( \sum_j \gamma_j \text{firm char}_j \right) + \left( \sum_i \delta_i \text{du sector} \right) + \left( \sum_j \theta_{du, \text{time} j} \right) + \varepsilon_{ipt} \tag{1}
\]

where \( d_{u, \text{export}_{ipt}} \) is a dummy taking the value of 1 if firm \( i \) located in province \( p \), of sector \( s \), exported in year \( t \), and 0 otherwise; province \( (k = 1, \ldots, K) \) and firm characteristics \( (j = 1, \ldots, J) \), when included, are those described above; and the error term \( \varepsilon_{ipt} \) is a residual with the usual properties for binomial-choice models. The specifications include sector dummies, defined in terms of two-digits ATECO-2007, and year dummies. Equation (1) is estimated by using a probit model.

For the intensive margin of exports, a similar specification is adopted, substituting the dependent variable with \( \text{share export}_{ipt} \) the share of exports over total sales,\(^\text{12}\) and estimating it using a standard ordinary least squares (OLS) model, a Tobit model and the generalized linear model (GLM) developed by Papke and Wooldridge (1996).\(^\text{13}\)

\[
\text{share export}_{ipt} = \alpha + \left( \sum_k \beta_k \text{province char}_k \right) + \left( \sum_j \gamma_j \text{firm char}_j \right) + \left( \sum_i \delta_i \text{du sector} \right) + \left( \sum_j \theta_{du, \text{time} j} \right) + \varepsilon_{ipt} \tag{2}
\]

Econometric evidence

Table 2 presents the results of the estimate of equation (1) on the impact of local-context and firm characteristics on their probability to export.\(^\text{14}\) Column (1) presents the results including a large set of local-context characteristics. This first specification is estimated on a sample of 20,815 firm-year observations and includes sector and time dummies. The pseudo-\( R^2 \) is 0.21. Consistent with the high degree of pairwise correlation, not all the coefficients of these local-context characteristics are statistically significant. Recycling, the amount of trade credit towards the public administration, among measures of the efficiency of the public sector, and the number of bank branches per inhabitant, among measures of the development of the banking sector, do not have a statistically significant effect on the probability that a firm is an exporter. The \( F \)-test of the null hypothesis that these variables
can be excluded from the specification cannot be rejected with $p = 0.51$.

Column (2) of Table 2 presents a more parsimonious specification that includes only those variables that have a statistically significant effect on the probability to export. The number of observations is unchanged as is the pseudo-$R^2$. The results confirm the findings of the descriptive statistics, showing that the characteristics of the local context where firms operate have a significant impact on their probability to export. All estimated coefficients are statistically significant at the 99% level, with the only exception of that of judicial system efficiency, that is statistically significant at the 95% level, and the blood donation that is not significant at the standard levels.

In addition to being statistically significant, the impact of the characteristics of the local context on the probability to

