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THE ROLE OF CREDIT CONDITIONS AND LOCAL FINANCIAL DEVELOPMENT ON EXPORT PERFORMANCES: A FOCUS ON THE ITALIAN REGIONS

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Abstract

The present study examines the drivers of Italian exports via an export demand equation augmented with regional and time-varying impacts of local financial development. Financial development has been considered a potential source of comparative advantage and its relationship with trade has been theoretically examined. This theory posits that countries that are well financially developed should experience greater volumes of international trade. We empirically investigate the effects of local financial development on regional trade of manufactured products. To this purpose a fixed effect regression model with Driscoll and Kraay standard errors has been used to account for cross-sectional dependence. The period of analysis goes from 1990 to 2012. The results show that a mix of factors would contribute to lift exports, including financial development, that exerts a positive impact on trade flows.

1. Introduction

The ability of a country to grow in economic terms and create job opportunities is tightly related to the possibility of exporting and penetrating into foreign markets. One of the problems that most characterizes southern Italy is the limited capacity of local businesses to access foreign markets and compete in the international arena. Exporting involves higher entry costs than selling to the domestic market: firms need to acquire information about foreign markets, customize products to fit foreign tastes and set up distribution networks. Furthermore, because most entry costs must be paid up-front, only firms with sufficient liquidity can cover them. This renders financial markets crucial for firms' export activity. The theoretical argument that supports the relationship between access to financing and export intensity can be traced back to the seminal works by Kletzer and Bardhan (1987), and Baldwin and Krugman (1989). These authors show that capital market imperfections importantly determine the countries' comparative advantage in trade. Recent theoretical studies have highlighted the relevance of such a relationship between finance and international trade patterns (see for instance Beck, 2002; Matsuyama, 2005; Wynne, 2005; Antras and Caballero, 2009; Manova, 2006). Countries endowed with well-developed financial systems tend to specialize in industries that rely more on external financial resources in production. Industries with higher external finance need also to have larger scales, higher research and development (R&D), higher working capital and value added in production (Kletzer and Bardhan, 1987; Rajan and Zingales, 1998; Beck, 2002; Braun and Larrain, 2004). This, in turns, shapes development and long term growth of less developed regions.

In this context, Italy represents a very interesting case to investigate given its high degree of heterogeneity in term of local financial development across geographical areas (Giannola et al., 2012). Even though Italy has been a unified country, from a political and legal point of view, for 150 years and, thus, can be considered a good case of normative integration, substantial differences in the degree of both real and financial development remain across its different geographical areas. The interest rate is also higher in areas with more crime (Bonaccorsi di Patti, 2009) and the evidence indicate the presence of persistent interest rate differentials across the Italian regions (Dow et al. 2012). Even with identical technology and factor endowments between regions, comparative costs may differ when regions differ in their domestic institutions of credit enforcement. Since financial services provided by local financial systems can be immobile across regions, the pattern of industrial specialization should be influenced by the level of financial intermediation. Further, compared to studies using data available in several countries, an analysis of different regions within the same country does not need to control for differences in legal systems and is affected to a lesser extent of the problem of omitted variables. The purpose of our paper is twofold: from a theoretical point of view we aim at demonstrating that in a region with an industrial structure consisting primarily of small and medium-sized firms strongly dependent from local banks, local financial development might represent an additional element influencing regions' propensity to export. At the same time, we provide empirical evidence on the relevance of local financial development for developing regions of Italy, since "not all goods are alike in terms of their consequences for economic performance", the structure of trade matters for economic development and growth (Hausmann et al., 2007).

The rest of the paper is organized as follows. Section 2 briefly reviews the literature on the topic. Section 3 presents the empirical methodology and the data used. Section 4 discusses the main results. Section 5 concludes and draws some policy implications.

