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Abstract: Intra-European Union trade in business services has increased substantially in recent years. However, trade in highly regulated business services is still struggling to take off. This paper uses two general equilibrium models to evaluate the potential macroeconomic benefits of eliminating the regulatory restrictiveness in those sectors in the European countries. The simulations presented here suggest that such reforms could generate up to 500,000 jobs and may increase the value added of the European Union by more than € 40 billion. Additional reforms in the regulation of construction services would add additional benefits. We find considerable variation in the economic impact across European regions.

Keywords: European single market, impact assessment, general equilibrium model.
JEL classification: C68, F15, O52.

1. Introduction

International trade creates several sources of efficiency gains, such as comparative advantage, gains from an increased variety of products, economies of scale, or increased competition (Krugman, 1980; Krugman, 1991; Feenstra, 2018). In the European Union (EU), the Single Market is probably one of the main accomplishments of European integration. It allows goods and services to travel freely, without any internal borders or other trade barriers. This promotes trade, economic growth, and innovation thanks to economies of scale and competition among firms selling products in a wider market than those within the national borders of the EU Member States (Melitz, Ottaviano, 2008).

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Looking more specifically at services, even if intra-EU trade in services has increased substantially in recent years, the cross-border trade in services markets is still lower than that of goods. This is particularly relevant considering that services account for about two-thirds of both EU employment and value added, and represents an increasing share of inputs for manufacturing industries. Low cross-border services integration and weak competitive pressures are still holding back the performance of the services markets. In fact, productivity growth in the EU services sector lags behind that of the United States. Although this partly reflects intrinsic characteristics of the sector, the large productivity gaps between Member States suggest that, to a certain extent, it is a result of the regulatory and administrative policies of the EU Member States (European Commission, 2019). The main regulatory and administrative policies that can affect trade in services are barriers related to foreign direct investment or other market entry conditions, restrictions on the movement of people (such as limitations on the movement of natural persons or non-recognition of their qualifications), discriminatory measures towards foreign providers and international standards, barriers to competition, or regulatory transparency and administrative requirements (see Stefaniak, 2018, for a detailed review of the barriers to service providers in the EU). Mariniello *et al.* (2015) claim that the initial estimates of the impact of the European single market were over-optimistic. According to the authors, the main reasons were precisely not considering the growing role of services in the EU economy and the persistence of internal barriers in these sectors.

The European Commission (2015a; 2015b) has put in place a Single Market strategy with the explicit objective of unlocking the full potential of the Single Market, whose benefits do not always materialise, mainly due to the existence of the type of non-tariff barriers mentioned above. The strategy aims to improve mobility for service providers to promote innovation, making it easier for retailers to do business across borders, and enhance access to goods and services in the EU. The latest Single Market performance report (European Commission, 2019) highlighted the fact that intra-EU trade in highly regulated business services such as engineering, accounting, legal, architectural, and construction services, is still extremely limited.

To understand in which direction to develop further policies to unlock the sector full potential, it is important to estimate what impact these policies could have in terms of economic and social growth. In fact, even if the policies are often aimed at single productive sectors, they also have a macroeconomic impact due to the productive and income network of our economies. The aim of this paper is to provide additional evidence from this perspective. More specifically, the paper presents a modelling exercise aiming at quantifying the potential macroeconomic benefits of tackling the regulatory barriers of service sectors in the EU Member States[1].

[1] The modelling exercise presented concerns scenarios developed prior to the United Kingdom

To analyse the macroeconomic impact of tackling the regulatory barriers of service sectors, we use general equilibrium models. The use of this analytical framework to estimate the macroeconomic impact of removing barriers to free competition is quite common. For instance, a number of articles use this approach to provide ex-ante or ex-post analyses of the integration of the European market (see Cecchini *et al.*, 1988; Baldwin, 1989; European Commission, 1997; Ilzkovitz *et al.*, 2007; Boltho, Eichengreen, 2008; Campos *et al.*, 2014). Other studies focus on the service sectors, recognizing their growing importance in the European economies, and at the same time the major integration difficulties (Bajo-Rubio, Gomez-Plana, 2005; Copenhagen Economics, 2005; De Bruijn *et al.*, 2008). Our study follows this line of literature. However, our proposal differs for the following reasons.

First, the analysis covers some specific services. The services categories that can suffer regulatory barriers are network services (energy, transport, and communication), distribution services, business services (such as engineering, accounting, legal, architectural services), and construction services. In this analysis we focus on business services and construction services. Regarding business services, based on two of the main indicators of the regulation level of a sector – the product market regulation (PMR) indicator and the services trade restrictiveness index – they are among the services with higher regulation in the EU. Some of these professions are, in fact, closely regulated by national governments through restrictions on the number of entrants, rates charged, the form of business, or supported by professional bodies. Ilzkovits *et al.* (2007) and Monti (2010) describe how professional services, along with network industries or retail trade, show acute regulatory distortions that limit internal competition. Regarding the construction service, this sector has historically played an important role in the economic system of many of the EU countries (Grosso *et al.*, 2008). The sector provides the infrastructure for other industries, and it is also an important user of inputs from other industries (Pietroforte, Gregory, 2003). Furthermore, its international market remains mostly dominated by a few large firms and relates to large-scale projects.

Second, we propose an analysis developed using two different models, namely the JRC's models called RHOMOLO (Lecca *et al.*, 2018) and FIDELIO (Rocchi *et al.*, 2019). Using an association of the two models has a first advantage linked to the scope that the analysis can provide in this way. On the one hand, RHOMOLO offers a very detailed territorial breakdown, modelling 267 European regions of the 27 EU countries and the United Kingdom (UK), covering 10 sectors of economic activity. On the other hand, FIDELIO has an important sectoral breakdown, covering more than 50 economic sectors for each EU country and 8 non-EU countries. A detailed

leaving the EU. The simulations, therefore, include assumed changes to regulatory barriers in the United Kingdom.

analysis both at a territorial and at a sectoral level offers plenty of information regarding the impact of possible policies to reduce regulatory barriers and, in particular, regarding the distribution of this impact on the territory and among the different branches of the economy.

A second advantage deriving from using an association of RHOMOLO and FIDELIO is that the two models are structurally different from each other, diverging in some basic assumptions. The former is a dynamic spatial Computable General Equilibrium (CGE) model, while the latter is a dynamic econometric input-output (IO) model. As a CGE model, RHOMOLO is based on a strong theoretical background and neoclassical assumptions in line with the economic theory of optimization. Prices adjust to market clearing, aggregate demand adjusts to meet potential supply, and output is determined by available capacity. Besides, RHOMOLO has characteristics of new economic geography models such as endogenous firm entry, increasing returns to scale, and iceberg transport costs (Krugman, 1991). Instead, macro-econometric models such as FIDELIO provide a more empirically grounded approach and the alternative assumption ruling agents' choices is represented by econometric estimations. Also, while RHOMOLO is a supply-driven model, FIDELIO is a demand-driven model.

The results of the analysis show that reducing the regulatory burden of the services sectors mentioned above would entail substantial gains in terms of EU-wide value added (VA) growth and employment, in line with the recent macroeconomic literature on the effects of anti-competitive regulation on productivity, growth, and exports (Kern *et al.*, 2019; Barone, Cingano, 2011). We find that the economic impact of reducing the regulatory burden varies considerably across regions. This macroeconomic analysis complements more micro-focused studies such as that by Arnold *et al.* (2011) and Van der Marel *et al.* (2016), who find, using European firm-level data, that regulation curbing competitive pressures reduces the productivity performance of firms.

