Trade in Services and TFP: The Role of Regulation

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Abstract

What determines services TFP: Is it services trade or services-trade regulation? To respond to this question I use four indicators of international trade in services since 1990 to 2005 – namely FDI inward stock, services imports, domestic sales of foreign affiliates (FATS) and FDI inflows – to examine what type of services trade directly affects services TFP. Such analysis is done both for the level and growth rate of TFP in each of the 14 selected services sectors. Subsequently, we analyze what type of sector-specific regulation with respect to each of the four indicators of services trade has played an inhibiting effect on both the level and growth of services TFP. Such analysis contrasts with former studies in which mainly factor inputs and economy-wide regulatory variables are used to explain services TFP. We provide evidence that services trade has a direct effect on the level of services TFP, but this effect is inhibited as soon as the regulatory variables are included. As for services TFP growth, we find that neither trade nor entry barriers are robust determinants to explain cross-country differences over time. Instead, regulation on operational procedures affecting the variables costs structure of the firm play a much more important role in explaining TFP growth between countries.

JEL Codes: F1; D24; L8
Key words: Trade in services; Services regulation; TFP in services

1   Introduction

The share of services in national income and employment rises over 70 per cent in most developed economies.[1] The productivity differences in services between these countries are shown to mirror to a great extent their aggregate growth differences. This underlines services as a central element in the world economy.[2] An important part of the productivity growth differences between these countries is explained by total factor productivity (TFP) in services. However, the growth in services TFP in the many developed countries are largely lagging behind as Figure 1 illustrates.

Standard explanations of how to explain TFP in general revolve around factor inputs such as the share of high-skilled labour or information and communication technology (ICT) related capital employed in production. The increased use of skilled labour as a source of faster TFP growth stimulates innovation as opposed to imitation (Aghion, Meghir and Vandenbussche, 2006). The use of ICT would generate additional externalities so as to explain TFP growth (see e.g. Stiroh, 2002). A third explanation is provided by Nicoletti and Scarpetta (2003) who show that decreasing entry barriers can explain only to some extent TFP growth differences across industries. There is no reason to believe that these sources of TFP growth are less important for services than for goods. Even more important for services is that in most developed countries since the 1990s deregulation has fostered not only domestic competition but particularly also international competition within each services sector. International trade brings along efficiency forces that consequently increases TFP growth. This paper therefore addresses the question whether it is international services trade or services regulation that forms a determinant for TFP growth in services.

Previous studies assessing the effect of either services trade or services deregulation on services TFP are rather scarce. Nicoletti and Scarpetta (2003) find a significant effect of entry regulation in services on TFP growth across all industries since many services are inputs into further production. However, no significant impact was found on TFP growth within services. A study by van Ark, Inklaar and Timmer (2008) only found limited evidence of TFP effects within services to the extent that entry barriers form a decreasing factor on TFP growth for post and telecommunication services but not for other sectors.[3] However, these studies exclude the fact that next to entry barriers regulation also includes all types of conduct regulation on operational procedures of domestic and foreign firms once established in the market. This type of domestic conduct regulation could further impede competition and hence slow down TFP growth. Moreover, both studies omit that in addition to these *domestic* competition forces *international* competition forces through trade or regulation also have a direct effect on TFP.

This paper therefore contributes to the existing literature in the following ways. First, we examine the role of international trade in services on services TFP by including a vector of services trade that consists of four variables: foreign direct investment (FDI) inward stock, services trade imports, sales statistics of foreign affiliates in the domestic country (FATS), and FDI inflows. Both FDI and FATS statistics measure trade through Mode 3 as established in the GATS. However, since FATS statistics are notoriously scarce trade through this type of mode is usually proxied by FDI. This article includes both trade variables for Mode 3 since we find enough observations to perform our estimations.

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[1]   In the lowest-income countries services occupy a share of 30 to 35 per cent in national GDP.
[2]   See Triplett and Bosworth (2004), van Ark, Inklaar and Timmer (2008), van Ark, Inklaar and McGuckein (2003), van Ark, O'Mahony and Timmer (2008) and Blanchard (2004).
[3]   Moreover, the latter study does not find any significant effect of the growth of high-skilled labour share or ICT-employed capital on TFP growth.

Second, we not only include sector-specific entry barriers in our empirical analysis but also all other types of conduct regulation detailed at sector level. Typically, only entry regulation affecting the fixed entry costs has been considered in the existing literature. The reason is simple: reduced entry barriers steers competition among firms and so increases TFP growth. However, services are regulatory intense in the sense that other forms of domestic regulation on operational procedures affecting the variables costs are also important and could further stifle domestic and foreign competition and hence TFP growth. Even if entry is feasible in a domestic market, discriminatory policies are still possible and technically even non-discriminatory policy could affect the operating costs of a foreign firm in a different way from a domestic firm (*de facto* discrimination) (Hoekman and Mattoo, 2008).

Third, we also include data on FDI regulation in our study and following the previous analysis we split up these data into two indexes that measure entry barriers and restrictions on operational procedures separately. Contrary to the previous regulatory indexes that measure domestic regulation in the form of entry or conduct regulation, these FDI regulatory indexes measure restrictions against a foreign company. Finally, relative to other works this paper undertakes a first attempt to deal with the endogeneity problems when estimating determinants of TFP growth. Next to taking lags of the independent variables we also apply a dynamic panel estimation technique to solve some of the potential endogeneity problems with the trade and input variables.

This paper is organized as follows. The next section will review the existing literature on productivity and services at the one hand and the effects of regulation and trade on TFP on the other. Section 3 presents the empirical strategy including the basic models to estimate both the level and TFP growth and provides a data description. Section 4 discusses the results of our empirical analysis, and finally, the last section concludes.

2   Literature Overview

There has been a long-standing concern about a supposed trade-off between the size of the services sector and aggregate growth because services would suffer from a productivity lag (Baumol and Bowen, 1966; Baumol, 1976)[4]. However, many services are inputs in the production process of other sectors facilitating overall growth because they allow specialization to occur as shown by Francois (1990). These inputs provide organization and coordination of the firm so that more differentiated goods and services are generated and economies of scale are realize measured by increased productivity of the firm. Moreover, services are also a mechanism to diffuse innovative production and spill-overs which allows productivity to further increase.[5] The importance of services to overall

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[4]   See for recent empirical contributions Nordhaus (2006) and Hartwig (2008). This so-called Baumol disease implies that the production process of services is more costly relative to the manufacturing sectors, which causes them to experience a lower output and higher prices in the long run. These costs would stem from the unfeasibility of substituting labour into more productive factors of production compared to manufacturing where wages are tied to their productivity. The limited scope for labour productivity improvements causes services to represent an ever growing part of the economy. This eventually results in an decreasing overall economic growth.

[5]   See also Burgess and Venables (2004) on the importance of a variety of services "inputs" that support specialization, creation and diffusion of knowledge, and exchange. Furthermore, Oulton (2001) argues theoretically that all services are used as input into further production of final goods sectors that show a higher rate of productivity growth. The perceived productivity lag of these expanding "stagnant" services may even increase economic growth. Here too, the rationale behind is that greater outsourcing of services by (productive) firm in non-stagnant sectors requires a reallocation of factors that increase overall output and aggregate productivity. Kox (2003) provides minor empirical support showing that business services in the Netherlands both expanded quickly in the 1990s and demonstrated stagnating productivity growth. However, Oulton's (2001) argument fails to recognize that services are heterogeneous in both nature and function. This diversity of services characteristics may help explain their increased or decreased rate of productivity. Even if one looks within the category of business services, which are often taken together, large TFP growth differences are observable. For instance, the nature of a telecommunication service is different than a transport service. The function of

productivity growth is perhaps best proven by Triplett and Bosworth (2004). They show that in the 1990s (market) services has been the source of strong US labour productivity growth. Other studies such as van Ark, Inklaar and McGuckein (2003), Blanchard (2004) and van Ark, O'Mahony and Timmer (2008) have shown that these market services help to explain to a very large extent cross country differences in labour productivity between developed economies.[6]

The study by van Ark, Inklaar and Timmer (2008) confirm the importance of market services as a contributor to labour productivity growth. They find as well that contrary to common belief cross-country (labour) productivity growth differences in services are not due to factor input growth variation in services across countries such as ICT and skills. They show that services TFP is a key-factor in explaining such growth differences.[7] More important, they in turn investigate what explains services TFP growth differences between countries but find these factor inputs neither to be significant. Instead, some evidence suggest that entry barriers are likely to play a central part in explaining TFP growth differences between countries. Especially in post and telecommunication services entry barriers drive TFP growth. This outcome substantiates earlier findings by Nicoletti and Scarpetta (2003) only insofar they show that entry barriers in services affect TFP growth across all industries and not specifically in services.[8] Besides, this significant outcome is only found when averaging this variable over all services sectors.

Related country-specific studies that investigate wide-ranging productivity effects caused by services policy generally find a significant effect. For services overall Arnold, Javorcik and Mattoo (2009) provide evidence that services liberalization in the Czech Republic causes increased levels of manufacturing TFP using measures of foreign entry and participation plus privatization. Related economy-wide effects of services reform such as Mattoo, Rathindran and Subramanian (2006) find support that openness in the financial and telecommunications sectors influences long-run growth performance. Eschenbach and Hoekman (2006) assesses the positive link at the aggregate level between the level of services liberalisation and economic growth (and thus implicitly productivity) for transition economies. Arnold, Javorcik, Lipscomp and Mattoo (2010) show that for India sector-specific policy reform in services, i.e. banking, telecommunications, insurance and transport create higher TFP in the manufacturing sector. [9]

Only some studies question whether services policy also affect the performance of domestic services sectors themselves as opposed to manufacturing sector. Sector-specific studies support the link between services productivity and domestic services openness. Fink, Mattoo and Rathindran (2003) have analyzed the impact of specific policy changes during the process when telecommunications became less state-supplied. They find that both privatization and creating domestic competition lead to significant improvements in labour productivity. A case study by Cammins and Rubio-Misas (2006) show significant TFP increase for the Spanish insurance industry

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services matter too. Not all services share the productivity-enhancing role of inputs into further production. Some are final-demand services serving the personal needs of end users. These personal services represent a substantial and growing part of all OECD economies. In a related analysis, Fixler and Siegel (1999) argue that outsourcing of services by manufacturing firms may show up in short terms divergences in measured productivity growth of services vs. manufacturing sectors.