2. Literature review

In recent years a growing body of research has pointed out the level of financial development as a source of comparative advantage in international trade (Kletzer and Bardhan, 1987; Demirguc-Kunt and Maksimovic, 1998; Rajan and Zingales, 1998; Beck, 2002, 2003; Svaleryd and Vlachos, 2005). The Heckscher–Ohlin model predicts that factor endowment is the key determinant of trade patterns. In this respect Kletzer and Bardhan (1987), building on the Heckscher–Ohlin model, provide a theoretical framework where credit market imperfections (when credit for working capital or trade finance is needed to pay for the cost of inputs before the receipt of revenues from sales) can lead to different comparative costs even with identical technologies and endowments. Empirically, a growing number of research confirms the uneven effect of financial development on industrial and sectoral growth depending on external credit dependence for investment financing. Rajan and Zingales (1998) and Demirguc-Kunt and Maksimovic (1998) show that industries that are more dependent on external finance grow faster in countries with better developed financial systems. Similarly, Beck (2002, 2003), Svaleryd and Vlachos (2005), and Hur et al. (2006) find that level of financial development determines the pattern of trade specialization. Accordingly, those countries with lower levels of financial development are found to have a lower share of exports in industries with higher external finance dependence. Consequently, the level of financial development has a significant importance for developing countries. Countries endowed with relatively high-quality institutions tend to specialize in industries that relatively rely more on the services provided by these institutions.

An efficient financial system can help overcome market frictions by reducing the costs of transferring information and wealth between savers and investors. Undoubtedly, when financial systems carry out their functions well, the cost of financial intermediation is lower and economic growth increases. Accordingly, industries and sectors that are more dependent on external finance are shown to grow faster in countries with better developed financial systems. In particular, developing countries with low levels of financial development are found to have lower export shares and trade balances in industries (such as manufactures) that depend more on external finance. To our knowledge while, several studies have emphasized the importance of local finance for the regional economic growth of Italy (Guiso et al., 2004; Usai and Vannini, 2005; Coccorese and Silipo, 2012) a specific analysis on the linkage between local financial development and export performances at regional level is still lacking.

3. A panel analysis for the sectoral manufacturing exports

3.1 The models

Export demand is estimated using panel regression in which regions are represented as panels and years as times. Three alternative specifications, using pooled OLS, fixed effect and random effect modelling have been adopted. The first specification assumes that there is no heterogeneity across regions and is formally expressed as:

$$\ln \exp_{it} = \alpha + \beta \ln X_t^{'} + \gamma \ln Y_{it}^{'} + e_{it} \qquad (1)$$

Where $\exp_{it}$ is the total manufactured goods exports in 20 regions in value terms. Put differently, i=1…20 and t=1998…2010 refer to all the Italian regions and time period. α is the common intercept, X and Y are the vectors containing the explanatory variables including the traditional price and income variables plus a group of controls. e_{it} is the error term i.i.d.

The OLS specification with fixed effects controls instead for heterogeneity among regions in the intercept parameter and is expressed as:

$$\ln \exp_{it} = \alpha_i + \beta \ln X_t^{'} + \gamma \ln Y_{it}^{'} + e_{it} \quad (2)$$

where α_i is region specific and denotes the fixed effect. Thus α_i represents ignorance about all of the other systematic factors that predict exports, other than X' and Y'.

The FGLS specification with random effects treats the heterogeneity across regions as random component and it is expressed as:

$$\ln \exp_{it} = \alpha + \beta \ln X_t^{'} + \gamma \ln Y_{it}^{'} + u_{it} + e_{it} \quad (3)$$

Where u_{it} is the individual specific error or the between-entity error and e_{it} is the usual regression error or the within-entity error.

In the three equations, the price variable proxied by the real effective exchange rate (*rex*) and the foreign income variable, proxied by the world GDP (*w_gdp*) are time variant, but fixed across regions, i.e. they belong to X_t.

Y_{it} is a vector of control variables which includes three financial development indicators, namely credit intensity, financial risk, and the number of branches1000, and three economic indicators, i.e. R&D expenditure on GDP, gross fixed capital formation (GFCF), compensation of employee.

In detail, credit intensity is the ratio between bank credits or loans (average per year) to firms and family businesses, and real GDP. This is by far the most frequently used measure of financial development in the literature (Beck et al., 2000; Beck, 2002, 2003; Levine et al., 2000; Svaleryd and Vlachos, 2005; and Braun and Raddatz, 2007).