This paper is structured as follows. In Section 2, we present an overview of the two models used in the analysis with a focus on the modules that are particularly relevant for the analysis at hand. Section 3 illustrates the simulation strategy. Section 4 presents the results and section 5 briefly concludes.

2. An introduction to the RHOMOLO and FIDELIO models

2.1. The RHOMOLO model in a nutshell

The RHOMOLO model is regularly used for territorial impact assessments (see, for instance, European Commission, 2018) and can provide results at the level of the NUTS (Nomenclature of Territorial Units for Statistics) 2 EU regions. This section presents an overview of the version of the model used here and whose full mathematical exposition can be found in Lecca *et al.* (2018). The key feature of RHOMOLO lies in its geographical granularity. Within RHOMOLO, a set of 267 EU and UK NUTS2 regions plus one single exogenous region representing the Rest of the World (ROW) are modelled (see Thissen *et al.*, 2019, for more details on the construction of the dataset used to calibrate the model). Spatial interactions between regional economies are captured through trade in goods and services, income flows, and factor mobility.

There are ten different economic sectors (industries), with a subset of these operating under monopolistic competition à la Dixit and Stiglitz (1977). In each region and imperfectly competitive sector, identical firms produce a differentiated variety, which is considered as an imperfect substitute for the varieties produced within the same region and elsewhere. The number of varieties in the sectors is endogenous and determined from the zero-profit equilibrium condition – according to which profits must be equal to fixed costs. In turn, this means that, in equilibrium, prices equal average costs. In the rest of the sectors, firms operate under perfect competition. The version of the model used in this paper employs the ten following aggregations of NACE 2 economic sectors (see Table 1): A, B-E, C, F, G-I, J, K-L, M-N, O-Q, and R-U. All are treated as imperfectly competitive sectors except A, O-Q, and R-U, which are modelled as perfectly competitive.

Final goods are consumed by households and the government, while firms consume intermediate inputs. Regional goods are produced by combining value added (labour and capital) with domestic and imported intermediates, creating vertical linkages between firms.

The production technology is represented by a nested CES function. In each region r, total production $Z_{r,j}$ by a firm in sector j is produced from intermediate input $V_{r,j}$ and value added $Y_{r,j}$

$$Z_{r,j} = Az_{r,j}\left[\delta^{z}_{r,j} V_{r,j}^{\frac{\sigma^z-1}{\sigma^z}} + (1-\delta^{z}_{r,j})\, Y_{r,j}^{\frac{\sigma^z-1}{\sigma^z}}\right]^{\frac{\sigma^z}{\sigma^z-1}} \qquad [1]$$

where $\delta^{z}_{r,j}$ is the calibrated share of intermediate input in total production, $Az_{r,j}$ is a scale parameter and is the elasticity of substitution.

In turn $V_{r,j}$ and $Y_{r,j}$ are defined as in equation [2] and [3].

$$V_{r,j} = \left(\sum_i b_{r,i,j} v_{r,i,j}^{\frac{\sigma^v-1}{\sigma^v}}\right)^{\frac{\sigma^v}{\sigma^v-1}} \qquad [2]$$

$$Y_{r,j} = Ay_{r,j}\left[(K^{d}_{(g)})^{\xi}\left[\delta^{y}_{r,j} KD_{r,j}^{\frac{\sigma^y-1}{\sigma^y}} + (1-\delta^{y}_{r,j})\, LD_{r,j}^{\frac{\sigma^y-1}{\sigma^y}}\right]^{\frac{\sigma^y}{\sigma^y-1}}\right] - FC_{r,j} \qquad [3]$$

The composite of intermediate input in equation [2] is a CES combination of $v_{r,i,j}$ that is intermediate inputs purchased by the firm in sector j from supplier sector i. Input substitution is determined by the elasticity of substitution and the share of expenditure is given by $b_{r,i,j}$.

Table 1: List of NACE Rev. 2 sectors in RHOMOLO

Code NACE Rev. 2	Sectors description
A	Agriculture, Forestry and Fishing
B-D-E	Mining and Quarrying + Electricity, Gas, Steam and Air Conditioning Supply + Water Supply; Sewerage, Waste Management and Remediation Activities
C	Manufacturing
F	Construction
G-I	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles + Transportation and Storage + Accommodation and Food Service Activities
J	Information and Communication
K-L	Financial and Insurance Activities + Real Estate Activities
M-N	Professional, Scientific and Technical Activities + Administrative and Support Service Activities
O-Q	Public Administration and Defence; Compulsory Social Security + Education + Human Health and Social Work Activities
R-U	Arts, Entertainment and Recreation + Other Service Activities + Activities of Households As Employers; Undifferentiated Goods- and Services-Producing Activities of Households for Own Use + Activities of Extraterritorial Organisations and Bodies

Source: Lecca *et al.* (2018).

In equation [3], value added, $Y_{r,j}$, is obtained combining private capital $KD_{r,j}$ and employment $LD_{r,j}$ in a CES function, net of fixed costs $FC_{r,j}$. Effective public capital, $K^d_{(g)}$, enters the production function as an unpaid factor of production (Barro, 1990; Baxter, King, 1993; Futagami *et al.* 1993; Glomm, Ravikumar, 1994; 1997), meaning that in a region all firms, in all sectors, enjoy the same level of public capital at no cost. Substitution between private capital and labour is governed by the elasticity of substitution σ^y and the share parameter $\delta^y_{r,j}$. The parameter ξ is the output elasticity of public capital. The scale parameter $A_{yr,j}$ represents the Hicks neutral technical change in the production function.

For each firm, labour is further disaggregated into three types of skills, *e*; low, medium and high. The labour composite is given by

$$LD_{r,j} = \left(\sum_e \delta^l_{r,j,e} (Al_{r,j,e} ld_{r,j,e})^{\frac{\sigma^l - 1}{\sigma^l}}\right)^{\frac{\sigma^l}{\sigma^l - 1}} \qquad [4]$$

where $A_{lr,j}$, $\delta^l_{r,j}$ and σ^l are respectively the scale parameter, the share parameter and the elasticity of substitution.

Trade between and within regions is costly, implying that the shipping of goods entails transport costs assumed to be of the iceberg type as in Krugman (1991). Transport costs are identical across varieties but specific to sectors and trading partners (region pairs). At the level of the firms' demand for goods and services from sector *j*, supplied by region *r* to region *r′*, $x_{r,r',j}$ is defined as

$$\frac{x_{rr'j}}{(1+\tau_{r,r',j})} = d_{r,r',j}\left(\frac{P_{r',j}}{(1+\tau_{r,r',j})(1+\tau_r^p)pr,r',j}\right)^{\sigma^x} X_{r',j} \qquad [5]$$

where $d_{r,\,r',\,j}$ is a calibrated expenditure share, $\tau_{r,\,r',\,j}$ is transport costs, τ_r^p is production taxes, σ^x is the elasticity of substitution and $X_{r',\,j}$ is an aggregate of demand for goods and services of type j in region r'. The price $P_{r',\,j}$ is a CES price index

$$P_{r',j} = \left(\sum_r N_{r,j} d_{r,r',j}((1+\tau_{r,r',j})(1+\tau_r^p)p_{r,r',j})^{1-\sigma^x}\right)^{\frac{1}{1-\sigma^x}} \qquad [6]$$

where $p_{r,\,r',\,j}$ is the market price set by the firm in region r selling to region r'. A firm in a monopolistic competitive sector sets the market price as a mark-up over marginal costs, whereas a firm in a competitive sector sets the market price equal to marginal costs.

