

Technical Appendix to
**SERVICE REGULATION AND GROWTH: EVIDENCE FROM
OECD COUNTRIES**

Guglielmo Barone and Federico Cingano

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Appendix

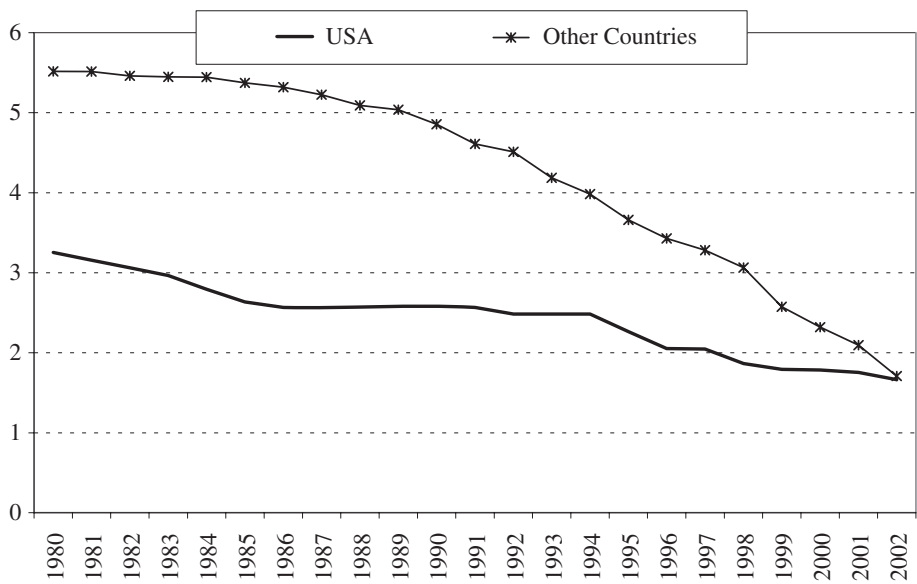


Fig. S1. *Service Regulation in the USA and in Other OECD Countries*

Notes. Service regulation is the simple average of the OECD measures of regulation ($X_{c,s}$) in energy, communications and transport. Other countries are: Austria, Belgium, Canada, Germany, Denmark, Finland, France, Great Britain, Greece, Italy, Japan, the Netherlands, Norway, Portugal, Spain and Sweden.

Table S1

Alternative Determinants of International Specialisation and Comparative Advantage

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|
| | Value added growth | | | | Exports | |
| | Human capital | Physical capital | Both | Property rights | Contract enforcement | |
| | | | | | (a) | (b) |
| Service regulation [$SERVREG_{j,c}$] | −0.154** (0.066) | −0.174** (0.068) | −0.154** (0.067) | −0.176** (0.068) | −6.786** (3.011) | −3.688* (2.032) |
| Financial dev. × external dep. [$FD_c \times ED_j$] | 0.007* (0.004) | 0.010** (0.004) | 0.007* (0.004) | 0.010** (0.004) | 0.405*** (0.144) | 0.298* (0.158) |
| Human capital × skill intensity | 0.101** (0.048) | | 0.101** (0.048) | | | |
| Physical capital × physical capital intensity | | −0.468 (2.885) | 0.082 (2.790) | | | |
| Property rights × intangible intensity | | | | −0.001 (0.003) | | |
| Quality of contract enforcement × contract intensity | | | | | 0.144*** (0.048) | |
| Quality of contract enforcement × institutional dependence | | | | | | 0.003** (0.001) |
| Initial industry share [$SHARE_{j,c}$] | 0.141** (0.064) | 0.169** (0.067) | 0.141** (0.064) | 0.171** (0.067) | | |
| Constant | −0.789** (0.382) | 0.023 (0.106) | −0.793** (0.366) | 0.009 (0.022) | 2.595 (1.736) | 6.634*** (2.207) |
| Observations | 220 | 220 | 220 | 220 | 220 | 220 |
| R ² | 0.69 | 0.67 | 0.69 | 0.67 | 0.79 | 0.37 |