[6] Triplett and Bosworth (2004) show that both labour productivity and TFP for several US services have been growing notably in financial and distribution services. However, they conclude that next to ICT developments, TFP growth may actually be due to the use of managerial innovations and new concepts of doing business.

[7] The authors do find that ICT use and skilled labour are nonetheless major contributors to labour productivity growth in market services in most OECD countries. However, cross-country differences of labour productivity in services are not due to these factor inputs.

[8] The authors also show that industry-specific entry liberalization in services bear no significant effect on TFP in services specifically. They find, however, that an economic-wide indicator of entry liberalization in services have a significant effect on TFP taking both manufacturing and services together. Still, this significant outcome is only found when averaging this variable over all services sectors and is thus sector-specific.

[9] Also, developing country-specific studies analyzing the link between services liberalization and manufacturing firm productivity. Arnold, Mattoo and Narciso (2006) found evidence for a positive and significant link between African manufacturing firms and their access to and performance in communications, electricity and financial services.

during the 1990s after the introduction of an EU insurance Directive. This productivity growth was largely due to domestic firm-growth through mergers and acquisitions (M&A) that took place within Spain, which could also be brought in by foreign firms.

In the literature on trade liberalization and productivity changes Melitz (2003) and Pavcnik (2002) put forward evidence of productivity improvements stemming from reallocation effects due to output liberalization. The direct relationship between trade imports (or input liberalization) and trade gains has recently been established by e.g. Goldberg, Khandelwal, Pavcnik and Topalova (2009). They show that, in the case of goods, through input import liberalization the range of products manufactured by the firm increases, which is an important component of TFP.[10]

However, studies that investigate the role of services imports or even FDI in services on TFP in the manufacturing sector are scarce. Even scarcer is the literature on the effects of services imports or FDI in services on services TFP. Moreover, empirical studies on productivity caused by inward FDI are generally mixed. Aitken and Harrison (1999) show that FDI can play a negative role for productivity due to a reduced competition effect. Javorcik (2004) finds that FDI in Lithuania has a positive impact on supplier industries, but no effect on local competitors in the same industry.[11] The results by Arnold and Javorcik (2009) indicate that FDI increases the TFP performance in the acquired manufacturing plants in Indonesia. Djankov and Hoekman (2000) suggest that foreign investment has a positive effect on the TFP growth of a recipient firm.

As such this paper is the first one to investigate at the sector level the impact of services trade and FDI on TFP in services themselves. Besides, we also explore whether a wide-range of sector-specific regulatory policies on entry and operation have effected TFP since the 1990s. Since our data is in panel dimension we are able to see if one of these factors can sufficiently explain cross-country differences in TFP over time.

3　Data and Methodology

3.1　Dependant Variable: TFP

The dependant variable is output-based TFP in services. This measure of TFP is adjusted for the share of high-skilled, mid-skilled and low-skilled labour and corrected for the amount of capital and ICT-related capital use, plus intermediate input use. This TFP calculation hence tries to avoid any type of a too crude measure of TFP since countries differ in their input use. Furthermore, there is a principle reason for using output-based rather than added-value based TFP: value added-based TFP only measures intermediate input use and thus might miss out some of the features of commodity and services output (Nordhaus, 2006).

This paper uses TFP data taken from the EUKlems database. It calculates TFP by subtracting the weighted cost-share of hourly factor inputs and intermediate input use from the share of gross

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[10]　The fact that Goldberg, Khandelwal, Pavcnik and Topalova (2009) do not use TFP is much related to identification problems of a clear link between trade liberalization and using firm's revenue to calculate TFP when using firm-level data. Note that whereas Melitz (2003) and Pavcnik (2002) analyze these productivity effects on the output and hence export side, Goldberg, Khandelwal, Pavcnik and Topalova (2009) study productivity effects established through imports. As noted in the previous section, the empirical part of this paper focuses on the effects of services imports on the services sectors themselves whilst considering services either as further inputs to other manufacturing or services production or as final-end consumer services. This paper therefore relates more to this latter part of the literature that analyzes productivity improvements caused by reallocation forces from increased domestic competition through tariff liberalization or de-regulation and consequently imports. Other recent work that focus on the link between trade liberalization and TFP is given by e.g. Kasahara and Rodrigue (2008) and Amiti and Konings (2007).

[11]　See also Javorcik and Li (2008) for positive supplier industry effects by entry of foreign retail chains in Romania.

output at constant prices.[12] As such, the input corrections are made on a detailed level. In the EUKlems database TFP is calculated up to 93 goods and services sectors that are consistent with the NACE industry classifications. Our dependant variable only includes services sectors for 21 OECD countries, as shown in Table A1 in the annex. In the database this measure of TFP is converted into an index and covers the period 1970-2005. Only a minor share of 9% of the total amount of observations are missing (510 out of a total of 5712). For our analysis we choose to select data from 1990-2005 so that it matches our trade and regulation data.[13]

3.2   Descriptive Analysis of TFP

Data from the EUKlems should shed some light on simple productivity statistics. Figure 1 displays annual average growth difference of manufacturing, business services and personal services. This separation of business and personal services is largely in parallel with the indicator of tradability vs. non-tradability in services described by Eichengreen and Gupta (2009).[14] It clearly shows that manufacturing has experienced high TFP growth of around 1,5 per cent on average. Business services have on average shown a lower TFP growth rate of around 0,7 per cent. This difference in TFP growth also comes out in Table 1 when comparing across countries. Personal services are the great laggards. Their annual average growth rate is far lower than the business services sectors. For many countries these services sectors show a negative trend and when averaged they show a -0.5 per cent growth rate for the period 1990-2005. Similar conclusions are found in Eichengreen and Gupta (2009) where the authors calculate an annual average growth rate of -0.5 to -1.0 for the personal services identified as non-tradable using similar data source.

Extended cross-country analysis among manufacturing, business and personal services over 1995-2005 illustrate similar patterns.[15] Figure 2 shows that average TFP growth is, respectively, positively associated with real output growth and negatively associated with the price index growth as economic theory predicts. The graphs reveal furthermore that within both business services and manufacturing a linear relationship is observable. It implies that over the years some factors have caused a variety of business services sectors to experience a higher average output growth together with lower growth in prices accompanied by higher TFP growth. No relationship is, however, found for personal services as TFP growth in these services sectors are largely clustered around zero or even become negative.

Of note, higher TFP growth is generally found in sectors that use a high level of intermediate inputs of the manufacturing sector whereas TFP growth decreases in sectors that relatively use less of these intermediate inputs, such as health. These personal sectors are much more dependant on labour as input. Although the EUKlems database states that it corrects its TFP measure for intermediate inputs use by subtracting them from the level of output, it remains unclear whether (business) services themselves are part of these inputs. Often these services inputs are not taken into account and only the materials are usually accounted for. This is important since services compared

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[12]   Further details of this database and how TFP is calculated can be seen in the data annex. TFP calculation in the EUKlems database is according to calculations explained by Timmer, O'Mahony and Ark (2008) and O'Mahony and Timmer, 2009). The EUKlems database shows a combination of 2-digit and 3-digit sectors. This descriptive section concentrates on the unweighted averages of the 3-digit sector levels.

[13]   Except for Czech Republic, Portugal, Slovenia and Ireland which shows data from 1995; Sweden which shows data from 1993; and Luxembourg which shows data from 1992. FATS data starts in 1995.

[14]   Their indicator of tradability has been constructed using data in Jensen and Kletzer (2005). However, some adjustment have been made in the selection of (tradable) business services. Retail trade and Hotels and restaurants have been added to business services as. Trade is observable in these sector according to our data.

[15]   When selecting data for the period 1995-2005 more countries can be included, i.e. Czech Republic, Portugal, Slovenia and Ireland. See footnote 13.

to manufacturing relatively use a much higher proportion of inputs from other services sectors.[16] In this regard, the interpretation of TFP for especially the personal sectors should be done with extreme care.[17] In the regression analysis these sectors will be left out because hardly any trade or regulatory variables are available for personal services.

3.2   Independent variables

The independent variables include both indicators that measure services trade and services regulation. Services trade generally spans the four modes of supply following the General Agreement on Trade in Services (GATS). Services imports and exports cover trade in Mode 1 and 2 and FDI stock and flows proxy for trade in Mode 3. Although FATS statistics are a better way to measure services trade in Mode 3 it is often claimed that it lacks many observations for many countries. Therefore FDI is often chosen instead by way of a crude indicator.[18] Nonetheless, FATS will be included since our estimations show that the amount of observations are comparable with those of services. Mode 4 trade deals with temporarily immigration and is left out in our analysis. For our empirical part we therefore select services imports, FDI inward stock and inward flows, plus FATS statistics sales (turnover) for inward multinational activity.

All four trade indicators are taken from the OECD database which are reported in current million US\$.[19] The country sample covers as mentioned before 21 OECD countries over a time period of 1990-2005 except for FATS which starts in 1995. However, a small share of all trade variables are zeros and a more sizeable part are non-reported and will fall away after taking the logarithm (an average of 3523 over the four trade variables out of a total of 5712). To avoid any selection bias we add for the zeros in the dataset a relatively small constant to the trade variables so that the vector of trade becomes $\ln(a + {}'\text{TRADE})$ where a corresponds to the first decile of the distribution for all trade variables on strictly positive values.[20] By doing so instead of choosing $a = 1$ we circumvent any data problems that could arise due to a substantially compressed distribution of the trade variables, especially for FDI (Bénassy-Quéré, Coupet and Mayer, 2007).[21]

The regulatory variables are also taken from the OECD. These policy indicators can be found at the Indicators of Product Market Regulation database. This database consists of several sub-databases such as the Indicators of Economy-wide Regulation (PMR) which contains indicators of policy regimes, Indicators of Sectoral Regulation (NMR) which measures the regulatory conditions in professional services such as architecture, accounting, engineering and legal services, and the Indicators of Retail Trade. We also take measures on regulation in energy, transport and

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[16]   For a typical OECD country like France in 2005, on average the manufacturing sector uses 36% services as inputs against an average of 73% for services sectors using OECD input-output tables.

[17]   Furthermore, authors of the EUKlems database (i.e. van Ark, Inklaar and Timmer, 2008) also mention that figures for these "non-market" services should be considered with care. TFP data in business services are considered to be reliable.

[18]   Using US data Hoekman (2006) shows that the ratio between FDI inward stock in services and FATS sales in a similar sector is similar to 1:3 respectively.

