GEORGRAPHY OF TRADE COSTS IN ITALY

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Abstract

We show that economic development is associated with lower trade costs by applying a gravity equation to exports from 103 Italian provinces to 188 countries over the period 1995-2004. Italian provinces are heterogeneous with respect to trade costs.

Keywords: trade costs, distance, heterogeneity, gravity equation.

JEL classification: F10, F14.

1. Introduction

We link trade costs (TC), cross-border trade and spatial disparities to test the hypothesis that TCs are inversely related to economic development. There is strong evidence on the impact of TCs on international trade (Anderson and van Wincoop, 2004, AvW henceforth) and on the location of production facilities. In the economic geography literature, pecuniary spillovers trigger a “circular causation” process leading to the endogenous formation of a richer industrial core and a poorer agricultural periphery (Krugman, 1991); agglomeration deepens as transportation costs decline. Other causes of agglomeration are cost and demand linkages (Venables, 1996) and innovation (Martin and Ottaviano, 2001). There is historical evidence that economic growth is associated with rapid urbanization, spatial disparities and rising income inequality (Kuznets, 1966). Spatial disparities are also evident today in fast growing emerging economies.

We test our hypothesis with provincial export data from Italy, a country known for its North-South divide that goes back to the very beginning of the nation and persists to these days despite large government transfers to the South (Lutz, 1962; Bagnasco, 1977; Becattini, 2007).

2. Heterogeneous TC elasticities

We use the AvW (2003) gravity equation (GE) that makes bilateral trade flows depend not only on bilateral trade costs but also on multilateral ones. This GE is estimated using trade between Italian provinces and partner countries imposing the assumption that each province is distinctive in its degree of economic development. The implication is that the elasticity of exports with respect to provincial trade costs (simply, TC elasticity), our measure of TCs, is negatively related to provincial per-capita income, our measure of economic development. We define TCs as in Carrère (2006):

$$t_{ijt} = d_{ij}^{\rho_0} \cdot e^{[\rho_1 RTA_{jt} + \rho_2 InterRTA_{jt} + \rho_3 MONEY_{jt} + \rho_4 BORDER_{ij}]}, \quad (1)$$

where t = TCs affecting the i^{th} Italian province exporting to the j^{th} country, d = distance, RTA ($InterRTA$) is a dummy that assumes 1 when i and j belong to the same (different) regional trade agreement, $MONEY$ and $BORDER$ are dummies that is 1 when i and j share the same money or land border. Institutional and cultural factors can increase (reduce) TCs and thus make countries closer (more distant). In our case, cultural factors are irrelevant and have been omitted. RTA , $InterRTA$, and $MONEY$ are relevant but are common to all provinces. $BORDER$ is also relevant but affects only some Northern provinces. Coefficients ρ_1 , ρ_3 and ρ_4 are negative; ρ_0 is positive; and ρ_2 is negative when the RTA is trade creating and positive when trade diverting (Fратиanni and Oh, forthcoming). Using (1), we test the equivalent of AvW's equation (19):

$$\ln x_{ijt} = A + \ln y_{it} + \ln y_{jt} + \sum_{i=1}^I \beta_{0,i} \delta(i) \ln d_{ij} + \sum_{f=1}^4 \beta_f Z_{f,ijt} + u_{ijt}, \quad (2)$$

where x = exports, y = income, A = multilateral TC factor, I = number of provinces, $\delta(i)$ is a province dummy, and Z_f are three TCs common to all provinces ($Z_1=RTA$, $Z_2=InterRTA$, $Z_3=MONEY$) plus one TC common to Northern provinces adjacent to other countries ($Z_4=BORDER$); province-sensitive distance elasticity $\beta_0 = (1 - \sigma)\rho_0$ is negative since the elasticity of substitution σ is larger than unity; the four semi-elasticities $\beta_f = (1 - \sigma)\rho_f$ are positive, except

for $\beta_2 < 0$ when the RTA is trade diverting; $u_{ijt} = \mu_t + \varepsilon_{ijt}$, where μ_t is a year dummy and ε_{ijt} is an idiosyncratic error.

Our methodology for estimating (2) is closer to Baier and Bergstrand's (2006) than to AvW's nonlinear least square estimation. However, we avoid receiving any medals in the Baldwin and Taglioni (2006) mistake race. With respect to the gold medal, we control for multilateral resistance using (a) Feenstra's (2003) method of country fixed effects (FE), (b) Carrère's method of country pair random effects (RE), and (c) the combined Feenstra-Carrère's method. We avoid the silver medal by using one-way exports and not two-way flows. Finally, we avoid the bronze medal because we employ nominal GDP instead of real GDP.

3. Data and results

Our dataset consists of 130,321 observations covering 103 Italian provinces and 188 countries over the period 1995-2004. Export data and provincial income are from the Italian National Institute of Statistic, country income from the World Bank's *World Development Indicators*. We define 11 separate RTAs, with year of entry or exit of each member.¹ Italy is a member of the European Union and when a province trades with a country that is a member of another RTA, $InterRTA = 1$. Information on common money, the euro, comes from the European Commission. For geodesic distance, we use geographic coordinates provided by official sites of each province and, for countries, by the CIA's *World Factbook*.