The spatial configuration of the system of regions has a direct impact on the competitiveness of regions because firms located in more accessible regions can source their intermediate inputs at lower prices and thus gain larger market shares in local markets.

For each labour type, the default wage-setting relationship is represented by a wage curve (Blanchflower, Oswald, 1994), whose implication is that lower levels of unemployment increase the workers' bargaining power, thereby increasing real wages.

Government expenditure includes current consumption of goods and services, capital expenditures dedicated to public infrastructure, and net transfers to households. Revenues are generated by labour and capital income taxes on household income and indirect taxes on production. In the simulations reported here, government spending is considered an exogenous policy variable.

The model is recursively dynamic with myopic expectations and is solved sequentially with stocks being upgraded at the beginning of each year. The RHOMOLO model briefly described here is used below to evaluate the macroeconomic effects of lowering the regulatory barriers in heavily regulated business sectors in the EU countries.

2.2. The FIDELIO model

The model FIDELIO is a macro-econometric dynamic enlarged IO model. The IO core describes the equilibrium between total supply and total demand. Firms produce total supply that is then consumed by four agents: firms that require inputs, households, the government, and foreign countries. Enlarging the IO core, the model describes the behaviour and choices of the four agents, adding a capital block and a labour block to describe the markets of primary inputs, and an energy block to take into account the environmental impact of the economic system. For a complete description of the characteristics, the assumptions, and equations of the FIDELIO model, see Rocchi *et al.* (2019).

In the line of the E3ME (Cambridge Econometrics) model, FIDELIO is based on a neo-Keynesian demand-driven macroeconomic framework. This family of models offers an alternative approach compared to CGE models. One of the main differences between the two types of models is that macro-econometric models assume that agents lack perfect knowledge and do not optimise their decisions. Moreover, econometric models are based on an empirically grounded approach: the alternative assumption ruling agents' choices is derived through econometric estimations. The parameters are estimated from time-series databases: agents behave as they did in the past. Finally, market imperfections exist and the economy is not assumed to be in equilibrium. There is no guarantee that all available resources are used. The level of output is a function of the level of demand and it might be less than the potential supply. Market imperfections generate the dynamic of the model that is solved sequentially.

Besides proposing an alternative approach, the use of FIDELIO offers an additional advantage for the analysis carried out. In fact, the model offers a fairly high level of sectoral disaggregation. FIDELIO covers 35 regions (the 27 EU Member States plus Brazil, China, India, Japan, Russia, Turkey, United Kingdom, and the United States). Each country is disaggregated into 56 sectors and products (see Table 2). This level of sectoral disaggregation makes it possible to look specifically at the sectors under analysis. Besides, it allows an analysis not only of the impact of changes in regulatory barriers in the specific sectors, but also of the spillover effects in the whole economy.

Like RHOMOLO, also in FIDELIO the production technology is represented by a multilevel CES function, although the nest structure is different. In each region r, sector j produces total production $Z_{r,j}$ using intermediate material input $M_{r,j}$ and a bundle of capital, labour and energy, the composite good $KLE_{r,j}$

$$Z_{r,j} = C^z_{r,j}\left[\gamma^z_{r,j} M_{r,j}^{\frac{\sigma^z - 1}{\sigma^z}} + (1-\gamma^z_{r,j}) KLE_{r,j}^{\frac{\sigma^z - 1}{\sigma^z}}\right]^{\frac{\sigma^z}{\sigma^z - 1}} \qquad [7]$$

where $C^z_{r,j}$ is a scale parameter, $\gamma^z_{r,j}$ is the calibrated share of material input in total production and σ^z is the elasticity of substitution between material input and the composite good $KLE_{r,j}$.

Differently from RHOMOLO, in FIDELIO the mix of material input $M_{r,j}$ does not change over time. The composite of capital, labour and energy is the CES combination

$$KLE_{r,j} = \begin{bmatrix} \gamma^k_{r,j}(c^k_{r,j}K_{r,j})^{\frac{\sigma^{kle}-1}{\sigma^{kle}}} + \gamma^l_{r,j}(c^l_{r,j}L_{r,j})^{\frac{\sigma^{kle}-1}{\sigma^{kle}}} \\ +(1-\gamma^k_{r,j}-\gamma^l_{r,j})(c^e_{r,j}E_{r,j})^{\frac{\sigma^{kle}-1}{\sigma^{kle}}} \end{bmatrix}^{\frac{\sigma^{kle}-1}{\sigma^{kle}}} \qquad [8]$$

Table 2: List of NACE Rev. 2 sectors in FIDELIO

Code NACE Rev. 2	Sectors description
A01	Crop and animal production, hunting and related service activities
A02	Forestry and logging
A03	Fishing and aquaculture
B	Mining and quarrying
C10T12	Manufacture of food products, beverages and tobacco products
C13T15	Manufacture of textiles, wearing apparel and leather products
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
C17	Manufacture of paper and paper products
C18	Printing and reproduction of recorded media
C19	Manufacture of coke and refined petroleum products
C20	Manufacture of chemicals and chemical products
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
C22	Manufacture of rubber and plastic products
C23	Manufacture of other non-metallic mineral products
C24	Manufacture of basic metals
C25	Manufacture of fabricated metal products, except machinery and equipment
C26	Manufacture of computer, electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C29	Manufacture of motor vehicles, trailers and semi-trailers
C30	Manufacture of other transport equipment
C31-32	Manufacture of furniture; other manufacturing
C33	Repair and installation of machinery and equipment
D35	Electricity, gas, steam and air conditioning supply
E36	Water collection, treatment and supply
E37T39	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services
F	Construction
G45	Wholesale and retail trade and repair of motor vehicles and motorcycles
G46	Wholesale trade, except of motor vehicles and motorcycles
G47	Retail trade, except of motor vehicles and motorcycles
H49	Land transport and transport via pipelines
H50	Water transport
H51	Air transport
H52	Warehousing and support activities for transportation
H53	Postal and courier activities

Table 2: (continued)

Code NACE Rev. 2	Sectors description
I	Accommodation; food and beverage service activities
J58	Publishing activities
J59-60	Motion picture, video and television program production, sound recording and music publishing activities; programming and broadcasting activities
J61	Telecommunications
J62-63	Computer programming, consultancy and related activities; information service activities
K64	Financial service activities, except insurance and pension funding
K65	Insurance, reinsurance and pension funding, except compulsory social security
K66	Activities auxiliary to financial services and insurance activities
L68	Real estate activities
M69-70	Legal and accounting activities; activities of head offices; management consultancy activities
M71	Architectural and engineering activities; technical testing and analysis
M72	Scientific research and development
M73	Advertising and market research
M74-75	Other professional, scientific and technical activities; veterinary activities
N	Administrative and support service activities
O84	Public administration and defence; compulsory social security
P85	Education
Q	Human health and social work activities
R-S	Arts, entertainment and recreation. Other service activities
T	Activities of households as employers; undifferentiated goods and services producing activities of households for own use
U	Activities of extraterritorial organizations and bodies

Source: Rocchi *et al.* (2019).

where $\gamma^k_{r,j}$ is the calibrated share of capital in the $KLE_{r,j}$ composite good, $\gamma^l_{r,j}$ is the share of labour, σ^{kle} is the elasticity of substitution and $c^k_{r,j}$, $c^l_{r,j}$ and $c^e_{r,j}$ capture factor productivity. Similarly to the mix of material input, the composition of energy input $E_{r,j}$ does not change either.

