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Institutions, services reforms and manufacturing productivity: The case of Italian firms[*]

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Abstract

This paper investigates whether and how institutions moderate the effect of services trade policy at the firm level. The analysis considers services liberalization in Italy and exploits the wide heterogeneity in institutional quality across Italian provinces. We distinguish between national-level services trade policy, which reduces entry barriers in services sectors, and firm-specific policy treatment, which captures the reduction in trade restrictions for services used as intermediate inputs in the firm. We find that services liberalization increases productivity of manufacturing firms located in provinces with sufficiently high quality institutions, proxied by the speed of civil proceeding.

Keywords: services policy; institutions; productivity.
JEL Classification: F61; K10; L25; L88.

1   Introduction

Recent literature has found that the liberalization of services markets can increase the productivity of manufacturing firms that use services as intermediate inputs (see for instance Arnold et al., 2011; Duggan et al., 2013; Arnold et al., 2016). Moreover, sector-level empirical evidence suggests that this effect crucially depends on the quality of governance institutions in the liberalizing environment: productivity in downstream manufacturing sectors is shown to increase with services trade liberalization only in countries with good quality of institutions (Beverelli et al., 2017). This paper investigates whether and how institutions moderate the effect of services trade policy at the firm level. To that end, our analysis considers services liberalization in Italy and exploits the wide heterogeneity in institutional quality across Italian provinces.

The empirical exercise distinguishes between national-level services trade policy and firm-specific policy treatment. The former is intended to reduce services trade restrictions (STR). The latter instead captures the reduction in trade restrictions for services used as intermediate inputs in the firm (input-services trade restrictions – ISTR). A measure of ISTR is constructed as the interaction between the STR variable and a proxy for services input consumption at the firm level. In both cases the paper investigates the differential effect of the policy treatment on firms' total factor productivity (TFP) across different institutional environments. A standard measure of speed of the judicial system (civil proceedings) is used to capture the quality of institutions in each Italian province over time.

2   Econometric framework

This section separately discusses the econometric model used to investigate the differential effects of services trade restrictions and input-services trade restrictions.

2.1   Differential effect of services trade restrictions

As an initial step, we estimate the average effect the policy treatment (services trade restrictions – STR – varying only over time) on the outcome variable, firm-level productivity in manufacturing.

The baseline empirical specification allowing to determine the average effect of the policy treatment is the following:

$$\log TFP_{i,p,t} = \beta STR_{t-1} + \gamma' \mathbf{x}_{i,t-1} + \delta_i + \eta' \mathbf{w}_{p,t-1} + \lambda_p + \mu' \mathbf{m}_{t-1} + \varepsilon_{i,p,t} \tag{1}$$

where the TFP of firm i that operates in province p at time t is regressed on: the treatment (STR_{t-1}); a vector of controls ($\mathbf{x}$) varying at the firm-time level; firm fixed effects (δ); a vector of controls ($\mathbf{w}$) varying at province-time level; province fixed effects (λ); a vector of controls ($\mathbf{m}$) varying over time; and an error term ($\varepsilon_{i,p,t}$).

To assess the role of institutions in shaping the downstream effect of services policy reforms, equation (1) is augmented with the interaction of services trade restrictions with a measure

of speed of justice (SoJ) at the province-level. This results in estimating either one of two specifications:

$$\log TFP_{i,p,t} = \beta STR_{t-1} + \rho STR_{t-1} \times SoJ_{p,t-1} + \\ + \xi SoJ_{p,t-1} + \gamma' \mathbf{x}_{i,t-1} + \delta_i + \eta' \mathbf{w}_{p,t-1} + \lambda_p + \mu' \mathbf{m}_{t-1} + \varepsilon_{i,p,t} \tag{2}$$

$$\log TFP_{i,p,t} = \rho STR_{t-1} \times SoJ_{p,t-1} + \\ + \xi SoJ_{p,t-1} + \gamma' \mathbf{x}_{i,t-1} + \delta_i + \eta' \mathbf{w}_{p,t-1} + \lambda_p + \omega_t + \varepsilon_{i,p,t} \tag{3}$$

In models (2) and (3), the effect of services trade policy is allowed to vary with the quality of institutions both at the sub-national level and over time. The difference between the two interaction models is that, while in (2) time fixed effects (ω) are excluded, in (3) they are included. As a consequence, model (2) identifies the effect of the treatment ($\partial \log TFP / \partial STR = \beta + \rho SoJ$), while model (3) only identifies the moderating effect of institutions on the relationship between $\log TFP$ and the treatment ($\partial^2 \log TFP / \partial STR \partial SoJ = \rho$), or, in other words, the differential effect of STR with respect to the moderator.