Table 1 presents estimates under the three alternative methods. We use a cluster correction for province-country pairs and robust standard errors. We could not apply the Hausman test to compare FE with RE because of the high number of groups (16,629). Instead, we relied on the Breusch-Pagan Lagrange Multiplier test, which rejects the null hypothesis of zero-variance implied by the FE model in favour of the RE model. Provincial and country income elasticities have the expected signs and are statistically significant. The *RTA* semi-elasticity is statistically positive

¹ They are European Union, U.S-IS, NAFTA, CARICOM, PATCRA, ANZCERTA, CACM, MECOSUR, ASEAN, SPARTECA, and ANDEAN; see Fratianni and Oh (forthcoming).

under methods (a) and (b). The negative *InterRTA* semi-elasticity under methods (a) and (c) suggests trade diversion, but its size is methodology sensitive. The *MONEY* semi-elasticity is statistically positive, but of low economic impact. The *BORDER* semi-elasticity is statistically positive, stable, and economically relevant. The 103 distance elasticities are all statistically negative, individually as well as jointly. Average distance elasticity is around minus unity and is in line with much of the empirical literature. Variability across provinces is high; see province of Vercelli in the North and province of Cosenza in the South. Finally, the regressions explain a great portion of the export variance and confirm the empirical robustness of the GE also at a disaggregated level.

The impact of TCs on exports is the sum of the distance, *BORDER*, *RTA*, *InterRTA*, and *MONEY* elasticities. This impact for, say, Vercelli, using method (b), is the sum of its distance elasticity, -0.777 , its *BORDER* elasticity, 0.0009 , and the three common elasticities that add up to 0.0408 ; that is, -0.7353 . For Cosenza, TCs, using method (c), are the sum of its distance elasticity, -1.43 , plus the common elasticities that add up to -0.1395 ; that is, -1.5695 . Naturally, in comparing provinces, common TCs drop out and what is left is the sum of distance and border elasticities. Distance elasticity accounts for about 99 per cent of province-specific TCs.

To test our main hypothesis, we regress the mean-adjusted provincial TC elasticities on average provincial per-capita GDP. We report scatter plots of this relationship in Figure 1. The fitted lines are positive and statistically very significant: provinces with lower (i.e., more negative) than average TC elasticities, such as Cosenza, are associated with lower per capita GDP, while provinces with higher (i.e., less negative) than average TC elasticities, such as Vercelli, are associated with higher per capita GDP.² In essence, developing provinces face higher TCs than developed provinces.

² While the slope coefficients of the graphs appear low (they range from 0.0197 to 0.0224), it should be remembered that we correlate a pure number like elasticity with a level variable like per capita GDP.

4. Conclusion

Our key result is that economic development in Italy is associated with lower TCs. The impact of TCs on exports is the sum of two province-specific elasticities, distance and border, and three other elasticities –*RTA*, *InterRTA*, and *MONEY*– that are common to all Italian provinces. Provincial TC elasticity, a measure of heterogeneity, is positively related to provincial per-capita income.

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Table 1: Estimates of Equation (2).