The income identity of sector j is

$$Z_{r,j} = (1+\mu_{r,j})(p^m_{r,j}M_{r,j} + p^k_{r,j}K_{r,j} + p^l_{r,j}L_{r,j} + p^E_{r,j}E_{r,j}) \quad [9]$$

where $p^k_{r,j}$ and $p^l_{r,j}$ are the price of capital and labour respectively, $p^m_{r,j}$ and $p^e_{r,j}$ are price indices of material and energy input. Finally, $\mu_{r,j}$ is the mark-up over marginal cost and the price of sector production the numeraire.

3. The simulation strategy

As Mariniello *et al.* (2015) highlight, an integrated market benefits welfare by boosting productivity. Productivity growth occurs through the goods market as well as the factor markets. In the goods market, due to stronger competition, firms have an incentive to set lower prices. In the medium and long term, they will reduce production costs thanks to economies of scale, and they will react to innovation incentives. Alongside this productivity growth channel, greater integration of labour and capital markets allows for a better allocation of resources, constituting another channel for productivity growth.

We propose two different simulation strategies for the two different sectors analysed, taking into account different channels of productivity growth.

The first set of simulations deals with the reduction in the restrictiveness in the highly regulated sectors of legal, accounting, architecture, and engineering services (these are the M69 and M70 sectors according to the NACE-2 classification used by EUROSTAT). In particular, the hypothesis behind this scenario is that, through structural reforms, the EU countries are able to reach the average restrictiveness level of the top EU performers, which, considering the four services combined, are Denmark, Estonia, the Netherlands, and Sweden. The values of the restrictiveness indicator used in the analysis are presented in Table 3. This is a composite indicator accounting for the regulatory approach and the requirements related to qualification, exercise, and other entry requirements. Relatively higher numerical values characterise countries with more heavily regulated sectors.

In order to simulate the hypothesised scenario in the models, the reduction in the restrictiveness indicator was converted into a reduction in market frictions. The reduction in market friction enters the model through a decline in the parameter in equation [5] and [6], which for the business services sector represents a wedge between producer prices and market prices due to trade costs. Due to regulatory restrictiveness (such as restrictive licensing or multiple administrative requirements), a fraction of the business services produced «melt» before reaching the market. A reduction in restrictiveness implies that the market friction parameter is reduced for services sold within the region as well as for services traded with other EU regions[2]. The reduction in regulatory restrictiveness was first converted into a decline in firms' mark-up using an estimated elasticity of 3.4 per unit, as suggested by the econometric regressions reported in European Commission (2016) Annex

[2] The outcome of the reduction in regulatory restrictiveness could affect market entry and cost of operation for firms located within the country; affect the cost of cross border trade in services for foreign firms exporting to the country or a combination of both. Market friction for bilateral trade in business services can thus be adjusted and are dependent in part on the regulatory changes in the region of origin and in part on the regulatory change in the region of destination. In our scenario, we put the emphasis on the former by adjusting market friction in bilateral trade based on regulatory changes in the region of origin.

Table 3: Country-specific summary restrictiveness indicators – heavily regulated business sectors (engineering, accounting, legal, and architectural)

Austria	3.1	Estonia	1.5	Ireland	2.7	Portugal	3.2
Belgium	2.5	Greece	2.8	Italy	2.9	Poland	3.1
Bulgaria	2.3	Spain	2.4	Lithuania	1.8	Romania	2.9
Cyprus	2.5	Finland	1.7	Luxembourg	3.4	Slovenia	2.4
Czech Republic	2.9	France	2.5	Latvia	2.2	Slovakia	3.1
Germany	3.3	Croatia	3.2	Malta	2.9	Sweden	0.9
Denmark	1.4	Hungary	2.6	Netherlands	1.5	UK	2.4

Source: European Commission, DG GROW.

VI. The dependent variable of the econometric regression is the profit ratio calculated as the gross operating surplus divided by turnover, all expressed in percentage, which can be interpreted as a reduction in the mark-up. We then adjust the market friction parameter so that the reduction in the wedge between market prices and average production cost becomes equivalent to the estimated change in firms' mark-up. Following this approach, a reduction in regulatory restrictiveness reduces market prices. In FIDELIO, the reduction in the restrictiveness indicator enters the model as an exogenous variation of $\mu_{r,j}$ in equation [9], corresponding to the estimated change in firms' mark-up.

Then, while the M69 and M70 sectors are modelled separately in FIDELIO, it was necessary to compute for each Member State the weight of those two sectors in the composite M_N sector defined in RHOMOLO to rescale the shock appropriately. EUROSTAT data on sectoral turnover were used for this purpose, and on average, that weight is about 25% across the EU.

For the construction sector, there is no readily available restrictiveness indicator. In the absence of more specific information, we use the information available, i.e. the same restrictiveness indicators shown in Table 3. Since in this way we are introducing an approximation, albeit necessary, we apply an average impact to all EU countries, estimated as follows.

First, we use the estimations proposed by Canton *et al.* (2014), who investigate the effect of regulatory barriers on sectoral allocative efficiency and profit. Through a two-step sequential approach, they link regulation to business dynamics and, through this channel, to allocative efficiency and profit rates. They find that a reduction in the professional services PMR indicator by 1 point increases the allocative efficiency index by 5.7%.

Second, to simulate the scenario in the model, we use another performance indicator that is labour productivity. In fact, the construction industry is a labour-intensive industry and greater efficiency in the labour market is another expected channel of productivity growth in integrated markets. We follow the estimates found in European Commission (2013), which focuses on the relation between allocative efficiency and labour productivity. The results from a fixed effects regression indicate that a 1% increase in allocative efficiency tends to increase labour productivity by 0.73%. Based on these estimations, the average increase in labour productivity we estimate is a 5% increase.

In this case, no further steps were necessary since the construction sector (F, according to the NACE-2 classification) is modelled explicitly both in RHOMOLO and in FIDELIO. In RHOMOLO we assume that the changes in labour productivity, $A_{lr,\, j\varepsilon}$ in equation [4], are identical for labour of all skill types in the sector.

It should be noted that the RHOMOLO results were used to quantify the value added and employment effects of the policy shocks illustrated above, while the higher level of sectoral detail of FIDELIO was exploited to investigate the spillover effects across all the sectors of the economy.

In addition to quantifying the potential macroeconomic effects of the hypothesised changes in regulatory restrictiveness in the sectors under scrutiny, the aim of this analysis also lies in the identification of the transmission channels at work in the economy, that is, the processes through which the policy initiatives affect the behaviour of economic agents. The operational mechanisms underlying each policy initiative are of crucial importance, mainly because, in this case, the policy shock does not involve any monetary injections into the economy. It is, therefore, of paramount importance to understand how regulatory measures like those aimed at reducing the restrictiveness of specific sectors may lead to macroeconomic effects such as changes in value added and employment.

4. Results

4.1. Reduction in the restrictiveness of highly regulated business services

The results of the RHOMOLO analysis on the heavily regulated business services sectors are reported in Figures 1*a* and 1*b* below, which depict the impact over time on value added and employment, respectively. In all cases, the numbers are to be read as differences from the baseline values of the variables, a baseline in which no policy shock is assumed. Thus, the interpretation is that the initial change in regulatory restrictiveness in the accounting, legal, architectural and engineering sectors in, for instance, Germany results in an additional € 5 billion of value added after two years at the aggregate EU level.