Notes. ***Significant at 1%, **significant at 5%, *significant at 10%. In columns 1–4 the dependent variable is the annual compounded growth rate of real value added at the country-industry level for the period 1996–2002 ($GROWTH_{j,c}$); in column 5 the dependent variable is the natural logarithm of total exports in industry j from country c in 1996; in column 6 the dependent variable is an index of export specialisation given by $(EXPORTS_{j,c}/\Sigma_c EXPORTS_{j,c})/(\Sigma_j EXPORTS_{j,c}/\Sigma_{j,c} EXPORTS_{j,c})$, where j and c represent industries and countries, respectively. $SERVREG_{j,c}$ measures exposure to service regulation at the country-industry level as a weighted average ($\Sigma_s w_{j,s} X_{c,s}$) of country-level anti-competitive regulation indexes from the OECD-PMR databases. Service regulation ($X_{c,s}$) is measured in 1996. Interaction weights $w_{j,s}$ are (‘direct’) technical coefficients of dependence between service sector s and manufacturing industry j computed on the 1997 US input-output matrix. Financial development is measured as Private Credit by Deposit Money Banks over GDP in 1996 (FD_c) and is interacted with External dependence (ED_j) an industry-level measure of reliance on external finance obtained from US firm-level data (see the Data Appendix Table A1). In columns 1 and 3, Human capital is an index of labour force quality on a (0–100) scale taken from Bosworth and Collins (2003). It is interacted with average years of schooling at the industry level in 1980 (as obtained from the US 1990 Integrated PUMS). In columns 2 and 3, Physical capital is the physical capital-to-GDP ratio in 1980. The capital stock is calculated using the perpetual inventory method as implemented by Klenow and Rodriguez-Clare (2005). Source. Penn World Table 5.6. It is interacted with US capital-value added ratio at industry level in 1995 taken from the EUKLEMS database (<http://www.euklems.net/>). In column 4, ‘Property rights’ is an index of the protection of the private property across countries. It is interacted with an industry-level measure of intangible intensity in US industries. Both are taken from Claessens and Laeven (2003). In columns 5 and 6, ‘Quality of contract enforcement’ measures the extent to which agents have confidence in and abide by the rules of society (Kaufmann *et al.*, 2003). In column 5, contract enforcement is interacted with Nunn (2007) measure of contract intensity (i.e. of the importance of relationship-specific investments). In column 6 it is interacted with a measure of institutional dependence. Following Levchenko (2007), this is computed as the (inverse of) an Herfindahl index of intermediate input use from the US Input–Output Use Table for 1997. $SHARE_{j,c}$ indicates the industry share in total value added in manufacturing in 1996. All regressions include country and industry-fixed effects and use (employment) weighted least squares as estimation method. Robust standard errors are reported in parentheses.

Table S2
Alternative Measures of Regulation Impact

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---------------------|----------------------|---------------------|---------------------|---------------------|---------------------|-------------------|---------------------|----------------------|
| | Value added growth | | | Productivity growth | | | Export growth | | |
| | ALTERN. | SERVREG | BOTH | ALTERN. | SERVREG | BOTH | ALTERN. | SERVREG | BOTH |
| <i>Panel (a): OECD Regulation Impact Indicator (RII)</i> | | | | | | | | | |
| Reg. imp. ind. [<i>RII_{j,c}</i>] | -0.246** (0.120) | | -0.158 (0.111) | -0.164 (0.144) | | -0.043 (0.120) | 0.199 (0.150) | | 0.352** (0.162) |
| Service reg. [<i>SERVREG_{j,c}</i>] | | -0.176*** (0.068) | -0.145** (0.064) | | -0.202** (0.080) | -0.193** (0.075) | | -0.215** (0.106) | -0.279*** (0.102) |
| Implied effects | -0.009 | -0.019 | - | -0.006 | -0.022 | - | 0.007 | -0.023 | - |
| Observations | 220 | 220 | 220 | 220 | 220 | 220 | 205 | 205 | 205 |
| R ² | 0.67 | 0.67 | 0.67 | 0.57 | 0.59 | 0.59 | 0.71 | 0.72 | 0.76 |
| <i>Panel (b): 'Mixed' indicator of service regulation</i> | | | | | | | | | |
| Serv. reg. mixed [<i>MIXED_{j,c}</i>] | -0.076** (0.036) | | -0.052 (0.037) | -0.086** (0.038) | | -0.058* (0.035) | -0.016 (0.039) | | 0.028 (0.043) |
| Service reg. [<i>SERVREG_{j,c}</i>] | | -0.176*** (0.068) | -0.123* (0.070) | | -0.202** (0.080) | -0.140** (0.071) | | -0.215** (0.106) | -0.242** (0.116) |
| Implied effects | -0.011 | -0.019 | - | -0.012 | -0.022 | - | -0.002 | -0.023 | - |
| Observations | 220 | 220 | 220 | 220 | 220 | 220 | 205 | 205 | 205 |
| R ² | 0.67 | 0.67 | 0.68 | 0.59 | 0.59 | 0.60 | 0.71 | 0.72 | 0.72 |