	(a)	(b)	(c)		(a)	(b)	(c)
Year Dummies	Yes	Yes	Yes	d*Massa-Carrara	-0.857	-0.815	-0.906
Constant	-31.09	-31.50	-31.53	d*Matera	-1.085	-1.007	-1.116
ln(Y _i)	1.454	1.312	1.447	d*Messina	-1.296	-1.189	-1.313
ln(Y _j)	0.785	0.944	0.831	d*Milano	-1.005	-0.906	-1.057
BORDER	0.801	0.927	0.809	d*Modena	-0.865	-0.803	-0.919
RTA	1.562	0.127	-0.481**	d*Napoli	-1.084	-1.000	-1.131
inter-RTA	-0.481	0.105	-0.399	d*Novara	-0.901	-0.851	-0.954
MONEY	0.061	0.065	0.061	d*Nuoro	-1.346	-1.236	-1.355
d*Agrigento	-1.406	-1.306	-1.426	d*Oristano	-1.289	-1.146	-1.264
d*Alessandria	-0.921	-0.868	-0.972	d*Padova	-0.930	-0.864	-0.981
d*Ancona	-0.919	-0.871	-0.977	d*Palermo	-1.316	-1.210	-1.334
d*Aosta	-1.102	-1.033	-1.134	d*Parma	-0.895	-0.842	-0.948
d*Arezzo	-0.916	-0.864	-0.965	d*Pavia	-0.926	-0.870	-0.977
d*Ascoli-Piceno	-0.952	-0.902	-1.007	d*Perugia	-1.051	-0.989	-1.099
d*Asti	-0.950	-0.894	-0.989	d*Pesaro	-0.919	-0.863	-0.965
d*Avellino	-1.070	-0.998	-1.102	d*Pescara	-1.048	-0.989	-1.089
d*Bari	-1.138	-1.061	-1.183	d*Piacenza	-0.891	-0.841	-0.940
d*Belluno	-0.909	-0.867	-0.967	d*Pisa	-0.957	-0.898	-1.003
d*Benevento	-1.323	-1.196	-1.313	d*Pistoia	-0.906	-0.857	-0.952
d*Bergamo	-0.939	-0.874	-0.996	d*Pordenone	-0.872	-0.821	-0.921
d*Biella	-0.933	-0.893	-0.988	d*Potenza	-1.165	-1.086	-1.196
d*Bologna	-0.936	-0.865	-0.986	d*Prato	-0.850	-0.811	-0.910
d*Bolzano	-1.178	-1.105	-1.221	d*Ragusa	-1.299	-1.208	-1.323
d*Brescia	-0.979	-0.913	-1.035	d*Ravenna	-0.932	-0.883	-0.985
d*Brindisi	-1.129	-1.043	-1.156	d*Reggio-Calabria	-1.326	-1.228	-1.340
d*Cagliari	-1.148	-1.058	-1.184	d*Reggio-Emilia	-0.850	-0.790	-0.901
d*Caltanissetta	-1.222	-1.123	-1.240	d*Rieti	-1.046	-0.957	-1.053
d*Campobasso	-1.116	-1.040	-1.141	d*Rimini	-1.010	-0.952	-1.055
d*Caserta	-1.065	-0.994	-1.106	d*Roma	-1.198	-1.099	-1.243
d*Catanania	-1.237	-1.146	-1.264	d*Rovigo	-0.967	-0.904	-1.003
d*Catanzaro	-1.371	-1.247	-1.364	d*Salerno	-0.995	-0.927	-1.042
d*Chieti	-0.975	-0.911	-1.014	d*Sassari	-1.255	-1.175	-1.290
d*Como	-0.910	-0.852	-0.963	d*Savona	-1.059	-0.981	-1.089
d*Cosenza	-1.422	-1.304	-1.430	d*Siena	-0.905	-0.849	-0.945
d*Cremona	-0.960	-0.904	-1.010	d*Siracusa	-0.965	-0.886	-0.998
d*Crotone	-1.254	-1.162	-1.262	d*Sondrio	-1.043	-0.974	-1.078
d*Cuneo	-0.951	-0.889	-1.001	d*Taranto	-1.139	-1.056	-1.175
d*Enna	-1.304	-1.202	-1.313	d*Teramo	-0.937	-0.886	-0.984
d*Ferrara	-0.955	-0.898	-1.002	d*Terni	-0.991	-0.932	-1.030
d*Firenze	-0.995	-0.926	-1.047	d*Torino	-1.049	-0.970	-1.105
d*Foggia	-1.307	-1.206	-1.321	d*Trapani	-1.191	-1.105	-1.215
d*Forli	-0.933	-0.879	-0.984	d*Trento	-1.050	-0.990	-1.100
d*Frosinone	-1.014	-0.942	-1.048	d*Treviso	-0.911	-0.843	-0.961
d*Genova	-1.025	-0.953	-1.073	d*Trieste	-0.978	-0.914	-1.017
d*Gorizia	-0.921	-0.869	-0.962	d*Udine	-0.969	-0.914	-1.025
d*Grosseto	-1.123	-1.032	-1.135	d*Varese	-0.905	-0.838	-0.955
d*Imperia	-1.128	-1.057	-1.161	d*Venezia	-1.001	-0.935	-1.053
d*Isernia	-0.897	-0.848	-0.943	d*Verbania	-1.055	-1.002	-1.099
d*LaSpezia	-0.995	-0.934	-1.032	d*Vercelli	-0.826	-0.777	-0.870
d*L'Aquila	-1.093	-1.019	-1.125	d*Verona	-0.949	-0.880	-0.997
d*Latina	-0.968	-0.905	-1.015	d*Vibo-Valentia	-1.266	-1.139	-1.244
d*Lecce	-1.159	-1.081	-1.192	d*Vicenza	-0.905	-0.836	-0.956
d*Lecco	-0.934	-0.883	-0.985	d*Viterbo	-1.064	-0.991	-1.092
d*Livorno	-1.009	-0.939	-1.045	Observations	130,321	130,321	130,321
d*Lodi	-0.996	-0.937	-1.037	R ²	0.775	0.720	0.774
d*Lucca	-0.908	-0.844	-0.949	F test	473.9	73,661	126,190
d*Macerata	-0.940	-0.898	-0.997				
d*Mantova	-0.903	-0.849	-0.955				

NOTE: Robust standard errors: no-asterisk p<0.01; * p<0.05; ** p<0.1; *** p>0.1. Cluster correction on pairs. See text for (a), (b), (c) methods.

Figure 1: Relative TC elasticity and per-capita provincial income