The RHOMOLO simulation estimates the potential impact of reducing regulatory restrictiveness in four important business services markets. The model predicts after ten years a positive gain of EU-wide value added and

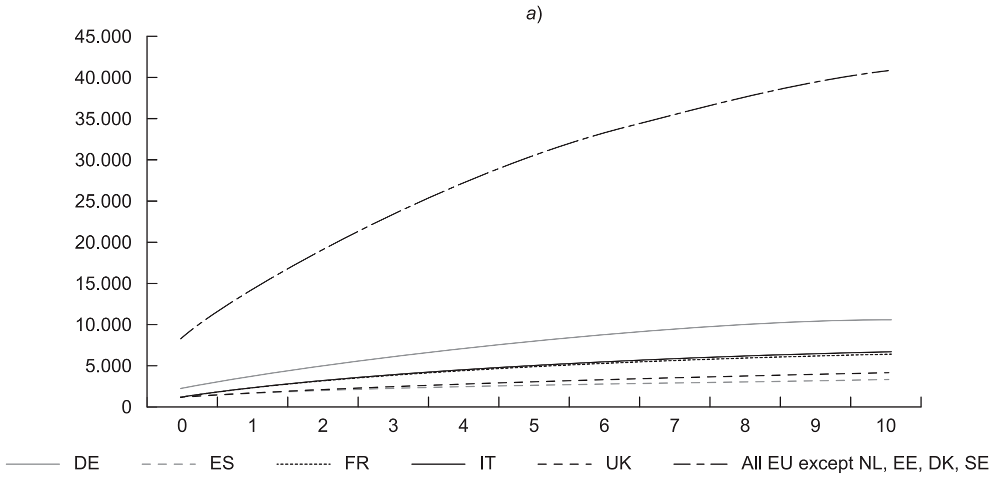

Figure 1*a*: Value added impact (€ mln) – heavily regulated services sectors scenario.
Source: Authors' calculation on RHOMOLO.

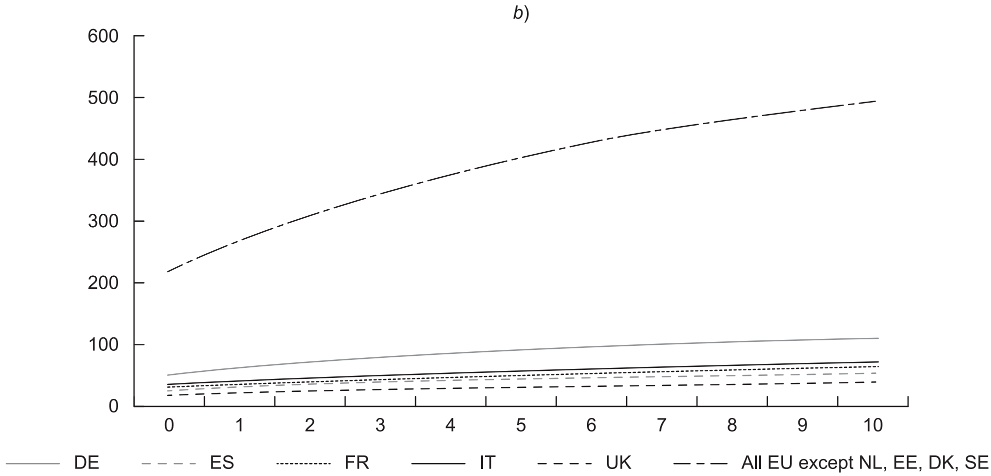

Figure 1*b*: Employment impact (thousands) – heavily regulated services sectors scenario.
Source: Authors' calculation on RHOMOLO.

employment of up to +€ 41 billion and slightly less than +500,000 persons employed with respect to the baseline scenario, respectively, if this occurred in all EU member states. Obviously, the effects would be fewer if the change occurred in one country only. The impact on value added and employment varies across member states. In the short run, the value added change ranges from -€ 79 million in the Netherlands to +€ 2.423 billion in Germany. However, after ten years, all member states experience an increase in value added, the highest being recorded for Germany (+€ 11.422 billion) and the lowest for Estonia (+€ 5 million). As for the change in employment, after

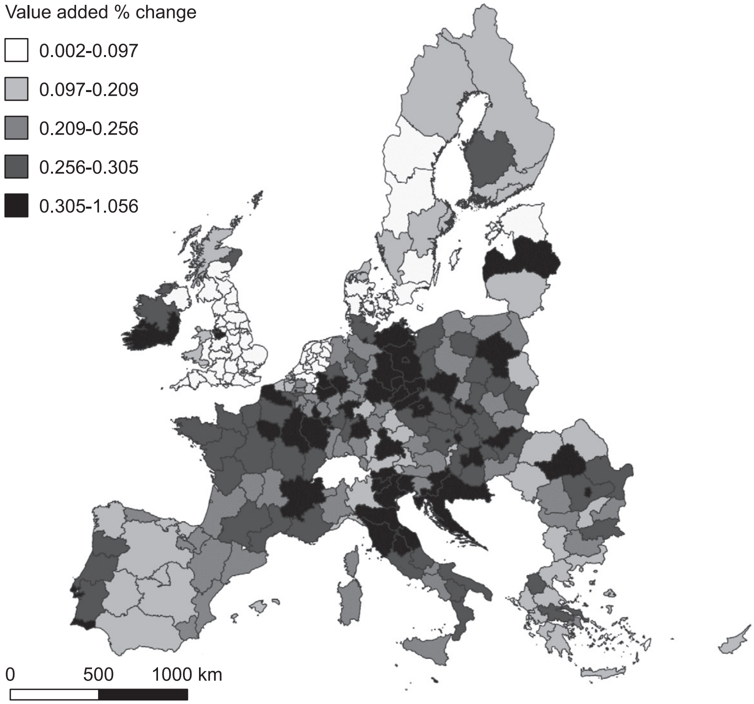

Figure 2: Regional value added impact in $t + 10$ (%) – heavily regulated services sectors scenario.
Source: Authors' calculation on RHOMOLO. EuroGeographics for the administrative boundaries.

ten years it ranges from about +100 persons employed in Estonia to about +118,000 in Germany.

The RHOMOLO model further allows for an assessment of the economic impact at the regional NUTS2 level. Considering relative changes in value added (Figure 2) reveals that the regions that experience the largest rise in value added after ten years are regions in North-West England, North-East Italy, Central Italy, Eastern Germany, and Western Germany. The lowest rise in value added occurs in regions in other parts of England and in the regions of the regulatory top EU performers (Denmark, Estonia, the Netherlands, and Sweden) as these countries experience no changes in their regulatory restrictiveness. For these regions, the rise in value added is purely due to positive spillovers, emanating from trade linkages and value chains from regions located in other Member States.

Examining the distribution of regional impacts using a combined violin-boxplot (Figure 3) leads to the following observations. The economic gains from reducing the regulatory restrictiveness for highly regulated business services increase over time. The median region experiences an increase in value added of 0.08% after one year and an increase of 0.23% after ten years. Considerable variations in economic impact across regions can be

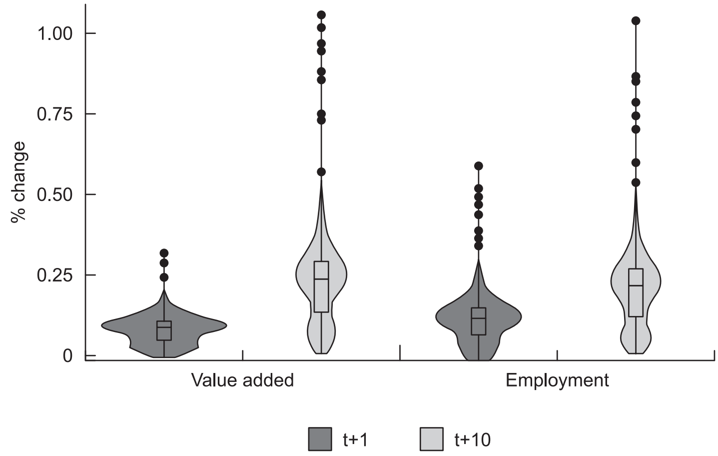

Figure 3: Regional impact (%) – heavily regulated services sectors scenario.
Source: Authors' calculation on RHOMOLO.