2.2 Differential effect of input-services trade restrictions

The same empirical strategy is adapted to assess the differential effect of input-services trade liberalization. The key difference is that, while services trade restrictions are measured at the national level over time, input-services trade restrictions vary at the firm level over time. A firm-specific policy treatment allows for a more demanding battery of fixed effects, including province-time dummies to control for observable and unobservable heterogeneity originating from shocks in each province at each point in time. Moreover, even under this specification, the main effect of the policy treatment is always identified.

In the spirit of the literature on firm-level effects of input tariffs (see for instance Amiti and Konings, 2007; Ahsan, 2013), we define input-services trade restrictions for firm i (located in province p) at time t as $ISTR_{i,p,t} = STR_t \times SIC_{i,p,t-1}$, where $SIC_{i,p,t-1}$ is the lagged firm-specific consumption of services input. Taking the lagged observation of SIC is a (preliminary) way in the direction of ensuring exogeneity with respect to the trade policy implemented at time t.

The baseline and interaction model used in the econometric analysis of the differential effects of $ISTR$ are respectively

$$\log TFP_{i,p,t} = \beta ISTR_{i,p,t-1} + \gamma SIC_{i,p,t-2} + \delta_i + \phi_{p,t} + \varepsilon_{i,p,t} \tag{4}$$

$$\log TFP_{i,p,t} = \beta ISTR_{i,p,t-1} + \rho ISTR_{t-1} \times SoJ_{p,t-1} + \\ + \xi SIC_{i,p,t-2} \times SoJ_{p,t-1} + \gamma SIC_{i,p,t-2} + \delta_i + \phi_{p,t} + \varepsilon_{i,p,t} \tag{5}$$

2

where ϕ denote province time fixed effects. Notice that the coefficient of $SIC_{i,p,t-2}$ in (4) and those of $SIC_{i,p,t-2}$ and $SIC_{i,p,t-2} \times SoJ_{p,t-1}$ in (5) do not have an economic interpretation but have to be included in order to account for omitted variable bias mechanically introduced by the use of input-services trade restrictions $ISTR_{i,p,t-1}$.

2.3 Data and estimation sample

Firm level TFP is constructed by estimating factor elasticities at the 2 digit level of disaggregation of NACE Rev. 2 sectoral classification. The Levinsohn and Petrin (2003) approach is used to account for the simultaneity bias in the Cobb-Douglas production function specification. Estimation is conducted in one stage according to the methodology proposed by Wooldridge (2009) which is robust to the Ackerberg et al. (2015) critique. Firm level data are mainly sourced from the Company Accounts Data Service (CADS), one of the largest datasets with detailed balance-sheet data for a large sample of non-financial incorporated firms in Italy. Employment data are from INPS, the Italian social security institute. Industry level deflators are taken from ISTAT, the Italian statistical office.

Services trade restrictions (STR) are proxied with the indicator of entry restrictions in energy, transport, post and communications (ETC) sectors sourced from the OECD Product Market Regulation (PMR) ETCR database. The indicator varies between 0 and 6 with higher values corresponding to more entry restrictions in these sectors. With respect to alternative data of the PMR family, the ETCR database offers yearly variation for the period covered in our estimation sample and therefore does not require any imputation assumption. For the construction of the $ISTR$ measure, STR is combined with a measure of services input consumption (in real terms) from the CADS database. This measure includes consumption of transport and communication services.

Speed of justice is captured by an inverse measure of duration of civil proceeding based on caseflow data from the Italian Ministry of Justice. The average lifetime of a proceeding in a tribunal is proxied by

$$L_t = \frac{P_t + P_{t+1}}{E_t + F_t} \tag{6}$$

where P are pending cases at the beginning of the year t; F denotes the new cases led during t and E the number of cases concluded with a judicial decision or withdrawn by the parties during the year t. We normalise L in order to vary between 0 and 1 in the whole data covering all Italian provinces for the period 2005-2013. Denoting with NL the normalized version of L, we define speed of justice as $SoJ = 1 - NL$. Note that $SoJ \in (0,1)$, whith higher values meaning higher speed of justice.

Other variables (value added per employee) varying at the province-time level are from ISTAT while macroeconomic indicators for Italy varying only over time are sourced from the World Bank World Development Indicators.

The estimation sample (N = 738,795) is an unbalanced panel of 118,464 firms, 9 years (2005-2013) and 103 provinces. Descriptive statistics for the variables used in the econometric analysis

are presented in Table 1.