Notes. ***Significant at 1%, **significant at 5%, *significant at 10%. In columns 1–3 the dependent variable is the annual compounded growth rate of real value added at the country-industry level for the period 1996–2002 (*GROWTH_{j,c}*). In columns 4–6 the dependent variable is the annual compounded growth rate of labour productivity (value added per employed worker) at the industry-country level for the period 1996–2002 (*LPGROWTH_{j,c}*). In columns 7–9 the dependent variable is the annual compounded growth rate of exports at the industry-country level for the period 1996–2002 (*EXP-GROWTH_{j,c}*). *SERVREG_{j,c}* measures exposure to service regulation at the country-industry level as a weighted average ($\sum_s w_{j,s} X_{c,s}$) of country-level anti-competitive regulation indexes from the OECD-PMR databases. Service regulation ($X_{c,s}$) is measured in 1996. Interaction weights $w_{j,s}$ are ('direct') technical coefficients of dependence between service sector s and manufacturing industry j computed on the 1997 US Input–Output matrix. In Panel (a) the Regulation Impact Indicator (*RII*) is the OECD measure of the relevance of service regulation for manufacturing industries (taken from Conway and Nicoletti, 2006). In Panel (b), the 'Mixed' indicator of service regulation is computed as a weighted average ($\sum_s w_{j,s}^c X_{c,s}$). Country-specific weights $w_{j,s}^c$ are ('direct') technical coefficients of dependence between service sector s and manufacturing industry j computed on the OECD Input–Output matrices. All regressions include (unreported) controls for financial development and for initial conditions: *SHARE_{j,c}* in columns 1–3, *LLP_{j,c}* in columns 4–6 and *EXSHARE_{j,c}* in columns 7–9 (see the Data Appendix Table A1 for the definition of these variables). All regressions also include country and industry-fixed effects and use (employment) weighted least squares as estimation method. Robust standard errors are reported in parentheses.

Table S3
Global Opportunities and Average Regulation

| | (1) | (2) |
|---|------------------------|----------------------|
| | Without other controls | With other controls |
| Service regulation [$SERVREG_{j,c}$] | −0.185*** (0.068) | −0.234*** (0.070) |
| Average service regulation × global opportunities | −0.101 (0.099) | −0.035 (0.123) |
| Fin. dev. × external dep. [$FD_c \times ED_j$] | 0.009** (0.004) | 0.011*** (0.004) |
| Initial industry share [$SHARE_{j,c}$] | 0.160** (0.067) | 0.148** (0.068) |
| Constant | 0.016 (0.020) | 0.042* (0.025) |
| Observations | 220 | 220 |
| R ² | 0.68 | 0.69 |

Notes. ***Significant at 1%, **significant at 5%, *significant at 10%. The dependent variable is the annual compounded growth rate of real value added at the industry-country level for the period 1996–2002 ($GROWTH_{j,c}$). $SERVREG_{j,c}$ measures exposure to service regulation at the country-industry level as a weighted average ($\sum_s w_{j,s} X_{c,s}$) of country-level anti-competitive regulation indexes from the OECD-PMR databases. Service regulation ($X_{c,s}$) is measured in 1996. Interaction weights $w_{j,s}$ are ('direct') technical coefficients of dependence between service sector s and manufacturing industry j computed on the 1997 US Input–Output matrix. Average service regulation is the simple average of sectoral regulation given by $(X_{c,ENERGY} + X_{c,PROSERV} + X_{c,TLCPOST} + X_{c,TRANSP})/4$. It is interacted with an industry-level measure of global opportunities obtained according to the following two-step procedure: (i) Regress $GROWTH_{j,c}$ on country dummies, industry dummies and industry dummies interacted with country-level simple average of sectoral regulation; US is excluded from the regression. (ii) Obtain global opportunities as the predicted values of $GROWTH_{j,c}$ for the US. The regression in column (2) includes (unreported) controls for labour market regulation and red-tape costs (see Tables 1 and 5 and the Data Appendix Table A1, for the definition of these variables). $SHARE_{j,c}$ is the industry share in total value added in manufacturing in 1996. All regressions include country and industry-fixed effects and use (employment) weighted least squares as estimation method. Robust standard errors are reported in parentheses.