[19]   FDI stocks and flows are also collected from the UNCTAD database, but since the OECD gives more observations four our country and sector sample the latter database has been chosen.

[20]   For FDI inward stock $a = 0.369$, for services imports $a = 0.792$, for FATS $a = 3.16$ and for FDI inflows $a = 0.1$

[21]   FDI inflows can often take a negative value, as shown in Table A3 in which case no investments take place an instead money is transferred back to the investing country. This problem of volatility is reflected in the low mean statistics and wider standard deviation. There actually several other reasons to rather look at FDI stocks in stead of flows. It represents a better measure of capital ownership since the stocks are financed through the local capital markets (Devereux and Griffith, 2002) and the international allocation of capital stocks are actually decided by foreign investors. Moreover, Bénassy-Quéré, Coupet and Mayer (2007) report that FDI flows are especially in small economies often influenced by one or two large takeovers. Our OECD country sample includes a considerable amount of small country economies.

communications as part of the ECTR database.[22] We only select regulation at sector level and aggregate on an un-weighted basis the indicators to both 2-digit and 3-digit sector level. [23] Working with interpolation technique we ultimately have a policy data set from 1990 to 2005 for the NMR and ECTR sectors and 1996-2005 for the PMR sectors.

These policy variables are adapted in such way so that two general sector-specific indexes are constructed. First, an index for Entry Barriers is created that corresponds in the services literature to the up-front fixed entry costs for the domestic and exporting firm of serving a market. These barriers include e.g. quotas and educational requirements or economic needs tests. The second index, so-called Conduct Regulation, represents all types of other regulatory policy barriers such as regulation on prices and fees or on advertising that have an impact on the variable costs structure of the firm due to operating in the domestic market after entering.[24] Table A1 gives a full explanation per sector which other entry and operational barriers are covered by the two indexes.

It should be noted that the separation of costs cannot be derived from the economy-wide regulatory variables that may affect services trade as it simply does not allow for a separation between entry and operational barriers. With this data at hand we are able to measure both types of regulatory policies individually and assess the relative marginal importance of each of them.

Last, since we are working with FDI we also include data on FDI restrictions at the sector level for services taken from Golub (2003 and 2009). This data is complementary to the previous two indexes because they do not include barriers on labour and production markets or any other barriers that apply equally to foreign and domestic investors (Golub, 2009).[25] As such, these restrictions include deviations from national treatment. The overall index developed by Golub summarizes both entry and conduct restrictions in FDI. However, we are able to separate and reconstruct two additional variables that summarize both entry and operational (conduct) restrictions.[26] Entry restrictions include measures on the percentage of foreign ownership, screening and approval procedures. Conduct restrictions cover various operational restrictions in the form of nationality or citizenship requirements for managers and board members or limitation on the duration of work permits for expatriates. This measure also deals with the input restrictions. For example, it takes into account how much domestic content must is required by the receiving country. Together these measures both affect the entry and variables costs of a firm separately and particularly target the costs of organizing business for FDI. Data covers the period 1991-2005.

3.3 The Basic Model

What determines TFP in services? Based on the previous section an empirical strategy is adopted were both the direct impact of trade and regulation on TFP and TFP growth are explored. Separating

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[22] The ECTR database is also part of the NMR database and holds data on telecoms, electricity, gas, post, rail, air passenger and road transport. An average is constructed to obtain regulatory indexes for transport and communications.

[23] The reason for selecting both digit levels is that sometimes data is only available in 3-digit levels for either TFP or services trade across countries. In order to include as much observations as possible we reconstruct the indexes also at 3-digit.

[24] In effect both these measures of entry barriers and impact measures on operations can be discriminatory or non-discriminatory (see, Table 4.1 in Francois and Hoekman, 2009) which is usually a typology used in the negotiations of markets access in services. However, these four distinctions can be hybrid since even if entry is feasible non-discriminatory regulatory policy can still affect the operating costs of a foreign firm that enters the domestic market and this firm may be affected differently from the domestic firm, i.e. *de facto* discrimination. As a result, the services literature uses the distinction between whether policies have an effect on the entry of a market and/ or the operation of firms (e.g. Francois and Hoekman, 2009; Findley and Warren, 2000a; 2000b; Deardorff and Stern, 2008).

[25] Golub (2009) mentions examples which types of regulations are not included in the index of FDI restrictions such as domestic content requirements, price ceilings, prudential regulation and other barriers to entry. These items largely cover the regulatory obstacles as measured in the index of entry and conduct regulation.

[26] We gratefully acknowledge Stehpen Golub's help in providing his detailed data on FDI regulations and support for explaining how this data is constructed.

first the individual impact of trade on TFP for both the level (*L*) and growth rate (*D*), the following basic equation will be estimated:

$$L.\ln(TFP_{dkt}) = \beta_o + \beta_1 L.\ln(a + 'TRADE_{dkt}) + \delta_d + \delta_k + \delta_t + e_{okt} \qquad (1)$$

$$D.\ln(TFP_{dkt}) = \beta_o + \beta_1 TG_{dkt} + \beta_2 D.\ln('TRADE_{dkt}) + \beta_3 D.\ln('TRADE_{dkt})*TG_{dkt} + \delta_d + \delta_k + \delta_t + e_{okt}$$

where TFP_{dkt} is Total Factor Productivity in country *d* and sector *k* in year *t*. TRADE represents a vector which is composed of the four services trade variables as previously described namely services imports, FDI inward stock and flows, plus FATS inward sales. For the TFP growth specification a convergence gap (TG) is added following standard practise in the growth literature. This variable controls for the fact that a services sector further away from the technology frontier exhibits higher TFP growth as part of its catching up process. Moreover, δ_d, δ_k and δ_t stand for the fixed effects by respectively country, sector and time and e_{okt} is the residual. Note that for the growth equation no small constant is added to zero trade flows since this could substantially bias the results due to many data gaps in the time dimension.

The second part of our analysis is to assess the effect of regulation on the level and growth of TFP and to estimate which one is a robust determinant. Therefore the basic models from equation (1) is augmented and estimated as follows:

$$L.\ln(TFP_{dkt}) = \beta_o + \beta_1 L.\ln(a + 'TRADE_{dkt}) + \beta_1 L.'REG_{dkt} + \delta_d + \delta_k + \delta_t + e_{okt} \qquad (2)$$

$$D.\ln(TFP_{dkt}) = \beta_o + \beta_1 TG_{dkt} + \beta_2 D.\ln('TRADE_{dkt}) + \beta_3 D.'REG_{dkt} + \beta_4 D'X_{dkt}*TG_{dkt} + \delta_d + \delta_k + \delta_t + e_{okt}$$

where REG denotes a vector of the services regulatory variables that includes entry and conduct barriers and restrictions. In the TFP growth specification X stands for both the vector of TRADE or REG which is interacted with the technology gap. This interaction term is positive when services trade or regulation has a larger effect on TFP growth for sectors that are father away from the technology frontier. If negative the coefficients reflect that trade or regulation has a greater effect on TFP growth for services that are closer to the technology frontier (see Inklaar, Timmer and van Ark, 2008).[27] The fixed effects again take account for the unobserved influences that may be correlated with one of the variables or over time.

3.4 Omitted Variable Bias and Endogeneity

Two possible problems arise for the estimation of both equations (1) and (2) that need to be dealt with: omitted variable bias and endogeneity. Generally there are other variables that can be found significant to explain TFP. Two often used variables in literature are the share of high-skilled labour, which would be better able to allow for innovation as opposed to innovation (Aghion, Meghir and Vandenbussche, 2006) and the concentration of ICT-related services in the production process

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[27]   See data sources for further information.

(Stiroh, 2002). The EUKlems database includes measures of both high-skilled labour share and ICT-capital. Both variables are also used in the estimation equation in Inklaar, Timmer and van Ark (2008) to explain TFP growth. However, in our analysis these variables will be left out as a direct regressor in order to avert any influence of endogeneity. The principle reason is that the EUKlems database is calculated on the basis of a growth accounting exercise that in turn includes high-skilled labour and ICT capital. TFP then becomes a variable that is a residual once accounted for these factor inputs. Instead, fixed effect by country and sector should ensure any biased influence as a result of these omitted variables.

A second concern of endogeneity relates to the interaction between TFP and trade. One cannot rule out beforehand the endogeneity between trade and TFP insofar the highly productive sectors themselves act as a vector of attracting more FDI investment and trade. Moreover, there is also substantial evidence that goods firms that are more productive are more likely to become importers (Bernard, Jensen, Redding and Schott, 2007). Moreover, more productive services firms have higher chances to experience foreign ownership or be part of a foreign multinational (Breinlich and Criscuolo, 2009). Given our the panel dataset and the use of fixed effects which rules out any invariant instruments it is hard to find any time-varying instruments that replace the vector of TRADE. Therefore, this TRADE vector together with the REG vector is simply instrumented by its two-year lagged value so that: [28]

$$L.IV_{dkt} \;=\; \beta_o + \beta_1 L'X_{dkt\text{-}2} + \delta_d + \delta_k + \delta_t + e_{okt} \tag{3}$$

$$D.IV_{dkt} \;=\; \beta_o + \beta_1 TG_{dkt} + \beta_2 D'X_{dkt\text{-}2} + \beta_3\, D'X_{dkt\text{-}2}{*}TG_{dkt} + \delta_d + \delta_k + \delta_t + e_{okt}$$

where both instrumented variables (IV_{dkt}) for the level as well as the growth specification are the 'X vectors of both trade and regulation. Since the model now becomes almost fully dynamic we will in a later stage as part of the robustness checks also use a full dynamic panel estimation method (GMM) in order to further account for any possible endogeneity between the variables.

3.5 Cross-sectoral Productivity Effects in Services

Before turning to the panel estimation it's interesting to illustrate the relationship between services TFP on the one hand and overall services trade and non-sector specific (i.e. economy-wide) services regulation on the other. There are several reasons that justify such investigation. First, services are to a large extent used as further inputs for not only goods but even for a larger share of services themselves. [29] This assumes that also for the domestic services sectors aggregate services trade has an impact on TFP in all services sectors. Second, horizontal services liberalization such as the abolishment of universal state-intervention has a direct effect on TFP in each sector. Third, one

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[28]   Schwellnus (2007) states, moreover, that in general the causal link between the PMR measures and trade (exports) may be endogenous because of political economy pressures that push for further lower regulatory barriers as a result of initial export increase. This increase would occur due to technological progress that made services trade possible in the first place. Ultimately, this could also have an effect on TFP. Here such endogeneity could be solved by first having both trade and regulation as independent variables, second by using imports trade rather than exports so that any political economy pressure from domestic sectors which might lower trade has a direct effect on lowering imports and thus lower productivity, and third by also using the simple two-years lag of each regulatory variable.