Financial risk is the decay rate of the loan facilities (percentage). It is measured as the ratio of non-performing loans and loans flow.

GFCF_gdp , which is the one-period lagged gross fixed capital formation as a share of GDP and controls for the effect of capital accumulation on the production structure and comparative advantage.

The ratio of R&D expenditures to GDP, which is defined as R&D intensity, controls for innovation and human capital. R&D is crucial both in the production of products of higher quality, and in the development of new varieties of goods and services. In short, technological competitiveness is measured by R&D intensity.

Compensation of employees by NUTS 2 regions[1] (NACE Rev. 2) enters the model to account for labour costs at regional level. Total compensation includes wages and salaries and compulsory and voluntary social contributions paid by the employer.

All the variables are expressed in natural logarithms. To have a first look at the data, the correlation matrix has been computed.

Table 1 Correlation matrix

	lexppil	lexp_ind	lrex	lnb~1000	lfinan~k	lgfcf_~p	lred	lcredi~y	lwd_gd~l	lcompen
lexppil	1									
lexp_ind	0.3247	1								
lrex	0.0125	0.3942	1							
lnbranc~1000	0.6433	0.0631	0.1031	1						
lfinancial~k	-0.3882	-0.0725	0.1015	-0.5585	1					
lgfcf_gdp	0.0572	0.1326	0.0347	0.0462	-0.1132	1				
lred	0.477	0.2776	0.116	0.3591	-0.2939	-0.3503	1			
lcreditint~y	0.6222	0.261	0.2907	0.7448	-0.3087	-0.0809	0.4921	1		
lwd_gdp_real	0.07	0.6042	0.8053	0.1257	0.0601	0.0243	0.1694	0.3757	1	
lcompen	0.0598	0.6572	0.753	0.1144	0.0199	0.0397	0.2046	0.3594	0.9282	1

It is interesting to notice that R&D is positively correlated to credit. Carlin and Mayer, (1999) and Levine et al., (2000) have shown that financial development positively affects the level of R&D and growth, respectively. The correlation between R&D and credit is however not so high, thus both variables can enter the models. Conversely, the variable compensation is highly correlated to world GDP, and hence it has been excluded from the models.

3.2 Comparison of different estimators

We estimate the pooled model (equ. 1), the fixed effects model (equ. 2), and the random effects model (equ. 3). Table 2 summarises the results of the regressions performed plus a refinement of the fixed effect model.

[1] The Nomenclature of territorial units for statistics, abbreviated as NUTS (from the French 'Nomenclature des Unités territoriales statistiques') is a geographical nomenclature subdividing the territory of the European Union into regions at three different levels (NUTS 1, 2 and 3, respectively, moving from larger to smaller territorial units).

Table 2 Regression results for export demand

Explanatory variables	*Pooled OLS*	*Fixed effect OLS*	*Random effect FGLS*	*Driscoll-Kraay fixed effect*
Real effective exchange rate	-1.435***	-1.847***	-1.563***	-1.789***
	(-2.65)	(-4.64)	(-3.92)	(-4.39)
Real world GDP	1.024***	1.313***	1.208***	1.376***
	(7.63)	(10.54)	(11.07)	(7.98)
Number of branches	0.126*	0.528*	0.052	0.336
	(1.84)	(1.76)	(0.44)	(0.27)
Financial risk	-0.032	-0.058**	-0.070***	-0.059*
	(-1.02)	(-2.41)	(-2.85)	(-1.79)
Gross fixed K formation	0.356***	0.435***	0.324**	0.659***
	(2.99)	(2.67)	(2.20)	(5.15)
R&D	0.089***	-0.021	0.038	0.002
	(3.88)	(0.52)	(1.17)	(0.07)
Credit intensity	0.020	0.337***	0.181*	0.328***
	(0.26)	(2.72)	(1.73)	(4.11)
Constant	4.404**	2.909**	3.964***	2.331*
	(2.36)	(2.10)	(2.97)	(1.70)
F-stat (Wald chi2)	20.89 F(7, 212)	44.54 F(7,194)	281.02 Wald chi2	244.74 F(7,18)
Prob > F (Prob > chi2)	0.000	0.000	0.000 chi2	0.000
R2	0.41			
R2 within		0.62	0.61	0.68
R2 between		0.030	0.004	
R2 overall		0.163	0.355	
Region effects (F test)		14.38 F(18, 194) 0.0000 Prob > F		
Breusch-Pagan Cook-Weisberg	0.499			
Number of obs.	220	220	220	238