Table 1: Descriptive statistics

Variable	Mean	Median	Std Dev	Min	Max
log $\text{TFP}_{i,p,t}$	3.375	3.395	0.677	-4.198	9.200
Services trade restriction$_{t-1}$	1.177	1.214	0.077	1.071	1.262
Input-services trade restriction$_{i,p,t-1}$	7.075	6.997	1.932	-0.313	18.857
Speed of justice$_{p,t-1}$	0.802	0.840	0.119	0.000	1.000
Services input consumption$_{ipt-2}$	6.009	5.960	1.579	-0.258	14.958
log Value added per employee$_{p,t-1}$	10.990	11.004	0.125	10.625	11.229
log GNI pc$_{t-1}$	10.498	10.488	0.039	10.429	10.552
log GNI$_{t-1}$	28.391	28.388	0.029	28.343	28.436
Trade in services (% GDP)$_{t-1}$	10.322	10.401	0.443	9.472	11.105
Services value added (% GDP)$_{t-1}$	72.882	73.656	1.054	71.408	73.974
Employment in services (% total empl)$_{t-1}$	67.123	67.070	1.341	65.120	69.350

2.4 Results

The results of the estimation of equations (1)-(3) are in columns (1)-(3) of Table 2. While the coefficient β in the first column is not statistically significant, it becomes statistically significant in column (2), where the interaction with SoJ is taken into account. The results of column (2) imply that the effect of the treatment STR is positive at low levels of SOJ, and it turns negative at high enough levels of SoJ. The threshold level of SoJ above which the treatment has a negative effect on firms' productivity (i.e., services liberalization boosts manufacturing firms' productivity) is equal to 0.86. Approximately a quarter of provinces, on average across all years included in the dataset, have a value of SoJ larger than this threshold. In column (3) of Table 2, we only report the differential effect of the treatment (since year fixed effects are included). This effect is negative and very similar in size to the corresponding coefficient of column (2). Since all regressions include firm fixed effects, identification is within the same firm across time, controlling (at the firm level) for consumption of services inputs CSI.

Table 3 reports the results of our second exercise, where we look at the effects of input-services restrictions, and how such effects are moderated by province level speed of justice. The first column reports the results of the estimation of equation (4). Input-services trade restrictions negatively affect manufacturing firm-level productivity. The second column reports the results of the estimation of equation (5). The results of column (2) imply that the effect of the treatment $ISTR$ is positive at very low levels of SOJ, and it turns negative at high enough levels of SoJ. The threshold level of SoJ above which the treatment has a negative effect on firms' productivity (i.e., services liberalization boosts manufacturing firms' productivity) is equal to 0.42. Almost all provinces (100/104) have a value of SoJ above this threshold on average across all years included in the dataset. Therefore, in the vast majority of cases input-services trade restrictions (liberalization) negatively (positively) affect manufacturing firms' productivity (in line with the results of the literature cited in the introduction). These effects are larger for firms

Table 2: Differential effect of services trade restriction

	(1)	(2)	(3)
Services trade restriction$_{t-1}$	0.045 (0.065)	0.544*** (0.151)	
Services trade restriction$_{t-1}$×Speed of justice$_{p,t-1}$		-0.627*** (0.184)	-0.586*** (0.144)
Speed of justice$_{p,t-1}$		0.623*** (0.235)	0.669*** (0.178)
Services input consumption$_{i,p,t-2}$	0.024*** (0.003)	0.025*** (0.003)	0.027*** (0.003)
log Value added per employee$_{p,t-1}$	0.369*** (0.110)	0.340*** (0.108)	0.030 (0.082)
log GNI pc$_{t-1}$	-0.844 (1.638)	-1.176 (1.626)	
log GNI$_{t-1}$	-2.257 (1.625)	-1.907 (1.620)	
Trade in services (% GDP)$_{t-1}$	0.215*** (0.017)	0.214*** (0.017)	
Services value added (% GDP)$_{t-1}$	0.119*** (0.015)	0.119*** (0.015)	
Employment in services (% total empl)$_{t-1}$	-0.167*** (0.024)	-0.169*** (0.023)	
Observations	738795	738795	738795
Adjusted R^2	0.640	0.640	0.642
Firm FE	✓	✓	✓
Province FE	✓	✓	✓
Year FE			✓

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parenthesis are clustered at the province-time level. Dependent variable: TFP$_{i,p,t}$.

located in provinces with high quality institutions (high levels of *SoJ*), leading to the conclusion that institutional quality crucially affects the way in which manufacturing firms benefit from liberalization of entry barriers in services that these firms use as production inputs.

Table 3: Differential effect of services trade restriction

	(1)	(2)
Input-services trade restriction$_{i,p,t-1}$	-0.082*** (0.008)	0.093* (0.048)
Input-services trade restriction$_{i,p,t-1}$×Speed of justice$_{pt-1}$		-0.221*** (0.060)
Observations	738795	738795
Adjusted R^2	0.644	0.644
Firm FE	✓	✓
Province-year FE	✓	✓

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parenthesis are clustered at the province-time level. Included controls: Services input consumption$_{i,p,t-2}$ (columns (1) and (2)); Speed of justice$_{p,t-1}$×Services input consumption$_{i,p,t-2}$ (column (2)). Dependent variable: TFP$_{i,p,t}$.

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