[29]   For a typical OECD country like France in 2005, on average the manufacturing sector uses 36% services as inputs against an average of 73% for services sectors using OECD input-output tables.

would expect a greater cross-sectoral mobility among the more homogeneous services sectors. For example between insurance and banking or sectoral exchanges of generic management skills that are not be specific to one sector. Hence, international trade and regulation is consequently most likely to be to some extent cross-sectoral affecting TFP across all sectors.[30]

These relationships are illustrated in Figures 3 and 4. The vertical axes in both figures depicts the TFP level and the horizontal axes show the trade and regulatory variables in Figure 3 and 4 respectively. These variables are most commonly used in the services literature, namely the aggregate Product Market Regulation (PMR) and (as part of the PMR) the country-wide Barriers to Trade and Investment (BTI). The fitted values line in Figure 3 shows that for both FDI inward stock and services import there is a positive and strong relationship. In contrast, Figure 4 shows a negative relationship holds between the PMR score and BTI for an economy on one side and TFP on the other. The correlation between TFP and regulation using the PMR index seems less strong than when using BTI. Admittedly, the aggregate PMR indicator is comprised of many sub-variables which can eventually cancel out much variation that exist for each type of barrier.

The next section therefore will provide a more rigorous estimation procedure that will include sector-specific regulatory measures and will deal with the endogeneity issues as described above.

4   Results of the Panel Estimation

4.1   The level of TFP

We first present the trade and regulatory effects on the level of TFP. The results for the panel regressions with the vector of TRADE solely are first reported in Table 2. The table shows that the coefficients on both FDI inward stock and services imports have a significant impact on TFP when taking these variables individually in columns 1 and 2 respectively. In column 3 FATS statistics comes out positive but insignificant whereas the coefficient on FDI inflows in column 4 has an unexpected negative sign which is insignificant. In column 5 the trade variables are taken together which gives somewhat different results. For FDI inward stock the coefficient now becomes negative although this variable is to some extent collinear with FATS sales. Robustness checks show, however, that by dropping FATS sales in the specification will bring FDI inward stock positive and significant at the 5% per cent level.

Table 3 report the results when adding the regulatory variables. They show that all coefficients on the trade variables now become negative and significant. This is particularly the case when adding the aggregate index of FDI restrictions in the estimation. More interestingly, however, are the negative coefficients on all the regulatory variables in almost all specifications. The results suggest that entry barriers rather inhibit productivity for FDI stocks and services imports whereas both conduct regulation and FDI restrictions explain lower TFP between countries for all types of services trade. Surprisingly, the entry of a firm in the domestic market alone does not appear to be the most important determinant for explaining levels of TFP. The results show that conduct regulation appears to be a most robust measure of determining TFP both in coefficients size and significance. This suggests that controlling for international trade in a sector, introducing competition in services alone in order to stimulate their TFP is not enough. Instead, other types of regulatory measures that

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[30]   Note, however, that cross-sectoral mobility is not necessarily the case if there are large up-front investments to be made which is not uncommon for high-skilled labour (i.e. investments made in education and training). Because of these fixed costs, there is an element of being lock-in to a specific sector, which could eventually inhibit cross-sectoral movement (Copeland and Mattoo, 2008).

take place "behind the border" affecting business operations tend to be at least of equal importance to explain higher TFP levels in services.[31]

We also separate the aggregate index of FDI restrictions into two separate measures of entry and conduct restrictions as described in previous section. Since these measures are not directly comparable with the aggregate index we report them in a separate table.[32] The results are reported in Table 4. The coefficients on entry restrictions in FDI are surprisingly insignificant for FDI inward stock in column 1, which is consistent with the weakly significant coefficient on domestic entry barriers. In all other specifications, FDI entry restrictions are significant. FDI conduct restrictions is also negative and significant for FDI instock and flows and FATS. This points out to the importance of the types of regulation that target operational procedures.

The negative coefficient of FDI entry restrictions and positive FDI conduct restrictions in column 2 are likely to be related. As soon as entry for FDI is restrained less services trade is likely to take place which further decreases TFP in the sector. This indicates that there are initial complementarities between services trade and FDI. However, once FDI is entered in the domestic market substitution effects could become more important since FDI facing additional restrictions on their operations is replaced by trade imports. However, the coefficient is insignificant although very significant in column 5.

4.2   TFP Growth

Tables 5 and 6 report the results for the effect of respectively services trade and regulation on services TFP growth. Columns 1-4 of Table 5 show the trade variables, again separately, interacted with the technology gap. In all four cases none of the coefficients on the interaction variables are significant and the R-squared remains relatively low. Some of the interaction terms are negative suggesting that trade matters more as a determinant for TFP growth in sectors that lie closer to the frontier. The fact that the importance of services trade is inversely related with its distance toward the technology frontier is not unexpected: more developed and open economies tend to have a higher share of specialized services sectors and therefore could become more competitive.[33] Such idea is reinforced to the extent that most coefficients of the interaction variables with trade in Table 6 also have a negative sign.

Clearly, the results in Table 6 show that the regulatory variables are better able to explain TFP growth differences between countries. We find strong negative effects of conduct regulation and overall FDI restrictions on TFP growth in the case for FDI inward stocks (column 1) and somewhat for FDI inflows (column 4) when this type of regulation is interacted with the technology gap. Entry regulation appears to play no role in affecting TFP growth.

Interestingly, FDI restrictions and domestic conduct regulation each show they assume opposite key-roles in determining TFP growth. Conduct regulation has a significantly stronger effect in those services that are further away from the technology frontier. FDI restriction on the other hand matter significantly more for services sectors that are closer placed to the frontier. This makes sense since

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[31]   Conduct regulation also appears to be the most robust indicators after other estimations have been performed. Dropping either FDI inward flows, FATS or FDI inward stock give a significant outcome for conduct regulation whereas both entry barriers and restrictions on FDI remain insignificant.

[32]   Some observations are missing and some of the values are weighted before aggregating.

[33]   One of the stylized facts of economic development is that the share of services in GDP and employment rises as per capita income increases. In the lowest-income countries, services generate some 35 percent of GDP. This rises to over 70 percent of national income and employment in OECD countries (Hoekman and Mattoo, 2008). Among other explanations, (e.g. income elasticity of demand for services greater than one or no room for productivity improvements for personal

FDI investment are a source of spill-over effects (e.g. Djankov and Hoekman, 2000 and Javorcik, 2004).[34] Assuming that these spill-over effects are more dependant in sectors that innovate (i.e. closer to the frontier) decreasing FDI restrictions explains higher TFP growth in these sectors. Alternatively, conduct regulations not specific to FDI seem to be a stronger driving force for less-competitive sectors.

In Table 7 we disentangle again entry and conduct restrictions in FDI. The results reinforce the idea that not regulation on entry but on operations is the main factor driving services TFP growth. The interaction terms of conduct regulation with the technology gap become significant in all columns that measure services trade in mode 3 (columns 1, 3 and 4), again with a positive sign. As well, none of the FDI entry restrictions become significant. FDI conduct restrictions have a negative and significant effect on TFP growth through FDI stock and when taking all trade variables together.[35] Overall, the results imply that increased measures of conduct regulation negatively impact TFP growth in services. Entry barriers do not play a significant role in explaining TFP growth in services.

4.3   TFP Growth and High-Skilled

In this section we exploit data on high-skilled labour shares from the EUKlems for each service sector in order to examine how TFP growth is affected by the implementation of regulation in sectors that relatively employ greater shares of skilled labour. Services are on average skill-intensive (Hoekman and Mattoo, 2008). Since high-skilled labour is a critical source of productivity, regulation in services sectors that have experienced a higher growth rate in their skilled labour force could have particularly moderated TFP growth. To examine this hypothesis the regression we estimate takes the following form:

$$D.\ln(TFP_{dkt}) \quad = \quad \beta_o + \beta_1 TG_{dkt} + \beta_2 D.\ln(HHS_{dkt}) + \beta_3 D.\ln('TRADE_{dkt}) + \beta_4 D.'REG_{dkt} + \quad (4)$$
$$\beta_5 D'X_{dkt}*TG_{dkt} + \beta_6 D'REG_{dkt}*D.\ln(HHS_{dkt}) + \delta_d + \delta_k + e_{okt}$$

where HHS denotes the share of high-skilled labour as part of total labour in country d and sector k in year t taken from the EUKlems database.[36] This measure is interacted with the vector containing the regulatory variable in services as described in previous sections. Furthermore, the usual two-years lag is applied on both the regulatory and trade vectors by way of instruments.

Following our discussion on the potential problems of the growth accounting method of the EUKlems database we use a different estimation technique that allows us to correct for the endogeneity in the selection of high-skilled labour input. Specifically, we use a dynamic panel

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services) one reason is that as structural change in the domestic economy takes place more "logistics" services such as coordination and intermediations services are demanded.

[34]   Other empirical studies, however, have found negative effects of the presence of FDI in the host country, see e.g. Haddad and Harrison (1993) and Aitken and Harrison (1999). Note that Djankov and Hoekman (2000) find positive sill-over effects on productivity for goods sectors, but not for services sectors.

[35]   In column 5 we have dropped FDI inflows since including this measure would reduce the number of observations to such extent that no regression analysis could be performed. Since FDI inward stock are more representative as a proxy for trade than inflows (see footnote 20) this latter variable has been dropped.

[36]   In the EUKlems database this indicator is calculated as the amount of hours worked by high-skilled persons engaged as a share of total labour hours.

estimation method (GMM) that treats this measure of high-skilled labour as endogenous.[37] This estimation technique is particularly useful since our model becomes dynamic when applying lags on many variables. As an extra robustness check we treat the vector of trade as pre-determinant so that we correct for any feedback from idiosyncratic shocks at time t to a regressor at time $s > t$, i.e. we allow $E['\text{TRADE}_{dks} \, e_{okt}] \neq 0$ for $s > t$. In other words, suppose that a positive shock to the TFP growth today causes an increase in the growth of any of the four trade variables in later years the GMM estimator will now deal with this endogeneity problem. Moreover, time fixed effects are dropped from equation (4) since the GMM estimator commonly uses fist differences in its implementation.