### Table 2. Baseline estimates on the extensive margin of exports: the impact of provincial- and firm-level indicators.

|                      | (1)  | (2)  | (3)  | (4)  | (5)  |
|----------------------|------|------|------|------|------|
|                      | Probit | Probit | Probit | Probit | Probit |
| distance             | $-0.172^{***}$ | $-0.187^{***}$ | $-0.181^{***}$ | $-0.118^{***}$ | $-0.119^{***}$ |
| (0.02)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| population age       | $-0.027^{**}$ | $-0.032^{***}$ | $-0.033^{***}$ | $-0.022^{**}$ | $-0.022^{**}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| education efficiency | $0.043^{***}$ | $0.046^{***}$ | $0.045^{***}$ | $0.034^{***}$ | $0.034^{***}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| opportunism          | $-0.052^{***}$ | $-0.052^{***}$ | $-0.049^{***}$ | $-0.040^{***}$ | $-0.040^{***}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| judicial efficiency  | $-0.025^{**}$ | $-0.024^{**}$ | $-0.022^{**}$ | $-0.019^{*}$ | $-0.019^{*}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| deposits/GDP         | $0.056^{***}$ | $0.056^{***}$ | $0.055^{***}$ | $0.049^{***}$ | $0.050^{***}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| child and health care efficiency | $0.025^{***}$ | $0.025^{***}$ | $0.024^{***}$ | $0.002$ | $0.002$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| recycling            | $0.021$ | $0.021$ | $0.021$ | $0.021$ | $0.021$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| trade credit public sector | $-0.001$ | $-0.001$ | $-0.001$ | $-0.001$ | $-0.001$ |
| (0.00)               | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| donation              | $-0.016^{*}$ | $-0.014$ | $-0.014$ | $-0.014$ | $-0.014$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| bank branches         | $-0.001$ | $-0.001$ | $-0.001$ | $-0.001$ | $-0.001$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| employees (lag)       | $0.136^{***}$ | $0.137^{***}$ | $0.137^{***}$ | $0.137^{***}$ | $0.137^{***}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| age (lag)             | $0.044^{***}$ | $0.044^{***}$ | $0.044^{***}$ | $0.044^{***}$ | $0.044^{***}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| productivity (lag)    | $0.073^{***}$ | $0.073^{***}$ | $0.073^{***}$ | $0.073^{***}$ | $0.073^{***}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| capital intensity (lag) | $0.022^{***}$ | $0.022^{***}$ | $0.022^{***}$ | $0.022^{***}$ | $0.022^{***}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| share of white collars (lag) | $0.000$ | $0.000$ | $0.000$ | $0.000$ | $0.000$ |
| (0.00)               | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| legal status          | $0.074^{***}$ | $0.074^{***}$ | $0.074^{***}$ | $0.074^{***}$ | $0.074^{***}$ |
| (0.01)               | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Observations          | 20,815 | 20,815 | 20,815 | 20,815 | 20,815 |
| Pseudo-$R^2$          | 0.21 | 0.21 | 0.21 | 0.26 | 0.26 |

Notes: Values are marginal effects estimated from different model specifications using Invind data pooled over the period 2000–13. Marginal effects are computed as the variation of the probability of exporting after a variation between the 10th and 90th percentiles of explanatory variables from probit estimates; standard errors (in parentheses) are calculated with the Delta method. Industry and year dummies are included in all specifications. See Table A1 in Appendix A in the supplemental data online for variables definitions.

*Significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.
export is also economically significant, as shown in column (2) of Table 2. A reduction of the distance from foreign destination markets from the level at the 90th percentile to that at the 10th percentile determines an increase in the probability to export of 18.7 percentage points. Other characteristics have smaller effects, but still not negligible. Local financial development has a relevant impact: an increase from the level at the 10th to the level at the 90th percentile of the sample distribution of the share of bank deposits to GDP augments the probability to export by 5.6 percentage points. Similar results are found for the measures of social capital: opportunism (≈5.2 percentage points) and average age of the population (≈3.2 percentage points). The efficiency of the public sector also has an economically significant impact: 4.6 percentage points for the efficiency of education services, 2.5 percentage points for the productivity of the child and health service sectors, and ≈2.4 percentage points for the length of judicial trials.

Column (3) of Table 2 includes all province-level variables that have a statistically significant effect on the probability to export, excluding blood donation that in the previous specification resulted statistically insignificant at the standard levels.

Overall, these results provide a sound confirmation that the characteristics of the local context where firms operate influence their propensity to export. However, as already argued above, a criticism that can be moved to this analysis is that local-context characteristics do not affect directly the probability that a firm export, but they are more in general favourable to the development of larger and more productive firms that are well known to have a higher propensity to export.

To test the hypothesis that the local context has an effect on the probability that firms export even controlling for the impact of firms’ observable features, we augment our specification including firm-level information on size, age, labour productivity, capital intensity, the share of white collars over the total workforce, and whether the firm is a limited liability company. While this paper does not claim that results on firms’ characteristics can be interpreted in a causal way, due to potential reverse causality effects, these variables are included with one-year lag (columns (4) and (5) of Table 2). The pseudo-$R^2$ of the regression rises to 0.26. The estimated coefficients on firm characteristics are in line with the ample empirical evidence already available: firms that are larger, older, more productive and have a higher capital intensity have a higher probability to export, while the share of white collars in the workforce does not have a statistically significant effect. The impact of firm-specific characteristics on the probability to export is substantial, as shown in column (5): an increase from the value at the 10th percentile to that at the 90th percentile of the sample distribution augments the probability to export of 13.7 percentage points in the case of size, of 4.4 percentage points in the case of age, 7.3 percentage points in the case of productivity and 2.2 percentage points in the case of capital intensity. Limited liability corporations have, ceteris paribus, a probability 7.4 percentage points higher of being exporter than unlimited liability corporations.