Note: Dependent variable: Export index. All variables are in logs. t-values are in brackets. ***p<0.01, **p<0.05, *p<0.10. All estimates were checked for heteroskedasticity through the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity. The pooled model is not heteroskedastic since the null of homoscedasticity cannot be rejected (Prob > chi2 = 0.4999). The models control for heteroskedasticity using the VCE robust estimator. Diagnostic checking rejects the presence of cross-sectional dependence, heteroskedasticity, and serial correlation. The Breusch-Pagan LM test (H_o: no cross-sectional dependence) reveals that there is independence, thus residuals are not contemporaneously correlated. The modified Wald test for groupwise heteroskedasticity (H_o: homoscedasticity) does not reject the null and concludes for homoscedasticity. The Wooldridge test for autocorrelation in panel data (Ho: no serial correlation) fails to reject the null and concludes that data does not have first-order autocorrelation.

All the coefficients are jointly significant as showed the F-stat (Prob > F = 0.0000) and the signs are in the expected direction so that the specification of the model is consistent with the rationale of export demand model.

To select the baseline model, three steps have been carried out (table 3). First the F test following the fixed effect estimation has been considered to verify if a pooled or a fixed panel estimation is more appropriate. The F test (F test that all u_i=0: F(18, 194) =14.38 Prob > F = 0.0000) indicates that there are significant individual (regional) effects, implying that ignoring unobserved heterogeneity can induce omitted variable bias (e.g., Hsiao 2003; Skrondal and Rabe-Hesketh 2004). Therefore, the pooled OLS estimates are biased and inconsistent, and we accept the presence of the regional effects.

Next, the Breusch and Pagan LM test helps to decide between the random effect regression and the pooled OLS regression. The null hypothesis in the LM test is that variances across entities is zero. That is, there is no significant difference across regions (i.e. no panel effect). We reject the null and conclude that the random effect is appropriate, while the pooled OLS not.

Then the selection between fixed and random has been performed. The identification of fixed and random effect models has been extensively discussed in the literature. When N individuals are randomly drawn from a large population, a random effect model is more appropriate. Conversely, when the attention is on specific N individuals, a fixed effect model would be more suitable. The selection of model, fixed or random, was based on the Hausman χ^2 test, which is designed to detect violation of the random effects modelling assumption that the explanatory variables are orthogonal to the unit effects. If there is no correlation between the independent variables and the unit effects, then estimates of γ in the fixed effect model should be similar to estimates of γ in the random effect model. Put differently, the null is that the two estimation methods fixed and random should yield coefficients that are "similar". The alternative hypothesis is that the fixed effects estimation is preferable to the random effects estimation. Given that the Hausman test returned a p-value of 0.0623 it can be inferred that the differences among estimators are not systematic at the 5% significance level. Therefore, FE and RE are both consistent and random effects is the more efficient e.g. uses less degrees of freedom.

If the Hausman test does not indicate a significant difference ($p > 0.05$), however, it does not necessarily follow that the random effects estimator is "safely" free from bias, and therefore to be preferred over the fixed effects estimator (Clark and Linzer, 2012). In most applications, the true correlation between the covariates and unit effects is not exactly zero. Thus, if the Hausman test fails to reject the null hypothesis, it is most likely not because the true correlation is zero and, hence, that the random effects estimator is unbiased. Rather, it is that the test does not have sufficient statistical power to reliably detect departures from the null. This can due to the size of the sample. Clark and Linzer (2012) have in fact shown that when there is little amount of data (around 200), the Hausman test generally fails to reject the random effect specification. The vice-versa applies with a great deal of data. A major objection to use the RE model relates to its restrictive assumption that the independent variables are uncorrelated with the random effects term (or unit effect). Since a variable varies both within and between clusters, many argue that this an unrealistic assumption to satisfy, since unobserved heterogeneity will almost always be correlated with the independent variables. This controversial assumption often makes the FE model, which does not incorporate this assumption, a superior choice over the RE model (e.g., Beck 2001; Kristensen and Wawro 2003; Wilson and Butler 2007).