The results obtained from this procedure are reported in Table 8. Yet again, we see that the interaction terms of conduct regulation with technology gap are very robust in all specifications except when services imports are included in column 2. In column 2, however, entry regulation interacted with the technology gap appears to explain TFP growth somewhat better. No significant effect is found on the interaction terms of both entry barriers and conduct regulation with the high-skilled labour share. Yet, FDI restrictions seem to determine TFP growth to a very significant extent for those services sectors that have experienced higher skilled labour growth. According to data, these sectors include Finance which employs high shares of skilled labour, but also Transport and Telecommunications which in fact employ a relatively lower share of high-skilled labour. Input growth in these two sectors has been on average high since 1990s.

Last, splitting up the FDI restrictions the coefficients on the interaction terms with high-skilled labour growth share give ambiguous results as reported in Table 9. One potential explanation for the weakly significant coefficients on FDI entry restrictions, however, is that equity restrictions provide most of the variation for this indicator.

5   Conclusion

This paper explores services TFP growth effects of services trade and services regulation in each sector specifically. To date no thorough analysis has been undertaken to see whether international services trade or regulation in services is the main determinant of services TFP. Using panel data and undertaking a first attempt to deal with endogeneity, we find that services trade plays a significant role in determining services TFP. This effect is especially significant through FDI inward stock and services imports. However, these TFP effects are inhibited by various types of domestic and FDI regulation. Especially regulation on operational procedures affecting the variable costs structure of the firm as opposed to entry barriers are a robust determinant.

As for TFP growth, services trade does not appear to be a robust factor. Instead, we provide evidence that regulation is the main factor in explaining cross-country differences in TFP growth over time. Again, domestic conduct regulation and FDI conduct restrictions are the most important factors to explain TFP growth. We furthermore find that domestic regulation and FDI restrictions seem to matter at different points in time. Domestic regulation plays a more important role for those sectors that are lying further away from the technology frontier whereas FDI restrictions is more important when a services sector is situated closer to the frontier. This suggests that initial liberalization of services sectors would mainly have an effect on TFP growth through domestic regulation. Over time when a sector becomes more competitive unleashing FDI restrictions seem to be more important in determining TFP growth. Moreover, these FDI restrictions are specifically significant in sectors that have experienced high growth in their skilled labour share.

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[37]   An additional reason for using a dynamic panel estimation is that our dataset contains a small-T (years) and relatively

Our results that mainly conduct regulation within each services sector is a more robust factor in explaining TFP growth than entry barriers is in line with the current literature. Previous works cannot find strong evidence that domestic entry barriers constitute the main factor in explaining TFP growth. However, these studies only take into account entry regulations assuming that once entry is allowed by either the domestic or foreign firm sheer competition effect will create TFP growth. Unlike goods services are regulatory intense and our findings suggest that the competitive component of a service sector revolves to a large extent around market operations after market entry has taken place.

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large-N (countries). The GMM estimator that is used here specifically deals with this issue.

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Tables and Figures

Figure 1: Annual Average Growth Rates of TFP (1990-2005)
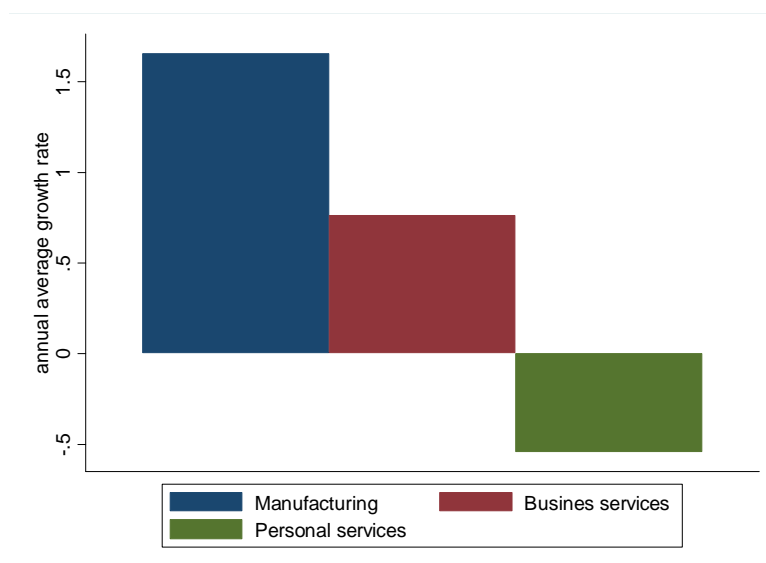
TFP annual average growth rates are calculated over 20 countries as described in Table 1b. Slovenia is excluded in this section. Indexes that show TFP level developments starting in a later year are according to their data availability in the EUKlems database. Countries for time period 1995-2005 include Czech Republic, Hungary, Ireland, Portugal and Slovenia.

Table 1: Annual average TFP growth for 1990-1995.

Country	Manufacturing	Business services	Personal services
Australia	0.390	1.304	-0.374
Austria	2.898	0.056	-0.404
Belgium	0.760	-0.346	-0.565
Denmark	-0.026	0.432	-0.464
Finland	3.232	1.428	-1.406
France	2.297	1.013	-0.178
Germany	1.674	1.034	0.493
Italy	0.172	0.829	-0.386
Japan	-0.029	0.633	-0.190
Korea	4.051	2.123	-0.780
Luxembourg	1.988	0.199	-1.875
Netherlands	1.416	0.971	-0.908
Spain	0.012	-0.643	-0.745
Sweden	3.747	0.569	-0.088
UK	1.172	1.528	-0.535
US	2.727	1.069	-0.270

Source: Author's calculations using EUKlems data.

Figure 2: TFP growth and real output and price growth (1995-2005) for 21 countries
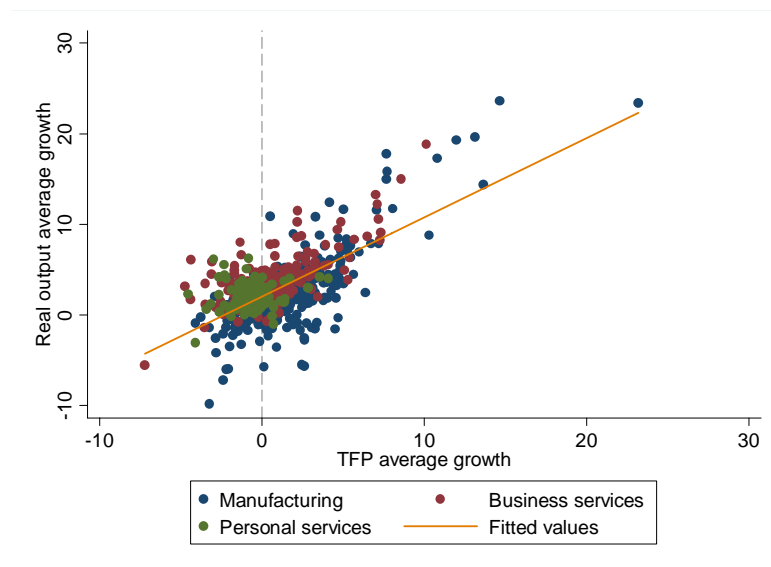
(a) TFP and real output growth
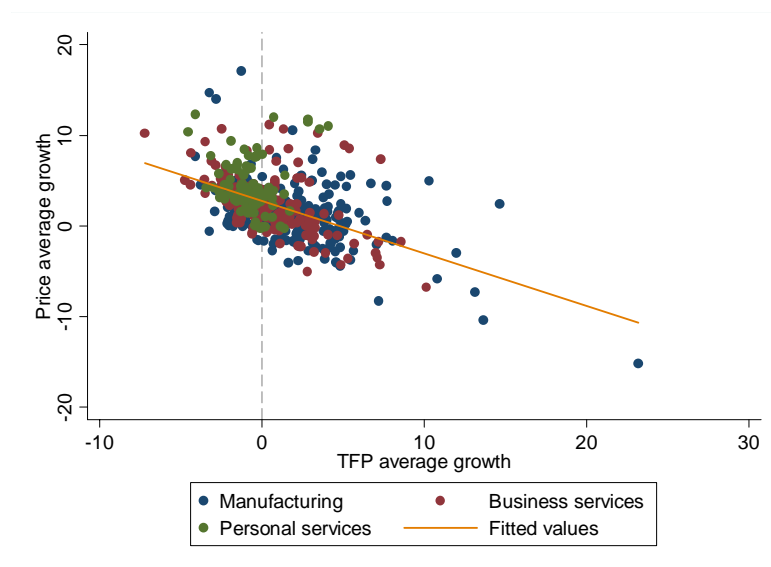
(a) TFP and price growth

Source: Author's calculations with EUKlems data.

Figures 3: Cross-sectoral TFP, FDI inward stock and services imports
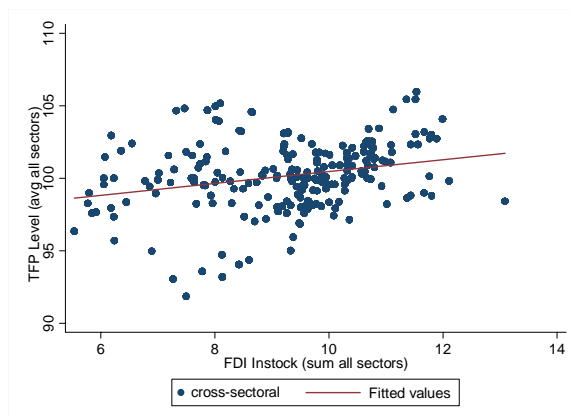
(a) TFP and FDI Inward Stock
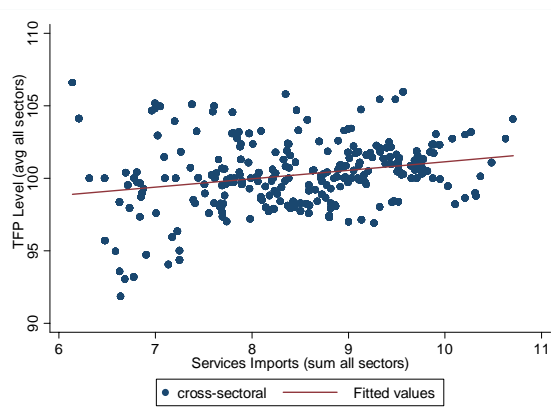
(b) TFP and Services Imports