Table 4: Regional averages in $t + 10$ – heavily regulated business scenario

	Catching up countries	Top performer countries
Percentage deviation from baseline		
Employment	0.23	0.03
Value Added	0.25	0.08
Household Consumption	0.38	0.07
Investments	0.41	0.19
Export	0.53	0.13
Aggregate demand for business services	0.92	0.04
CPI	-0.25	-0.08
Decomposition of deviation in export		
Intra EU by business services	0.04	-0.06
Intra EU by other sectors	0.37	0.12
Extra EU by business services	0.01	0.00
Extra EU by other sectors	0.10	0.07
Total Export	0.53	0.13

Source: RHOMOLO calculations.

observed, and the distribution becomes more dispersed over time. A few regions experience relatively large gains in value added and employment of up to 4 times the median (Cheshire, Merseyside, Umbria and Trento). Finally, almost all regions in the EU top performing Member States suffer a small loss in value added and employment after one year. However, after ten years, all the regions in the top performing Member States experience gains in value added and employment, indicating that the positive spillovers take time to materialise, as trade and value chains need some time to adjust.

To examine the regional results in debt, we separate the regions into two subgroups: those belonging to the catching up countries with reduced levels of regulatory restrictiveness for business services and those belonging to the top performers with no improvement in the regulatory framework. For each group, we calculate the means of the deviation from baseline for selected variables (Table 4). We first consider average deviations from baseline for the regions in catching up countries with improved regulatory restrictiveness. The improvement in regulatory restrictiveness results in lower prices and higher aggregate (intermediate and final) domestic demand for business services. Aggregate demand in $t + 10$ is on average 0.92% higher than the baseline. Lower prices for business services spill into other sectors as lower production costs and, in turn, lower commodity prices and improved competitiveness. This raises exports (0.53% on average) and results in higher employment (0.23%), investments (0.41%) and household consumption (0.38%). Regions in top performing countries do not benefit directly from lower regulatory restrictiveness. However, lower prices for imported commodities result in lower domestic commodity prices and leads to economic growth, although the rise in value added is more modest (0.08%). In Table 4, we decompose the change in exports by exporting sector (business services and other sectors) and trade destination (intra EU and extra EU). The decomposition shows that regions benefitting from regulatory improvement experience a rise in exports of business services. However, export to EU regions by other sectors than business services account for most of the rise in exports. Regions in top performing countries experience a decline in exports of business services to EU regions. However, total exports still rise (0.13%) due to higher exports by other sectors to EU regions and to ROW.

The heavily regulated services sectors scenario is based on the hypothesis that the regulatory restrictiveness of all countries reaches the average restrictiveness level of the regulatory top performing countries. Regions in different Member States thus benefit from varying improvements in restrictiveness and therefore varying reductions in market friction. Furthermore, the relative size of the business services sector in the regional economy influences the region's potential to benefit from the regulatory improvements. One would therefore expect that the improvement in market friction scaled by the relative size of business services correlates positively with regional changes in value added and employment. Figure 4*a* confirms this assertion. An improvement in market friction scaled by the relative size of the business services sector strongly and positively correlates with a rise in value added for the regions in regulatory catching up countries. The figure also illustrates that regions in top performing countries experience a modest rise in value added entirely due to positive spillover from trade. As illustrated in Figure 4*b*, value added

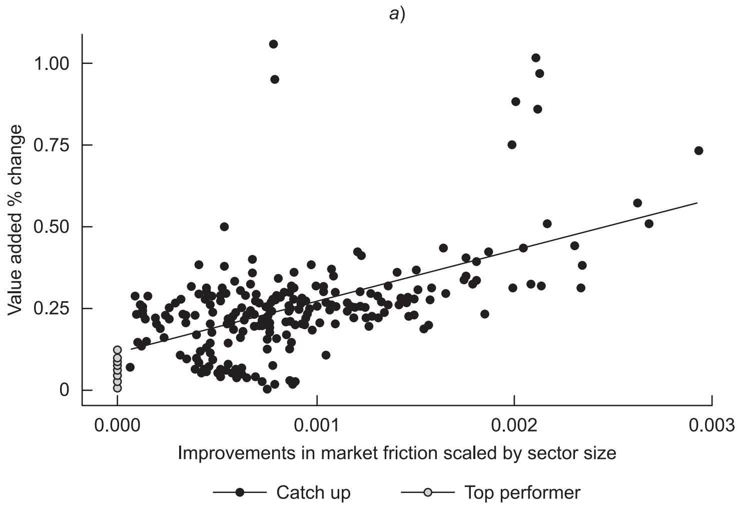

Figure 4*a*: Correlation market friction and value added impact in $t + 10$ – heavily regulated business scenario.
Source: Authors' calculation on RHOMOLO.

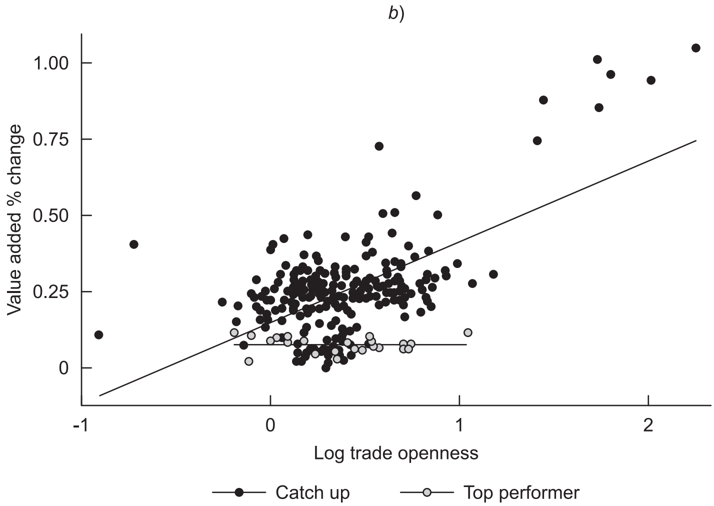

Figure 4*b*: Correlation trade openness and value added impact in $t + 10$ – heavily regulated business scenario.
Source: Authors' calculation on RHOMOLO.

for regions in regulatory catching up countries correlates positively with trade openness at the baseline. This suggests that a regional economy with higher trade openness has a better potential to gain from a competitive advantage caused by reduced market friction. In contrast, value added of regions in top performing regulatory setup does not correlate with higher trade openness.

FIDELIO simulations suggest that, from the first year, value added and employment of almost all sectors would increase. This positive impact happens in greater measure in the sectors not directly affected by the reduction in the regulatory restrictiveness. In fact, for the sectors directly involved, the positive impact caused by an increase in the production volume is partially offset by the decrease in the mark-up. Instead, for the other sectors, a reduction in the regulatory restrictiveness in business services implies a positive impact due to cheaper intermediary inputs, as well as a better allocation of the resources in the economy. Sectors that seem to benefit from the change at the EU level are, for instance, real estate activities (NACE L68), production of machinery and equipment (NACE C28), and the wholesale trade sector (NACE G46). In the short run, the value added increase in these sectors would represent around 40% of the total value added increase.