Interestingly, and reassuringly, the coefficients of the variables describing the local context where the firm operates are all still statistically significant, confirming the claim that the local context has an effect on the probability that firms export in addition to the impact of firms’ features. Controlling for firm characteristics, the economic impact of the local context slightly shrinks, as it was to be expected since in this case the effect of the local context on firms’ characteristics has not been included. But it remains substantial.

The next step in the analysis is to analyze the intensive margin of exports. Accessing foreign markets typically involves sunk costs that need not be sustained twice. The determinants of the degree of internationalization measured on the extensive margin can therefore differ from those measured on the extensive margin. Table 3 reports the results of investigating the impact of provincial characteristics on the intensive margin of exports, controlling as usual for firm-level characteristics. The structure of Table 3 mimics that of Table 2, with the inclusion of Tobit and GLM estimates: columns (1) to (4) include only local-context characteristics, while columns (5) to (8) also include firm-level features.

The specification in column (1) includes sector and time dummies and is estimated on the same sample of 20,815 firm–year observations and has $R^2 = 0.27$. As with the extensive margin, local-context characteristics have an impact on the share of firms’ exports over total sales. However, the set of characteristics that have a statistically significant effect and their economic magnitude are partly different in the case of the intensive margin. Column (1) of Table 3 shows that a larger number of features of the local context have no statistically significant effect on the share of exports, including proxies for the efficiency of the public sector, such as child and healthcare services efficiency and the length of judicial trials. The F-test of the null hypothesis that these and the other features of the local context that had no statistically significant effect also on the extensive margin can be excluded from the specification cannot be rejected with $p = 0.71$. The second specification, presented in column (2) of Table 3, includes only five characteristics of the local context, one for each of the major groups of determinants: geographical distance for transportation costs; population age; the degree of opportunism for social capital; the efficiency of education services; and the ratio of bank deposits to GDP for financial development. The number of observations and the $R^2$ of the regression are unchanged with respect to the previous specification. Interestingly, features of the local context have an economically significant impact also on the intensive margin of exports. With a change from the level at the 10th percentile to that at the 90th percentile of the sample distribution an increase in the share of exports over total sales of 14.6 percentage points is estimated when reducing geographical distance, of 1.7 percentage points when reducing population age, of 2.4 percentage points when increasing the efficiency of education services, of 2.0 percentage
Table 3. Baseline estimates on the intensive margin of exports: the impact of provincial-level and firm-level indicators.