Figures 4: Cross-sectoral TFP and Economy-wide Regulation
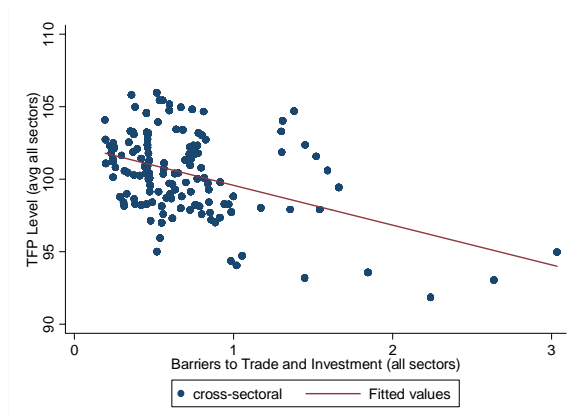
(a) TFP and Barriers to Trade and Inv.
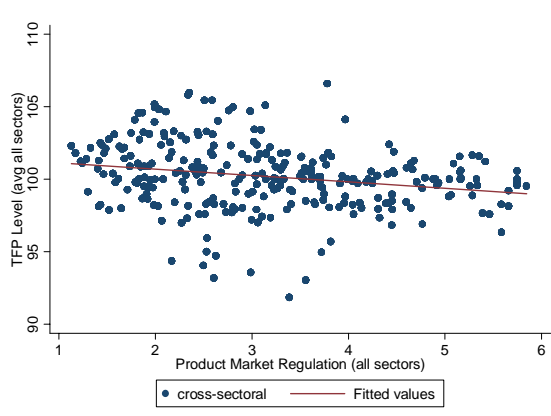
(b) TFP and Product Market Regulation

Source: Author's calculations with EUKlems data.

Table 2:TFP level with Services Trade

	(1) $L.\ln(\text{TFP})$	(2) $L.\ln(\text{TFP})$	(3) $L.\ln(\text{TFP})$	(4) $L.\ln(\text{TFP})$	(5) $L.\ln(\text{TFP})$
$L.\ln(a + \text{FDI inward stock})$	0.00292* (0.00158)				-0.0115** (0.00498)
$L.\ln(a + \text{Services imports})$		0.00703*** (0.00163)			0.0188*** (0.00487)
$L.\ln(a + \text{FATS sales})$			0.000736 (0.00355)		0.0230*** (0.00806)
$L.\ln(a + \text{FDI inflows})$				-0.000581 (0.000994)	0.00195 (0.00310)
Observations	1635	2701	979	1942	286
R-squared	0.385	0.319	0.444	0.370	0.609

Notes: OLS estimation with ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors with country, sector and year fixed effects.

	(1) $L.\ln(\text{TFP})$	(2) $L.\ln(\text{TFP})$	(3) $L.\ln(\text{TFP})$	(4) $L.\ln(\text{TFP})$	(5) $L.\ln(\text{TFP})$
$L.\ln(a + \text{FDI inward stock})$	0.00292* (0.00158)				-0.0115** (0.00498)
$L.\ln(a + \text{Services imports})$		0.00703*** (0.00163)			0.0188*** (0.00487)

Table 3: TFP level with Services Trade and Regulation

	(1) L.ln(TFP)	(2) L.ln(TFP)	(3) L.ln(TFP)	(4) L.ln(TFP)	(5) L.ln(TFP)
L.ln(a + FDI inward stock)	-0.0130***				-0.0215***
	(0.00301)				(0.00626)
L.ln(a + Services imports)		-0.00814**			-0.0910***
		(0.00361)			(0.0283)
L.ln(a + FATS sales)			-0.0118**		-0.0186*
			(0.00503)		(0.0103)
L.ln(a + FDI inflows)				-0.00414***	-0.00652
				(0.00152)	(0.00559)
L.Entry Barriers	-0.0489**	-0.0645***	-0.0509*	-0.0193	-0.0335
	(0.0202)	(0.0220)	(0.0263)	(0.0201)	(0.0500)
L.Conduct Regulation	-0.0749***	-0.114***	-0.121***	-0.0971***	-0.172***
	(0.0290)	(0.0280)	(0.0304)	(0.0245)	(0.0634)
L.FDI Restrictions	-0.0550**	-0.130***	-0.0928**	-0.119***	0.0705
	(0.0217)	(0.0316)	(0.0450)	(0.0234)	(0.0904)
Observations	583	727	514	756	93
R-squared	0.692	0.660	0.584	0.597	0.948

Notes: OLS estimation with ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors with country, sector and year fixed effects.

Table 4: TFP level with Services Trade and Regulation

	(1)	(2)	(3)	(4)	(5)
	L.ln(TFP)	*L*.ln(TFP)	*L*.ln(TFP)	*L*.ln(TFP)	*L*.ln(TFP)
L.ln(*a* + FDI inward stock)	-0.0136***				-0.0210***
	(0.00310)				(0.00551)
L.ln(*a* + Services imports)		-0.0113***			-0.0724***
		(0.00395)			(0.0253)
L.ln(*a* + FATS sales)			-0.0111**		-0.0207**
			(0.00506)		(0.00867)
L.ln(*a* + FDI inflows)				-0.00395**	-0.00664
				(0.00155)	(0.00486)
L.Entry Barriers	-0.0381*	-0.0691***	-0.0413	-0.00874	0.0342
	(0.0213)	(0.0217)	(0.0270)	(0.0212)	(0.0417)
L.Conduct Regulation	-0.104***	-0.107***	-0.128***	-0.109***	-0.0500
	(0.0295)	(0.0281)	(0.0304)	(0.0244)	(0.0664)
L.FDI Entry Restrictions	-0.0321	-0.143***	-0.114**	-0.114***	-0.536***
	(0.0222)	(0.0321)	(0.0445)	(0.0233)	(0.117)
L.FDI Conduct Restrictions	-0.239***	0.107	-0.254*	-0.132*	1.589***
	(0.0791)	(0.143)	(0.137)	(0.0712)	(0.462)
Observations	583	727	514	756	93
R-squared	0.695	0.665	0.588	0.597	0.961

Notes: OLS estimation with ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors with country, sector and year fixed effects.

Table 5: TFP growth with Services Trade

	(1) D.ln(TFP)	(2) D.ln(TFP)	(3) D.ln(TFP)	(4) D.ln(TFP)	(5) D.ln(TFP)
Technology gap (TG)	0.00969**	0.0121***	0.00264	0.00894***	0.0171
	(0.00413)	(0.00303)	(0.00333)	(0.00287)	(0.0131)
D.ln(FDI inward stock)	-0.00255				0.0530
	(0.00638)				(0.0460)
D.ln(FDI inward stock)*TG	0.00288				-0.0501
	(0.00743)				(0.0487)
D.ln(Services imports)		0.00838			0.0131
		(0.00583)			(0.0709)
D.ln(Services imports)*TG		-0.00843			-0.00842
		(0.00559)			(0.0692)
D.ln(FATS sales)			0.00287		-0.0142
			(0.00739)		(0.0120)
D.ln(FATS sales)*TG			-0.00324		0.0180
			(0.00869)		(0.0122)
D.ln(FDI inflows)				-0.000497	-0.00930
				(0.00158)	(0.00784)
D.ln(FDI inflows)*TG				0.000239	0.00697
				(0.00161)	(0.00831)
Observations	1254	2307	654	1365	171
R-squared	0.119	0.142	0.177	0.123	0.326

Notes: OLS estimation with ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors with country, sector and year fixed effects.

Table 6: TFP growth with Services Trade and Regulation

	(1)	(2)	(3)	(4)	(5)
	D.ln(TFP)	D.ln(TFP)	D.ln(TFP)	D.ln(TFP)	D.ln(TFP)
Technology gap	0.00800	0.0136*	-0.00129	0.0136**	0.0451
	(0.00604)	(0.00709)	(0.00552)	(0.00656)	(0.0453)
D.ln(FDI inward stock)	0.00303				0.0217
	(0.00765)				(0.0517)
D.ln(FDI inward stock)*TG	-0.00474				-0.0126
	(0.00907)				(0.0592)
D.ln(Services imports)		0.00341			0.453
		(0.0166)			(0.309)
D.ln(Services imports)*TG		-0.0115			-0.544
		(0.0234)			(0.392)
D.ln(FATS sales)			0.000461		0.0758***
			(0.00605)		(0.0242)
D.ln(FATS sales)*TG			0.00129		-0.0477**
			(0.00599)		(0.0181)
D.ln(FDI inflows)				0.00190	-0.00572
				(0.00252)	(0.0109)
D.ln(FDI inflows)*TG				-0.00233	-0.00454
				(0.00283)	(0.0116)
D.Entry Barriers	-0.00759	-0.0231	0.00901	-0.00254	0.268*
	(0.0246)	(0.0151)	(0.0210)	(0.0169)	(0.138)
D.Entry Barriers*TG	0.0195	0.0223	-0.0164	0.00919	-0.295
	(0.0266)	(0.0142)	(0.0190)	(0.0170)	(0.174)
D.Conduct Regulation	-0.142***	-0.0467	-0.118	-0.106**	-0.392
	(0.0494)	(0.0399)	(0.0772)	(0.0462)	(0.386)
D.Conduct Regulation*TG	0.175***	0.0414	0.130	0.0976*	0.626*
	(0.0564)	(0.0429)	(0.0825)	(0.0524)	(0.362)
D.FDI Restrictions	0.0497*	-0.0206	0.0332	-0.00554	-0.0396
	(0.0286)	(0.0456)	(0.0509)	(0.0335)	(0.120)
D.FDI Restrictions*TG	-0.0744**	-0.0422	-0.0617	-0.0163	0.193
	(0.0314)	(0.0346)	(0.0623)	(0.0336)	(0.238)
Observations	449	609	335	517	54
R-squared	0.286	0.278	0.296	0.275	0.801

Notes: OLS estimation with ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors with country, sector and year fixed effects.