Table 3 Model Selection

Pooled vs. Fixed	F test that all u_i=0[1]	F(18, 194) = 14.38	Prob > F = 0.0000
Pooled vs. Random	Breusch and Pagan Lagrangian multiplier M) test[2]	Chibar2(01) = 248.51	Prob > chibar2 = 0.0000
Fixed vs. Random	Hausman Test[3]	Chi2(6) = 11.99	Prob>chi2 = 0.0623

[1] For F test, since the P value is zero, then the null hypothesis is rejected, which means all ui cannot be zero, so the composite error terms (ui+eit) are correlated and the iid condition is violated, so the pooled is not appropriate.
[2] The null hypothesis in the LM test is that variances across entities is zero. There is no significant difference across units (i.e. no panel effect). Since the null is rejected we conclude for random effect.
[3] Under the null, both are consistent estimators and the random effects model is efficient (since it takes account of the error structure). Under the alternative, only the fixed is consistent.

In order to test if data present any specification problem, heteroskedasticity, serial autocorrelation and spatial autocorrelation are tested. Group-wise heteroskedasticity in fixed effect regression model is tested by using modified Wald's test for. The null hypothesis of homoskedasticity is rejected (Table 4).

Table 4 Wald test

Chi2 (19)	352.81
Prob>chi2	0.0000

(H_0: sigma(i)^2 = sigma^2 for all i)

Serial autocorrelation is tested with Wooldridge's test (2002). The test reveals the presence of autocorrelation because the null is rejected.

Table 5 Wooldridge test

F(1, 18)	10.746
Prob > F	0.0042

(H_0: no first-order autocorrelation)

Finally, Pesaran's (2004) spatial autocorrelation test allows for testing whether our data suffer cross-sectional dependence or contemporaneous correlation. According to Baltagi (2008), cross-sectional dependence is a problem in macro panels with long time series, since it can lead to bias in tests results. Pesaran's test evaluates the null hypothesis that residuals are not correlated.

Table 6 Pesaran test

Pesaran's test of cross sectional independence	9.243	Pr=0.0000
Average absolute value of the off-diagonal elements	0.443	

(H_0: no cross-sectional dependence)

From the output of the Pesaran test one can notice that estimating with fixed effects produces regression residuals that are cross-sectionally dependent. On average, the (absolute) correlation between the residuals is 0.443.

Since all three tests reject the null hypothesis of no specification problems, so, we have to correct the mentioned issues in order to provide valid statistic inference. In presence of cross-sectional dependence and heteroskedasticity we follow Hoechle (2007) which suggested to use a fixed effect regression model with Driscoll and Kraay (1998) standard errors which are robust to all three aforementioned specification problems. The results are reported in the fourth column of table 2. The Driscoll and Kraay estimation accounts for one lag of explanatory variables, and this allow us also to account for potential endogeneity (Cerra and Saxena 2008). An alternative way to address potential endogeneity is to use the Arellano and Bond (1991) and Arellano and Bover (1995) generalized method-of-moment estimators. But these estimators are designed for large N, small T panels (Roodman 2006), unlike the panel of small N, large T used in this paper. Hence, it is not applied here.

3.3 Analysis of the results

In all cases, coefficients show the expected signs and are highly significant. Consistently with trade theory, the sign of the foreign demand is positive. That means that a higher level of income, translated into higher demand and pushes exports. The baseline specification in the fourth column in table 2 shows that a 1% increase in foreign demand generates, ceteris paribus, a 1.4% increase in exports on average. From the magnitude of the estimated elasticities it can be seen that foreign income has a high effect on Italian exports. This result is in line with Peña Sánchez (2008), who obtains the same coefficient but using labour productivity as a dependent variable and NUTS 2 level of disaggregation.