|              | (1) OLS | (2) OLS | (3) Tobit | (4) GLM | (5) OLS | (6) OLS | (7) Tobit | (8) GLM |
|--------------|---------|---------|-----------|---------|---------|---------|-----------|---------|
| distance     | -0.148*** | -0.146*** | -0.198*** | -0.153*** | -0.096*** | -0.096*** | -0.135*** | -0.105*** |
|              | (0.01)   | (0.01)   | (0.01)    | (0.01)   | (0.01)   | (0.01)   | (0.01)    | (0.01)   |
| population age| -0.017**  | -0.017**  | -0.021**  | -0.013*  | -0.000   |         |           |         |
|              | (0.01)   | (0.01)   | (0.01)    | (0.01)   |         |           |           |         |
| education efficiency | 0.024***  | 0.024***  | 0.033***  | 0.023***  | 0.012*   | 0.012*   | 0.018**   | 0.012*   |
|              | (0.01)   | (0.01)   | (0.01)    | (0.01)   | (0.01)   | (0.01)   | (0.01)    | (0.01)   |
| opportunism  | -0.020**  | -0.020**  | -0.028*** | -0.018**  | -0.023*** | -0.023*** | -0.032*** | -0.020** |
|              | (0.01)   | (0.01)   | (0.01)    | (0.01)   | (0.01)   | (0.01)   | (0.01)    | (0.01)   |
| judicial efficiency | 0.008     |         |           |         |         |         |           |         |
|              | (0.01)   |         |           |         |         |         |           |         |
| deposits/GDP | 0.043***  | 0.045***  | 0.065***  | 0.050***  | 0.045***  | 0.045***  | 0.064***  | 0.049***  |
|              | (0.01)   | (0.01)   | (0.01)    | (0.01)   | (0.01)   | (0.01)   | (0.01)    | (0.01)   |
| child and health care efficiency | 0.007 |         |           |         |         |         |           |         |
|              | (0.01)   |         |           |         |         |         |           |         |
| recycling    | -0.009   |         |           |         |         |         |           |         |
|              | (0.01)   |         |           |         |         |         |           |         |
| trade credit public sector | -0.002 |         |           |         |         |         |           |         |
| donation     | 0.001    |         |           |         |         |         |           |         |
|              | (0.01)   |         |           |         |         |         |           |         |
| bank branches| 0.009    |         |           |         |         |         |           |         |
|              | (0.01)   |         |           |         |         |         |           |         |
| employees (lag) |          |         |           | 0.139*** | 0.138*** | 0.163*** | 0.131*** |         |
|              |         |         |           | (0.01)   | (0.01)   | (0.01)   | (0.01)    |         |
| age (lag)    |         |         |           | -0.002   |         |         |           |         |
|              |         |         |           | (0.01)   |         |         |           |         |
| productivity (lag) |         |         |           | 0.023*** | 0.023*** | 0.040*** | 0.026*** |         |
|              |         |         |           | (0.01)   | (0.01)   | (0.01)   | (0.01)    |         |
| capital intensity (lag) |         |         |           | 0.036*** | 0.036*** | 0.046*** | 0.038*** |         |
|              |         |         |           | (0.01)   | (0.01)   | (0.01)   | (0.01)    |         |
| share of white collars (lag) |         |         |           | 0.000    |         |         |           |         |
|              |         |         |           | (0.00)   |         |         |           |         |
| legal status |         |         |           | 0.077*** | 0.077*** | 0.112*** | 0.106*** |         |
|              |         |         |           | (0.01)   | (0.01)   | (0.01)   | (0.01)    |         |
| Observations | 20,815   | 20,815   | 20,815    | 20,815   | 20,815   | 20,815   | 20,815    | 20,815   |
| Pseudo-$R^2$ | 0.27     | 0.27     | 0.29      | 0.29     | 0.29     | 0.29     | 0.29      | 0.34     |

Notes: Values are marginal effects estimated from different model specifications using Invind data pooled over the period 2000–13. Marginal effects are computed as the variation of the export share after a variation between the 10th and 90th percentiles of explanatory variables. GLM is estimated using the binomial as the family distribution and logit as the link function. Standard errors (in parenthesis) are calculated with the Delta method. Industry and year dummies are included in all specifications. See Table A1 in Appendix A in the supplemental data online for variables definitions.

*Significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

points when abating opportunism, and of 4.5 percentage points when augmenting the share of bank deposits. The Tobit estimates, reported in column (3) of Table 3, confirm the results of the OLS model. The results of the empirical model for the intensive margin estimated using the quasi-likelihood method introduced by Papke and Wooldridge (1996), reported in column (4), also show that all coefficients have the expected sign and are statistically significant.

Also in this case, adding firm-level characteristics does not alter the previous picture. The number of observations is unchanged and $R^2 = 0.26$ (columns (5) and (6) of Table 3). All province features have a statistically significant effect, with the only exception of the average age of
population. From an economic perspective, the effects are relevant (column (6)). An increase from the level at the 10th percentile to that at the 90th percentile of the sample distribution augments the share of exports over total sales of 13.8 percentage points in the case of Marshallian specialization economies (columns (1) and (2)), Jacobian diversity economies (columns (3) and (4)), export spillovers (columns (5) and (6)), and all agglomeration economies together (columns (7) and (8)). The number of observations drops by about 50% because of the reduced time span for which data on agglomeration economies are available. Columns (1) and (2) show that the impact of Marshallian externalities is positive on the extensive and on the intensive margin of exports. An increase of the

Table 4. Estimates on the extensive and intensive margin of exports: the impact of agglomeration economies.