Table S4
Service Regulation and Country Size

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|--|----------------------|----------------------|------------------|----------------------|----------------------|------------------|---------------------|--------------------|-------------------|
| | Value added growth | | | Productivity growth | | | Export growth | | |
| | All countries | Large countries | Small countries | All countries | Large countries | Small countries | All countries | Large countries | Small countries |
| Service reg. [<i>SERVREG_{j,c}</i>] | -0.272*** (0.073) | -0.313*** (0.086) | 0.107 (0.174) | -0.282*** (0.101) | -0.340*** (0.124) | 0.012 (0.127) | -0.241** (0.104) | -0.270* (0.145) | -0.233 (0.180) |
| Constant | 0.020 (0.025) | 0.036 (0.038) | 0.033 (0.030) | -0.070 (0.048) | -0.083 (0.065) | 0.017 (0.054) | 0.028 (0.030) | 0.006 (0.047) | -0.006 (0.043) |
| Observations | 220 | 113 | 107 | 220 | 114 | 106 | 205 | 98 | 107 |
| R ² | 0.70 | 0.75 | 0.59 | 0.61 | 0.65 | 0.52 | 0.75 | 0.80 | 0.75 |

Notes. ***Significant at 1%, **significant at 5%, *significant at 10%. In columns 1–3 the dependent variable is the annual compounded growth rate of real value added at the country-industry level for the period 1996–2002 (*GROWTH_{j,c}*). These columns replicate results of Table 6, columns 7–9 in the main text. In columns 4–6 the dependent variable is the annual compounded growth rate of labour productivity (value added per employed worker) at the industry-country level for the period 1996–2002 (*LPGROWTH_{j,c}*). In columns 7–9 the dependent variable is the annual compounded growth rate of exports at the industry-country level for the period 1996–2002 (*EXPGROWTH_{j,c}*). *SERVREG_{j,c}* measures exposure to service regulation at the country-industry level as a weighted average ($\sum_s w_{j,s} * X_{c,s}$) of country-level anti-competitive regulation indexes from the OECD-PMR databases. Service regulation ($X_{c,s}$) is measured in 1996. Interaction weights $w_{j,s}$ are ('direct') technical coefficients of dependence between service sector s and manufacturing industry j computed on the 1997 US Input–Output matrix. All regressions include (unreported) controls for financial development [$FD_c \times ED_j$], Labour market regulation [$LMR_c \times LABINT_j$], Red tape costs [$COST_c \times GROP_j$], FDI restrictions [$FDIREG_{j,c}$], Public ownership [$POWN_{j,c}$] and the corresponding initial conditions [$SHARE_{j,c}$, $LLP_{j,c}$ and $EXSHARE_{j,c}$]. See the Data Appendix Table A1 for the definition of these variables. The sample of large countries include Canada, France, Germany, Italy, Japan, the Netherlands, Spain and the UK while the sample of small ones include Austria, Belgium, Denmark, Finland, Greece, Norway, Portugal and Sweden. All regressions also include country and industry-fixed effects and use (employment) weighted least squares as estimation method. Robust standard errors are reported in parentheses.

Table S5
Sector-Specific Effects over Longer Horizons: Energy

| | (1) | (2) | (3) | (4) | (5) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | Initial year: 1980 | Initial year: 1984 | Initial year: 1988 | Initial year: 1992 | Initial year: 1996 |
| Energy Regulation \times energy dependence [$X_{c,ENERGY} \times w_{j,ENERGY}$] | -0.206 (0.207) | -0.210 (0.175) | -0.434** (0.182) | -0.469*** (0.178) | -0.482*** (0.147) |
| Observations | 139 | 139 | 154 | 220 | 220 |
| R ² | 0.74 | 0.74 | 0.75 | 0.66 | 0.69 |

Notes. ***Significant at 1%, **significant at 5%, *significant at 10%. The dependent variable is the annual compounded growth rate of real value added at the industry-country level for the period 1996–2002 ($GROWTH_{j,c}$). $X_{c,ENERGY}w_{j,ENERGY}$ is an interaction term between country-level measures of regulation in energy in 1996 ($X_{c,ENERGY}$) and the corresponding industry-level indicators of dependence ($w_{j,ENERGY}$). The interaction weight $w_{j,ENERGY}$ is the ('direct') technical coefficients of dependence between energy and manufacturing industry j computed on the 1997 US Input–Output matrix. All regression include (unreported) controls for financial development, labour market regulation and red-tape costs (see Tables 3 and 5 and the Data Appendix Table A1, for the definition of these variables), and the industry share in total value added in manufacturing in 1996. All regressions also include country and industry-fixed effects and use (employment) weighted least squares as estimation method. Robust standard errors are reported in parentheses.

References

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