Even if these sectors would initially represent the major share of the value added increase, the positive impact is expected to spread across many economic sectors over time. Ten years after the reform, the value added increase in these sectors would represent around 20% of the total value added increase. The reduction in the regulatory restrictiveness would imply a more efficient allocation of resources, therefore, benefits across sectors. Other sectors that would benefit from the reform would be, for instance, human health activities (NACE Q), public administration and education (respectively NACE O84 and P85), legal accounting, and financial services (NACE M69-70, K74), construction and retail trade (NACE F and G47). These sectors would account for another 30% of the total positive impact.

Although these sectors account for most of the total value added increase, other sectors have less impact on the value added change, but the positive impact is significant relative to their initial value added. For instance, this happens for some manufacturing sectors (textiles, basic metals, furniture, computer and electronic products, machineries), or mining and quarrying. Once again, this is due to a better allocation of resources in the economy.

4.2. Reduction in the restrictiveness of construction services

Figures 5*a* and 5*b* report the results of the simulations on the construction sector. Similarly to before, the impact on value added is depicted in Figure 5*a*, and the employment impact in Figure 5*b*. Once again, the productivity increase would have a smaller impact, should it happen, in only one country rather than in all the EU Member States. Figures 5*a* and 5*b* show the effects of the productivity change when assumed in the whole EU and when assumed in few selected countries only (namely, France, Germany, Italy, Spain, Sweden, and the UK).

The simulated 5% increase in labour productivity in construction illustrates the potential gains from reducing barriers in that sector, with up to

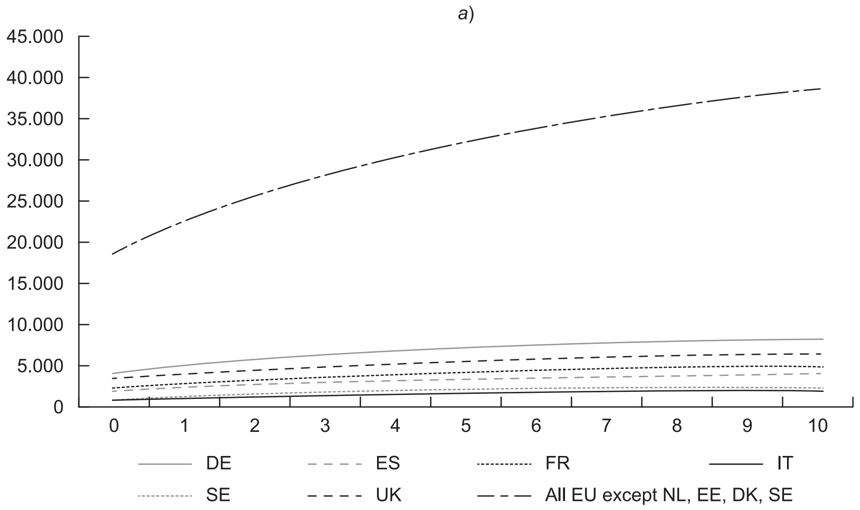

Figure 5*a*: Value added impact in millions of € – construction sector scenario.
Source: Authors' calculation on RHOMOLO.

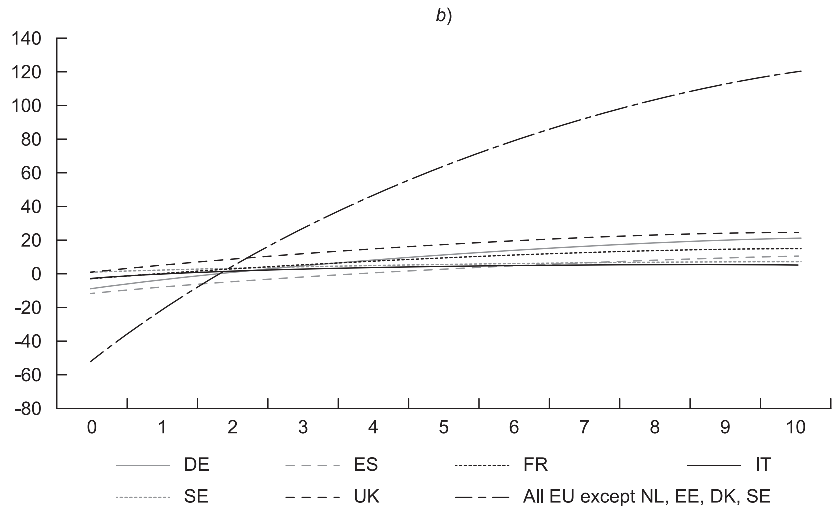

Figure 5*b*: Employment impact in thousands of persons employed – construction sector scenario.
Source: Authors' calculation on RHOMOLO.

+€ 38.60 billion in terms of EU-wide value added and +119,000 persons employed after ten years in the scenario in which all EU Member States experience the change.

The relative change in value added varies across regions (Figure 6). The largest rise in value added after 10 years occurs in Latvia, Cyprus, and regions in Sweden, Austria, the UK and Belgium. Regions in Greece and Italy experience the smallest rise in value added.

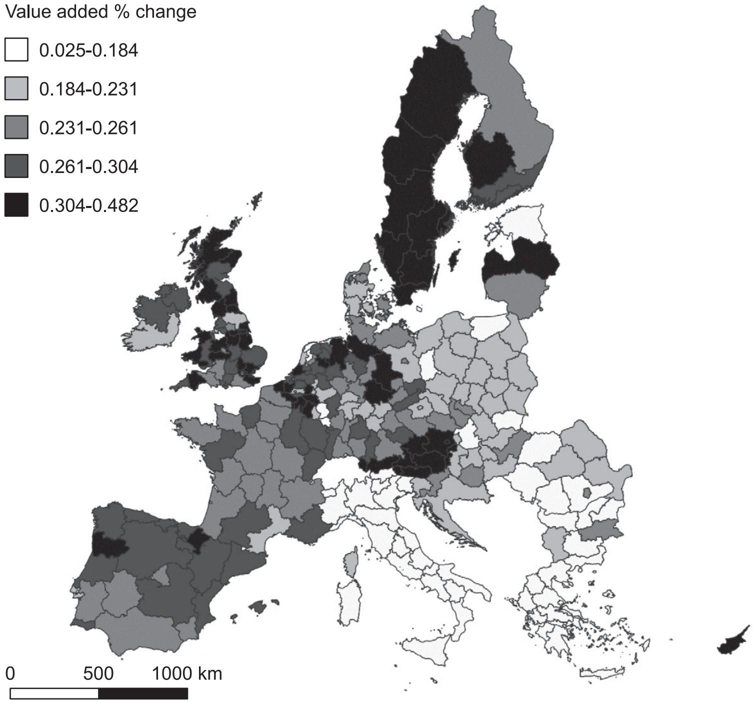

Figure 6: Regional value added impact in $t + 10$ (%) – construction sector scenario.
Source: Authors' calculation on RHOMOLO.

Considering the regional variations in value added and employment following a rise in labour productivity in the construction sector (Figure 7) leads to the following observations. All regions experience a rise in value added following the rise in labour productivity. The rise in value added for the region with median gain is respectively 0.14% after one year and 0.25% after 10 years. In contrast, the improvement in labour productivity leads to a short-term decline in employment for about half of the EU regions. The largest decline in employment is found in regions in North-West England and across Spain. The median change in employment is -0.01% after one year. However, after 10 years most regions experience a rise in employment, although some regions in North-West England, South and Central Spain and Greece see employment below baseline. The median change in employment after 10 years is 0.05%.