Table 7: TFP growth with Services Trade and Regulation

	(1) D.ln(TFP)	(2) D.ln(TFP)	(3) D.ln(TFP)	(4) D.ln(TFP)	(5) D.ln(TFP)
Technology gap	0.00954	0.0115	0.0138*	0.0105	0.0425
	(0.00917)	(0.00708)	(0.00821)	(0.00765)	(0.0586)
D.ln(FDI inward stock)	0.00490				0.0551**
	(0.00730)				(0.0259)
D.ln(FDI inward stock)*TG	-0.00975				-0.0575*
	(0.00878)				(0.0298)
D.ln(Services imports)		0.00154			-0.246**
		(0.0157)			(0.102)
D.ln(Services imports)*TG		-0.00685			0.258**
		(0.0223)			(0.110)
D.ln(FATS sales)			0.00687		0.0352*
			(0.00707)		(0.0192)
D.ln(FATS sales)*TG			-0.00379		-0.0277
			(0.00739)		(0.0169)
D.ln(FDI inflows)				8.06e-05	
				(0.00291)	
D.ln(FDI inflows)*TG				-0.000981	
				(0.00334)	
D.Entry Barriers	-0.000284	-0.0176	0.0141	0.00124	0.0144
	(0.0263)	(0.0155)	(0.0212)	(0.0156)	(0.0952)
D.Entry Barriers*TG	0.0116	0.0209	-0.0175	0.00730	0.00222
	(0.0304)	(0.0145)	(0.0195)	(0.0157)	(0.103)
D.Conduct Regulation	-0.168***	-0.0308	-0.180**	-0.135***	-0.180
	(0.0482)	(0.0391)	(0.0850)	(0.0455)	(0.265)
D.Conduct Regulation*TG	0.205***	0.0351	0.198**	0.131**	0.199
	(0.0548)	(0.0420)	(0.0947)	(0.0511)	(0.261)
D.FDI Entry Restrictions	0.00278	0.00592	-0.0152	0.0169	-0.0998
	(0.0263)	(0.0245)	(0.0226)	(0.0200)	(0.115)
D.FDI Entry Restrictions*TG	-0.00174	-0.0354	0.0151	-0.0243	0.0595
	(0.0309)	(0.0264)	(0.0257)	(0.0217)	(0.145)
D.FDI Conduct Restrictions	0.182**	-0.0152	-0.0759	0.0370	0.949**
	(0.0913)	(0.0675)	(0.101)	(0.0577)	(0.407)
D.FDI Conduct Restrictions*TG	-0.241**	-0.0352	0.0540	-0.0547	-1.222**
	(0.115)	(0.0709)	(0.117)	(0.0702)	(0.497)
Observations	321	534	247	381	60
R-squared	0.339	0.303	0.338	0.330	0.682

Notes: OLS estimation with ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors with country, sector and year fixed effects.

Table 8: TFP growth with Services Trade, Regulation and Skilled labour share

	(1) $D.\ln(\text{TFP})$	(2) $D.\ln(\text{TFP})$	(3) $D.\ln(\text{TFP})$	(4) $D.\ln(\text{TFP})$
Technology gap (TG)	0.0707**	0.0473*	0.286***	0.146***
	(0.0316)	(0.0278)	(0.0703)	(0.0364)
D.High-skilled labour (HHS)	-0.0215***	-0.0644***	-0.0559***	-0.0116*
	(0.00699)	(0.0194)	(0.0216)	(0.00685)
$D.\ln(\text{FDI inward stock})$	0.0163**			
	(0.00832)			
$D.\ln(\text{FDI inward stock})$*TG	-0.0174*			
	(0.00890)			
$D.\ln(\text{Services imports})$		-0.0106		
		(0.0189)		
$D.\ln(\text{Services imports})$*TG		0.00815		
		(0.0277)		
$D.\ln(\text{FATS sales})$			-0.0132	
			(0.00819)	
$D.\ln(\text{FATS sales})$*TG			0.00963	
			(0.00711)	
$D.\ln(\text{FDI inflows})$				0.00394
				(0.00401)
$D.\ln(\text{FDI inflows})$*TG				-0.00340
				(0.00427)
D.Entry Barriers	-0.0279	-0.0297**	0.0193	0.0201
	(0.0235)	(0.0132)	(0.0198)	(0.0298)
D.Entry Barriers*TG	0.0498*	0.0268**	-0.00433	-0.0258
	(0.0276)	(0.0108)	(0.0178)	(0.0319)
D.Entry Barriers*HHS	-0.0188	0.0210	-0.114	0.0275
	(0.0355)	(0.0479)	(0.104)	(0.0196)
D.Conduct Regulation	-0.125**	-0.00234	-0.211*	-0.141***
	(0.0553)	(0.0486)	(0.114)	(0.0458)
D.Conduct Regulation*TG	0.157***	0.0165	0.261**	0.137**
	(0.0602)	(0.0450)	(0.110)	(0.0580)
D.Conduct Regulation*HHS	0.0677	-0.247	-0.00944	0.0831
	(0.0950)	(0.176)	(0.231)	(0.0859)
D.FDI Restrictions	0.0267	0.00677	-0.132	-0.0130
	(0.0305)	(0.0347)	(0.107)	(0.0396)
D.FDI Restrictions*TG	-0.0428	-0.0417	0.221	0.0269
	(0.0382)	(0.0270)	(0.154)	(0.0359)
D.FDI Restrictions*HHS	-0.101***	-0.169	-0.464***	-0.0320
	(0.0332)	(0.129)	(0.160)	(0.0333)
Observations	364	532	145	257
Number of cntrysctr	59	66	53	67

Notes: GMM estimation with ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors with country and sector and fixed effects.

Table 9: TFP growth with Services Trade, Regulation and skilled labour share

	(1)	(2)	(3)	(4)
	$D.\ln$(TFP)	$D.\ln$(TFP)	$D.\ln$(TFP)	$D.\ln$(TFP)
Technology gap (TG)	0.0491	0.0555**	0.392***	0.115***
	(0.0301)	(0.0235)	(0.0494)	(0.0412)
D.High-skilled labour (HHS)	-0.0290***	-0.0665***	-0.0190	-0.0509***
	(0.0106)	(0.0243)	(0.0241)	(0.0177)
$D.\ln$(FDI inward stock)	0.0159*			
	(0.00873)			
$D.\ln$(FDI inward stock)*TG	-0.0196**			
	(0.00895)			
$D.\ln$(Services imports)		-0.0234*		
		(0.0142)		
$D.\ln$(Services imports)*TG		0.0284		
		(0.0216)		
$D.\ln$(FATS sales)			-0.00766	
			(0.00906)	
$D.\ln$(FATS sales)*TG			0.00779	
			(0.00747)	
$D.\ln$(FDI inflows)				0.00241
				(0.00405)
$D.\ln$(FDI inflows)*TG				-0.00203
				(0.00443)
D.Entry Barriers	-0.0385*	-0.0240**	0.00534	0.00122
	(0.0225)	(0.0114)	(0.0210)	(0.0253)
D.Entry Barriers*TG	0.0623**	0.0237**	0.0112	-0.000712
	(0.0283)	(0.00949)	(0.0187)	(0.0263)
D.Entry Barriers*HHS	-0.00397	-0.00222	-0.0732	0.0252
	(0.0423)	(0.0418)	(0.112)	(0.0307)
D.Conduct Regulation	-0.132**	-0.0114	-0.202**	-0.134***
	(0.0564)	(0.0430)	(0.100)	(0.0440)
D.Conduct Regulation*TG	0.177***	0.0332	0.262***	0.154***
	(0.0591)	(0.0409)	(0.0966)	(0.0541)
D.Conduct Regulation*HHS	0.0602	-0.185	0.185	-0.0367
	(0.108)	(0.176)	(0.190)	(0.0958)
D.FDI Entry Restrictions	0.0387	-0.0264	-0.0199	0.0184
	(0.0276)	(0.0259)	(0.139)	(0.0354)
D.FDI Entry Restrictions*TG	-0.0504	0.0292	-0.00799	-0.0300
	(0.0380)	(0.0285)	(0.124)	(0.0357)
D.FDI Entry Restrictions*HHS	-0.102*	-0.124*	-0.150	-0.0323
	(0.0617)	(0.0720)	(0.160)	(0.0791)
D.FDI Conduct Restrictions	0.0697	0.143	-0.707***	-0.0412
	(0.0861)	(0.158)	(0.124)	(0.104)
D.FDI Conduct Restrictions*TG	-0.129	-0.234	0.819***	0.0759
	(0.111)	(0.167)	(0.123)	(0.107)
D.FDI Conduct Restrictions*HHS	-0.120	0.0950	-0.0272	-0.343**
	(0.0943)	(0.233)	(0.321)	(0.169)
Observations	250	463	97	179
Number of cntrysctr	40	57	38	49

Notes: GMM estimation with ***, ** and * denote significance at the 1%, 5% and 10% levels respectively. Robust standard errors with country and sector and fixed effects.

Data Sources

EUKlems Database

The EUKlems database covers 28 countries of which most of them are OECD countries. Depending on the variable, the data series spans a wide time period from roughly 1970 for mainly Western European countries, Korea and Japan and from the 1990s from non-Western European countries.[38] In this database information is given for totally 107 categories of industries of which 37 categories form head categories on a 2-digit level of which one is a 1-digit level for total industries. The coverage for services counts 45 sectors in which both 3-and 2-digit category levels are included. Within the business services category 12 out of totally 32 represent head categories on a 2-digit level. The personal services category have in total 7 head categories on 2-digit level of which two services sector are practically no data given.[39] No data for 3-digit services sectors are given.

Multi Factor Productivity (EUKlems)

Sectoral TFP as calculated by Timmer, O'Mahony and Ark (2008). This TFP measure is calculated by subtracting the (cost-share weighted) share in hours worked by different types of workers, different types of capital and intermediate inputs from share of gross output at constant prices. Although the EUKlems database shows output-based TFP data on both 3-digit and 2-digit sector level,d ata on 2-digit level is rather scarce. Where TFP data on this level is missing, a weighted TFP is calculated based on nominal output. This TFP data can then be matched with the trade data. Acquiring information on both digits levels will turn out to be convenient as for some countries trade data is only available on a 2-digit level, as shown in the variable table. Data is collected for the time period 1990-2005. The 3-digit sectors include: (a) Transport, Storage and Communication, (b) Finance, Insurance and Real Estate and Business Services, (c) Real Estate, Renting and Business Services. Moreover, depending on the trade variables, not all sector are included as data is not always given.