The negative and significant sing of the variable the real effective exchange rate denotes that the role of the price competitiveness on the export performance is very important. A 1% loss in price competitiveness brings about a 1.8% contraction in Italian exports. This means that Italian exports of manufactures are quite sensitive to price changes. Therefore, since a nominal devaluation is not possible due to the fact of the common currency adopted in the Euro Area, a real devaluation could be achievable only contracting labour costs. The obtained coefficient is higher than those coming from the estimations at aggregate level. The variable gross fixed capital formation is positive and significant at 5%. It is not surprising that those regions with higher levels of investments, enjoy upper levels of exports.

The variable credit intensity is positive and highly significant: a 1% increase in credit intensity remaining the other variables constant, yields a 0.33% increase in export flows. Conversely, the higher the financial risk, the smaller export flows are. A 1% raise in the financial risk, in fact, leads to a drop in exports by 0.1%. These results support the idea that financial constrains are significant for explaining the level of export performance across the Italian regions, and the financial development determines the degree of credit availability for international trade. This occurs because the lack of developed financial systems both augment the transaction costs and represents a trade barrier (UNCTAD, 2005; 2007).

Both the variable number of branches and R&D turn to be not significant. This can be due to the fact that R&D investments are concentrated in high and medium-tech manufactures, while the Italian specialization is more focused on medium-low and low-tech productions.

4. Conclusions

This paper investigates the effects of financial sector development on manufacturing trade, using a sample of 20 regions of Italy over the period 1991-2010. Using both cross-sectional and panel specifications, as well as appropriate estimation methods, our results indicate that financial development exerts a strong and robust impact on manufacturing trade. On average, regions with better-developed financial sector are found to have higher levels of exports of manufactured goods.

By using Driscoll-Kraay estimator as an alternative method, it is apparent that these results are not driven by reverse causality or simultaneity bias.
Our results suggest that there is another favorable impact of financial sector development on economic development beyond its positive impact on economic growth, namely its positive effect on manufacturing

exports. As policy implications, economic policies that promote financial sector development should rather be used to boost exports of manufactured goods and to reduce current account deficits than exchange rate manipulations.
This study has examined the importance of price competitiveness, foreign demand, and economic and financial assets for explaining the export development and the persistent differences among Italian regions.

To examine exports, we have started comparing a “complete pooling”, “fixed effects” (FE), and “random effects” (RE) modelling approach. The pooling model ignores unobserved heterogeneity while the other two approaches account for unobserved heterogeneity, though in very different ways.

Albeit trade studies are growing up, they are still scarce attention to “credit features” in affecting trade flows. This study has therefore introduced a group of variables to account for financial development and credit at regional level. Another contribution of this article is the methodology. To our knowledge, previous studies for the Italian case did not control for the presence of cross-sectional dependence. Neglecting that problem may lead to invalid statistic inference. After we noticed that our data presented cross-sectional dependence, we used Driscoll and Kraay standard errors for the estimations.

Estimating using that refinement corrects heteroskedasticity and both serial and spatial autocorrelation. According to our results, we found that financial constraints have a negative influence on the level of export flows of Spanish regions. This result is highly relevant in the sense that confirms that financial development is, among other factors, behind the differences presented by the Italian regions in terms of export growth. That disparities are characterized by its high persistence along time.

These results might have interesting policy implications in the sense that if financial facilities is one of the mechanisms to achieve a higher stage of export performance, policies should pursue the generation of greater endowments of financial capital in those regions where this *asset* is relatively scarcer.

A second conclusion we can extract from this paper is the importance of credit to foster investment. We have shown that investment is the most relevant factor in the increase of the output per capita. Investment is an activity which needs trust. We all know that the major of the investment activities are made borrowing financial resources. The presence of social capital in a given society or region makes easier and cheaper this kind of activities.

The theory of social capital declares the importance of the social features in the reduction of transaction costs. If banks can save costs in supervision and checking the reliability of clients, the last can obtain cheaper credit. Trust also can extend the relationships between banks and clients and this fact induces lower transaction cost in future economic transactions. So, in the current economic context in which credit does not flow as a few years ago, social capital might be an additional instrument to recover the credit, specially in those activities not related with construction, and drive the economy ahead in the following years.

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