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-----|-----|-----|-----|-----|-----|-----|-----|
| Probit | GLM | Probit | GLM | Probit | GLM | Probit | GLM |
| distance | -0.118*** | -0.096*** | -0.128*** | -0.103*** | -0.080*** | -0.052*** | -0.073*** | -0.045*** |
| (0.01) | (0.01) | (0.02) | (0.01) | (0.02) | (0.01) | (0.02) | (0.01) |
| population age | -0.030** | -0.029** | -0.018 | -0.019 | -0.018 | -0.019 | -0.018 | -0.017 |
| (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| education efficiency | 0.035*** | 0.008 | 0.038*** | 0.017* | 0.025* | 0.001 | 0.022* | 0.003*** |
| (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| opportunism | -0.050*** | -0.027** | -0.051*** | -0.037*** | -0.052*** | -0.034*** | -0.052*** | -0.038*** |
| (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| judicial efficiency | -0.018 | -0.020 | -0.018 | -0.017 | -0.018 | -0.017 | -0.018 | -0.017 |
| (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| deposits/GDP | 0.046*** | 0.054*** | 0.047*** | 0.052*** | 0.041*** | 0.049*** | 0.040*** | 0.044*** |
| (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Marshallian externalities | 0.024*** | 0.030*** | 0.022*** | 0.024*** | 0.022*** | 0.024*** | 0.022*** | 0.024*** |
| (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Jacobian externalities | -0.006 | 0.036*** | 0.036*** | -0.006 | 0.028*** | -0.006 | 0.028*** | -0.006 |
| | (0.01) | (0.01) | (0.01) | | (0.01) | (0.01) | (0.01) | (0.01) |
| export externalities | 0.133*** | 0.119*** | 0.126*** | 0.132*** | 0.113*** | 0.128*** | 0.109*** | 0.109*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| employees (lag) | 0.051*** | 0.050*** | 0.047*** | 0.048*** | 0.047*** | 0.048*** | 0.047*** | 0.048*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| age (lag) | 0.091*** | 0.023*** | 0.091*** | 0.023*** | 0.087*** | 0.017*** | 0.087*** | 0.016*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| productivity (lag) | 0.021*** | 0.038*** | 0.021*** | 0.038*** | 0.022*** | 0.039*** | 0.022*** | 0.038*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| capital intensity (lag) | 0.068*** | 0.093*** | 0.092*** | 0.064*** | 0.091*** | 0.064*** | 0.091*** | 0.091*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| legal status | 12,520 | 12,520 | 12,520 | 12,520 | 12,520 | 12,520 | 12,520 | 12,520 |
| Pseudo-$R^2$ | 0.27 | 0.26 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 |

Notes: Values are marginal effects estimated from different model specifications using Invind data pooled over the period 2000–13. Marginal effects are computed as the variation of the export share after a variation between the 10th and 90th percentiles of explanatory variables. GLM is estimated using the binomial as the family distribution and logit as the link function. Standard errors (in parenthesis) are calculated with the Delta method. Industry and year dummies are included in all specifications. See Table A1 in Appendix A in the supplemental data online for variables definitions.

*Significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Of Table 3, broadly confirm the findings of the OLS specification. Column (8) reports the GLM estimates that also confirm our previous results.

Table 4 shows the results obtained including as additional context-level characteristics indices of Marshallian specialization economies (columns (1) and (2)), Jacobian diversity economies (columns (3) and (4)), export spillovers (columns (5) and (6)), and all agglomeration economies together (columns (7) and (8)). The number of observations drops by about 50% because of the reduced time span for which data on agglomeration economies are available. Columns (1) and (2) show that the impact of Marshallian externalities is positive on the extensive and on the intensive margin of exports. An increase of the...
standardized indicator from the level at the 10th percentile to that at the 90th percentile determines an increase in the probability to export of 2.4 percentage points and in the export share of 3.0 percentage points. Other characteristics remain broadly unchanged in terms of significance and economic impact. Also, Jacobs externalities (columns (3) and (4)) have a positive and statistically significant impact on the intensive margin, and a 10th to 90th percentile change is associated with an increase in the share of exports of 3.6 percentage points. Finally, also export spillovers have a positive and statistically significant impact on the probability to export and on the export share (columns (5) and (6)), with marginal impacts of a 10th to 90th percentile change of 6.6 and 9.1 percentage points respectively. Remarkably, even including all three indices of agglomeration externalities at the same time (columns (7) and (8)), the coefficients of the local-context and firm-level characteristics are broadly unchanged with respect to the baseline specifications of column (5) of Table 2 and column (6) of Table 3.

Overall, the findings give therefore significant support to the literature that underlies the importance of location assets in determining firm competitiveness (D’Angelo, 2012; Dunning, 1998; Giovannetti et al., 2013), in addition to firm characteristics.