Technology gap (Inklaar, Timmer and van Ark, 2008)

Calculations are made following the methodology outlined by Inklaar, Timmer and van Ark (2008) based on the TFP data described above. The authors measure technology gap as TFP gaps even though TFP measures also reflect other factors besides technology. The relative MFP levels corrected for price differences between countries are used in this variable. The US is used as a benchmark and therefore represents the technology frontier. Explanations about this variable and additional papers on this subject can be found at http://ggdc.net/databases/levels.htm

FDI Inward Stock / Inward Flows (OECD)

Inward FDI position, industry sector based ISIC3 (and NACE). A direct investment enterprise is defined as an incorporated or unincorporated enterprise in which a foreign investor owns 10 per cent or more of the ordinary shares or voting power of an incorporated enterprise or the equivalent of an unincorporated enterprise. The numerical guideline of ownership of 10 per cent of ordinary shares or voting stock determines the existence of a direct investment relationship. An effective voice in the management, as evidenced by an ownership of at least 10 per cent,

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[38] Exceptions are Ireland and Portugal which show data only from the 1990s for some variables.
[39] These two personal services categories are Private households with employed persons and Extra-territorial organizations and bodies.

implies that the direct investor is able to influence or participate in the management of an enterprise; it does not require absolute control by the foreign investor.

Services Imports (OECD)

OECD Statistics on International Trade in Services: Volume I: Detailed Tables by Service Category. The types of services are presented according to the services classification of the 1993 Fifth edition of the Balance of Payments Manual of the International Monetary Fund (BPM5) and its detailed extension, the Extended Balance of Payments Services (EBOPS) Classification. Data are submitted directly to the OECD by the non-EU OECD member countries and are published without any further changes.

FATS (OECD)

FATS Statistics Sales (turnover) for inward activity of the OECD Inward activity of Multinationals in ISIC Rev 3 (services). No further meta data is given is the OECDStat.

Entry regulation (OECD)

Data is part of PMR and are on discrete basis but are also intrapolated to make them continues. Head categories (sector) are unweighted averages. Real Est. Rent. Business; Real Estate & Business and Renting similar PMRs. They include Licensing, Educational Requirements, Quotas and Economic needs test for Professional services; Registration in commercial register, Licenses or permits needed to engage in commercial activity and Specific regulation of large outlets for Distribution services; and sector specific entry barriers for Transport and Communication services. Slovenia is not included. Head categories of services sector as unweighted averages. Index is rescaled from 0 to 1.

Conduct regulation (OECD)

Data is part of PMR and are on discrete basis but are also intrapolated to make them continuous. Head categories (sector) are unweighted averages. Real Est. Rent. Business; Real Estate & Business and Renting similar PMRs. They include Regulation on prices and fees, Regulation on Advertising and Regulation on forms of business and inter-professional cooperation for Professional services; Operational restrictions (protection of existing firms and regulation concerning opening hours) and Price controls for Distribution; and Public ownership, Market structure, Vertical integration and Price controls for Transport and Communication services. Slovenia not included. Head categories of services sector as unweighted averages. Index is rescaled from 0 to 1.

FDI restrictions (Golub, 2009)

Data is provided by Stephen Golub and explained in Golub (2009). Initially the FDI restrictiveness indicator has also been used for the PMR as sector specific variables as part of Barriers to Trade and Investments. The FDI restriction scoring method include measures on the broad categories, namely (a) foreign ownership (foreign equity allowance), (b) screening and approval procedures and (c) operational restrictions such as national or residential requirements for board of director/ managers, duration of work permits for expatriates and other restrictions. Services industries and their subsectors are weighted by their FDI instead of GDP. However, an average of FDI and trade weights has been employed using OECD data taken from Golub (2003) to mitigate endogeneity issues. Index ranges from 0 to 1.

Annex

Table A1: Variable table

	TFP level (output)	FDI Inflow OECD source	FDI Instock OECD source	Services Import OECD source	FATS OECD source	PMR (Discr. & Cont)	Entry Regulation (Discr. & Cont)	Conduct Regulation (Discr & Cont.)	FDI Restrictions (Discr.& Cont.)
	(1)	(2)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Electr Gas Water	90-05	93-05	93-05	-	95-05	90-05	90-05	90-05	91-05
Construction	90-05	90-05	90-05	90-05	95-05	-	-	-	91-05
Distribution	90-05	90-05	90-05	-	95-05	96-05	96-05	96-05	91-05
Tourism	90-05	90-05	90-05	90-05	95-05	-	-	-	91-05
Transp Stor Com	90-05	90-05	90-05	90-05	95-05	90-05	90-05	90-05	91-05
Transp	90-05	99-05	99-05	90-05	95-05	90-05	90-05	90-05	91-05
Communications	90-05	90-05	90-05	90-05	95-05	90-05	90-05	90-05	91-05
Fin Ins Real Bus	90-05	90-05	90-05	90-05	95-05	-	-	-	91-05
Finance	90-05	90-05	90-05	90-05	95-05	-	-	-	91-05
Real Est. Rent. Bus.	90-05	93-05	93-05	-	95-05	96-05	96-05	96-05	91-05
Real Estate	90-05	93-05	93-05	-	95-05	96-05	96-05	96-05	91-05
Business & Renting	90-05	93-05	93-05	90-05	95-05	96-05	96-05	96-05	91-05
Com Soc Perso	90-05	90-05	90-05	90-05	95-05	-	-	-	-
Publ Adm	90-05	-	-	90-05	-	-	-	-	-
Education	90-05	-	-	90-05	-	-	-	-	-
Health	90-05	-	-	90-05	-	-	-	-	-
Other Personal serv.	90-05	-	-	-	95-05	-	-	-	-
No of countries*	21	21	21	21	21	20	20	20	20
Variable specifics	Index	Current	Current l	Current	Current	Index	Index	Index	Index

(1) Data available from 1980 onwards for most countries, except CZ, PRT, SVN IRL, HUN from 1995; SWE from 1993; LUX from 1992. Head categories of services sector as weighted averages by their nominal output. Source: EUKlems

(2) Many zero trade flows in early 1990s but from 1993 better for Electr. Gas Water; Toerism; Real Est. Rent. Business; Real Estate; Poor data for Transport. Actual data continues to 2006/2007.

(3) Many zero trade flows in early 1990s but from 1993 better for Communications. Public Adm. And, Health and Education idem data. Actual data continues to 2006/2007.

(4) Only from 1995 onwards available. Quite some countries missing in data.

(5) PMRs are on discrete basis but are also intrapolated to make them continues. Head categories (sector) are unweighted averages. Real Est. Rent. Business; Real Estate & Business and Renting similar PMRs. Slovenia not included. Head categories of services sector as unweighted averages.

(6) Entry regulation are part of PMR and are on discrete basis but are also interpolated to make them continues. Head categories (sector) are unweighted averages. Real Est. Rent. Business; Real Estate & Business and Renting similar PMRs. They include Licensing, Educational Requirements, Quotas and Economic needs test for Professional services; Registration in commercial register, Licenses or permits needed to engage in commercial activity and Specific regulation of large outlets for Distribution services; and sector

specific entry barriers for Transport and Communication services. Slovenia excluded. Head categories of services sector as unweighted averages.

(7) Conduct regulation are part of PMR and are on discrete basis but are also interpolated to make them continues. Head categories (sector) are unweighted averages. Real Est. Rent. Business; Real Estate & Business and Renting similar PMRs. They include Regulation on prices and fees, Regulation on Advertising and Regulation on forms of business and interprofessional cooperation for Professional services; Operational restrictions (protection of existing firms and regulation concerning opening hours) and Price controls for Distribution; and Public ownership, Market structure, Vertical integration and Price controls for Transport and Communication services. Slovenia not included. Head categories of services sector as unweighted averages.

(8) Received data from Stephen Golub and also used for UNCTAD and OECD studies. PMRs are partly based on this information. FDI regulation index is sector specific and are available from 1981 onwards! Korea, Czech Republic and Hungary only time-series from 1996 onwards. Head categories of services sector as unweighted averages. From this data are able to separate and reconstruct two variables that summarize both entry and operational (conduct) restrictions. Entry restrictions include measures on the percentage of foreign ownership, screening and approval procedures. Conduct restrictions cover various operational restrictions in the form of nationality or citizenship requirements for managers and board members or limitation on the duration of work permits for expatriates. This measure of conduct restrictions also deals with the input restrictions.

* Countries for which data is researched. Trade data too dispersed to indicate the number of countries for which we have good data.

Table A2: Country Table

ISO-3 code	Country
AUS	Australia
AUT	Austria
BEL	Belgium
CZE	Czech Republic
DEU	Germany
DNK	Denmark
ESP	Spain
FIN	Finland
FRA	France
DEU	Germany
HUN	Hungary
IRL	Ireland
ITA	Italy
JPN	Japan
KOR	Korea
LUX	Luxembourg
NLD	Netherlands
PRT	Portugal
SVN	Slovenia
SWE	Sweden
GBR	United Kingdom
USA	United States

Table A3: Summary Statistics in growth rates (*D*ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
TFP (output-based)	5083	.0007143	.0256652	-.2090377	.1829378
Technology gap	4930	.9450209	.2849236	.3044278	3.871316
High-skilled labour share	5015	.0282278	.0878922	-.7425235	1.12815
ICT-capital share	5049	.0132097	.2604589	-4.337976	4.067055
FDI inward stock	1723	.1472768	.4967	-5.889042	6.183538
Services imports	3016	.0835928	.3885326	-3.970282	4.842437
FATS sales	910	.1419413	.4636052	-4.691095	3.123531
FDI inward flows	1759	.1820892	1.41939	-5.779026	8.184199
Entry barriers	1791	-.0672223	.1958363	-2.282382	.3626719
Conduct regulation	1876	-.0387651	.0772732	-.7884574	.438255
FDI restrictions	2940	-.0551982	.1057739	-1.882731	1.122143

Table A4: Correlation Matrix of the Trade Variables

Variable	*D*.ln (FDI inward stock)	*D*.ln (Services imports)	*D*.ln (FATS sales)	*D*.ln (FDI inward flows)
D.ln(FDI inward stock)	1.0000			
D.ln(Services imports)	0.1277	1.0000		
D.ln(FATS sales)	0.0429	0.0190	1.0000	
D.ln(FDI inward flows)	0.4159	0.1039	-0.0711	1.0000

Table A5: Correlation Matrix of the Regulatory Variables

Variable	*D*.Entry Barriers	*D*.Conduct Regulation	*D*.FDI Restrictions
D.Entry barriers	1.0000		
D.Conduct regulation	0.1398	1.0000	
D.FDI restrictions	0.0846	0.0985	1.0000