Table 5 reports the average regional deviation from baseline for selected variables. Labour productivity gains in the construction sector imply that the construction sector can produce the same output with less labour, which results in cheaper construction services and free up labour for other production. Aggregate demand for construction services rises to become on average 0.76% higher than the baseline in $t + 10$. Labour migrates from the construction sec-

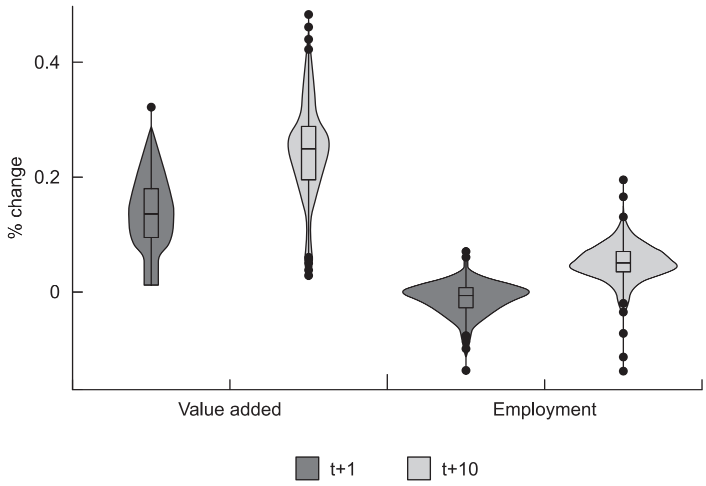

Figure 7: Regional impact (%) – construction sector scenario.
Source: Authors' calculation on RHOMOLO.

Table 5: Regional averages in *t* + 10 – construction sector scenario

	Regional average
Percentage deviation from baseline	
Employment	0.05
Value Added	0.24
Household Consumption	0.17
Investments	0.27
Export	0.26
Aggregate demand for construction services	0.76
CPI	-0.13
Decomposition of deviation in export	
Intra EU construction services	0.03
Intra EU other	0.17
Extra EU construction services	0.01
Extra EU other	0.04
Total export	0.26

Source: Authors' calculation on RHOMOLO.

tor to other sectors of the economy, causing a downward pressure on wages. Cheaper intermediate inputs reduce the sector's production cost and result in lower commodity prices, which in $t + 10$ is 0.13% below baseline. The regions see a rise in capital accumulation and economic growth. In $t + 10$ value added

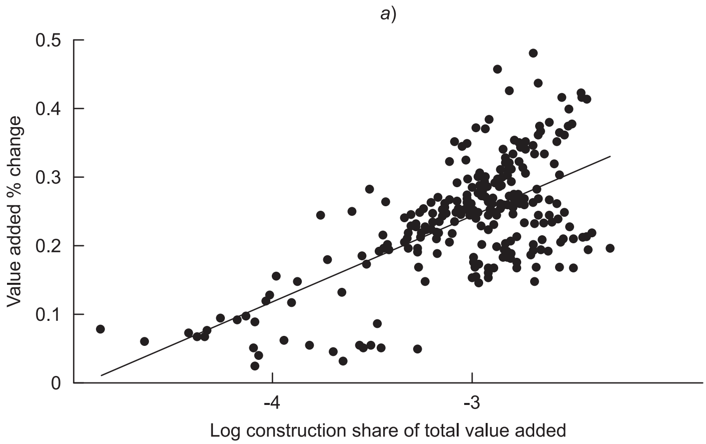

Figure 8*a*: Correlation relative sector size and value added impact in *t* + 10 – construction sector scenario.
Source: Authors' calculation on RHOMOLO.

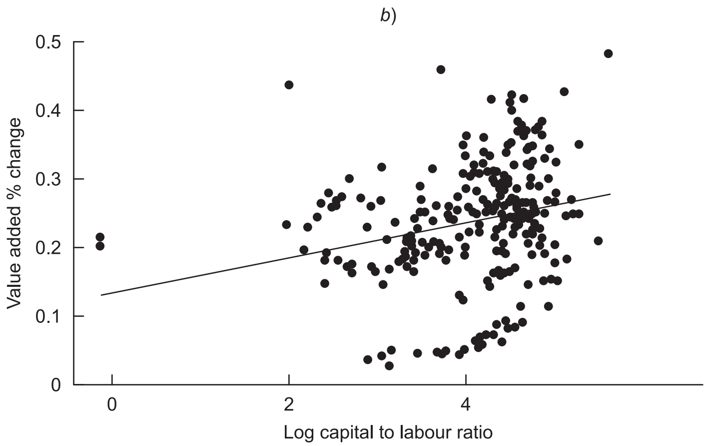

Figure 8*b*: Correlation capital intensity and value added impact in *t* + 10 – construction sector scenario.
Source: Authors' calculation on RHOMOLO.

and investments are respectively 0.24% and 0.27% higher than baseline. The labour-saving productivity gain result in a modest change in employment (on average 0.05% above baseline). Decomposing export by exporting sector and export destination reveals that the economic expansion across EU regions generates a rise in intra EU trade. Furthermore, the competitive advantage from lower production costs causes a rise in extra EU export.

The scenario considers a uniform rise in labour productivity in construction across regions. However, the impact of the productivity gain is higher in regions where construction makes up a larger share of the economy

(Figure 8*a*). The regional changes in value added and employment correlates positively with the relative size of the construction sector.

Furthermore, the regional impact on value added correlates positively with regional capital intensity (as shown in Figure 8*b*). In capital-intensive regions, the labour that migrates from construction to other sectors of the economy will be paired with a larger capital stock generating higher investments and growth in value added.

Looking at the sectoral results found using FIDELIO, as for the first simulation, also under the construction sector scenario, there is a positive impact on value added for the different economic sectors, and this positive impact is more concentrated in few sectors right after the shock, while it is distributed more evenly among many sectors over time. Unlike the first simulation, in the first year roughly 50% of the positive impact on value added happens in real estate activities (NACE L68). Another difference is that the construction sector (NACE Q) accounts for an important share of the value added increase from the first year, as well as rental and leasing (NACE N). While in the short-term sectoral impacts there are differences between the two simulations, in the long term the results obtained in this second scenario are similar to those described for the first simulation. The intuition behind this result may be that both scenarios simulate an improvement in aggregate productivity and a better allocation of resources among the different sectors. The two simulations, therefore, converge to similar sectoral results in the long run.

5. Conclusions

The European Commission continuously monitors the performance of the Single Market and, in November 2019, published the Single Market Performance Report 2019 (European Commission, 2019). The Report highlights the importance of structural reforms at the member state level and the need for improvement in the compliance and application of Single Market legislation not just in goods markets, but also in services markets.

Indeed, free trade and cross-border investments do not guarantee lower prices for consumers and new business opportunities unless markets are also open to competition in terms of existing market power, regulations, and sufficient energy and transport infrastructures. This is the reason why the Report emphasises the key role of structural reforms to deliver the Single Market benefits to citizens and businesses.

The analysis contained in this paper provides estimates of the potential benefits of structural reforms made to further unlock the potential of the European Single Market (as already stressed by, among others, Mustilli, Pelkmans, 2012; De Mello, Padoan, 2010). In particular, the model simulations presented here assess the likely effects on value added and employment stemming from changes in the restrictiveness of the legal, accounting, architecture, and engineering services, and the construction sector. The results suggest that there may be sizeable economic effects despite the relatively small price and productivity changes affecting only some of the sectors of the EU economy. Our results indicate that the potential benefits of structural reforms vary considerably across countries and regions. The differences in economic impact are caused by varying structural characteristics and the magnitude of interregional spillovers.

As for any modelling outcome, the numbers reported here should be interpreted with care as they result from a number of assumptions embedded in the nature of the two models used, RHOMOLO and FIDELIO.

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