CONCLUSIONS

The empirical analysis shows that the characteristics of the local context where firms operate, measured at the province level, have a statistically and economically significant impact on their export performance. This is true both at the extensive and intensive margins, also controlling for firm-level characteristics. This last result is notably important from a policy perspective, showing that an adequate environment for entrepreneurial activities not only helps firms to increase their productivity and growth, e.g., providing a culture more favourable to economic development (e.g., Tabellini, 2010) or enhancing Darwinian selection mechanisms and agglomeration effects (e.g., Combes, Duranton, Gobillon, Puga, & Roux, 2012), but also sustains exporting activities.

In fact, even after controlling for specific characteristics of firms, a large part of the heterogeneity in export behaviour is explained by the context in which they operate. While confirming the results of new-new trade theory, which stresses the role of firm characteristics, results provide strong support to the common wisdom that local characteristics have a crucial role in determining the export performance of a given geographical area. These include distance from foreign markets, social capital, the efficiency of the public sector, the development of financial markets and agglomeration economies.

As far as firm-level characteristics are concerned, the analysis results confirm the main findings of the previous literature, revealing that size, experience in business, labour productivity and capital intensity positively impact on the decision of firms to export and the exports ratio.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

NOTES

1. Meyer et al. (2011, p. 243) argue that ‘local context are themselves embedded in broader regional context: issues may pertain to, for example, cities, provinces, nation states, or even supra-national units’.

2. For instance, Minetti and Zhu (2011) argue that differences among the South, Centre and the North of Italy, in terms of infrastructure, institutions and closeness to the most important markets where firms can export, motivate the inclusion of dummy variables indicating where the firm is headquartered.

3. Sestito (2011), for example, argues that the localism of the network of relationships in which firms are entrenched may have a strong influence on their performance.

4. Bronzini (2000), for example, finds a significant industrial district effect on export performance at the province level. Similarly, Bagella, Becchetti, and Sacchi (2000) show that the benefits of geographical agglomeration in terms of export intensity and export participation are decreasing with firm size and are higher in sectors where competition is based on product differentiation. Gola and Mori (2000) argue that trade specialization of the Italian manufacturing sector depends on factor endowments (human and physical capital, labour), as well as on other location advantages.

5. The authors are grateful to an anonymous referee for pointing out how these problems may affect the interpretation of the results.

6. This possibility can be explained by alternative hypotheses: (1) that there is a positive effect of local-context
characteristics on exports (as we know, for example, in the case of distance from the large available evidence) and, therefore, firms have correctly chosen to locate in provinces that enhance their ability to internationalize; and (2) that all firms that for some idiosyncratic and unobserved reasons were willing to internationalize had the incorrect perception that local-context characteristics of the chosen location might have a positive impact on their export performance, while this was not the case. While both hypotheses are possible in principle, we believe that the second is far less plausible and the strategy allows one to identify correctly the impact of local-context characteristics on the average performance of the firms located in a given geographical area.

7. See Bottasso and Piccardo (2013) for a detailed survey of the literature on firm heterogeneity and exports; and Wagner (2007) for a survey of the literature on the impact of productivity and export performance.

8. Wang and Lin (2013) argue that firm attributes interact with regional environment and inter-firm relations to shape innovation, but firm characteristics have a prominent role.

9. Wagner (2014) provides a survey on firm-level studies analyzing the impact of credit constraints on export.

10. The Invind survey is conducted on a high-quality representative sample of Italian non-financial firms obtained from a one-stage stratified sample design (see Appendix A in the supplemental data online) (Banca d'Italia, 2015).

11. Data on distance were obtained from Fratianni and Marchionne (2012), whereas data on GDP of foreign markets are from the World Economic Outlook (see https://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx).

12. Export intensity is motivated by the literature (D’Angelo, 2012; Katsikeas, Leonidou, & Morgan, 2000; Majocchi et al., 2005) and is by far the most widely used indicator in empirical research, even if it has been subject to some criticism.

13. As argued by Wooldridge (2010, p. 748), ‘there are drawbacks to using Tobit to model fractional response’; following Wagner (2001), we therefore also estimate the GLM, developed by Papke and Wooldridge (1996), to account for the nature of the export-to-sales ratio. The authors are grateful to an anonymous referee for this suggestion.

14. To allow comparability of the results, we estimate all specifications on the same sample of 20,815 observations. Results are very similar including the maximum number of observations available for each specification.

15. In unreported regressions (available from the author upon request), we have verified that these results are broadly confirmed when estimating the same specifications on a sample that excludes the 36 cases of firms that relocated during the sample period.

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