Computable General Equilibrium Modeling of Market Access in Services

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Abstract

We examine how the applied multisector computable general equilibrium (CGE) literature has moved into quantification of the impacts of greater market access for services. This includes discussion of multisector linkages to the service sector, as well both measuring barriers to trade and investment (generally with a mix of firm surveys, price comparisons and econometrics), and how changes in these barriers, however measured, have been implemented in the CGE literature. Three challenges are highlighted: (i) identification of how trade in services takes place and how market access is therefore affected by policy; (ii) to find data sufficiently robust for modeling purposes; and (iii) linked to the data problem, quantify the barriers to be examined. Significant progress has been made in modeling foreign direct investment and linking this to productivity, which turns out to be important. We also provide an example of modeling productivity linkages to openness and domestic regulation, with an applied CGE model of Italy. This illustrates cross-sector linkages and the integration of economic data and policy measures to define service sector experiments. Priorities for future research include better modeling of market structure, the linkages between sectors and the complementarities between different modes of supplying services.

Keywords

Trade in services, non–tariff measures, non–tariff barriers, regulation, FDI, productivity, liberalization, CGE

JEL classification codes

F10

25.1 INTRODUCTION

Services play an increasingly important role in world trade. According to the World Trade Organization (WTO), the gl bal value of cross–border services exports in 2007 was $3 trillion or about 20% of world trade in goods and services. As services are less tradable than goods, this number significantly understates the importance of services in world trade. In practice, much services trade is indirect, in that services are embodied in traded goods or are sold to foreign consumers through direct investment in affiliates. If account is taken of sales of services by foreign affiliates of multinational firms, then the value of

trade in services rises substantially. Data for 15 Organization for Economic Cooperation and Development (OECD) countries puts the value of such sales at some $1.5 trillion in 2007 (WTO, 2009). If account is taken of the direct and indirect value-added content, i.e. if trade is measured in terms of the value that is added by processing of imported components into final products for export as opposed to measuring trade flows on the basis of the gross value of goods crossing the border, the share of services in world trade rises to almost 50% (Escaith, 2008; Francois *et al.*, 2012a).

While the expanding economic importance of services has not gone unnoticed, services have been downplayed in the economic growth and development literature, and have only recently been highlighted in the multisector computable general equilibrium (CGE) literature. The trigger for greater attention was the emergence of services on the international policy agenda in the 1980s, in particular the effort that was launched in the Uruguay Round to negotiate multilateral rules on policies affecting trade and investment in services. One result was to mobilize the first analytical contributions to the trade literature (e.g. Deardorff, 1985). This initial effort suggested that in contrast to the presumption that services were mostly of export interest to high-income countries, many economies had a potential interest in liberalizing trade in services. Thus, for example, many of the poorest developing countries have a revealed comparative advantage in services (Hoekman, 1990).[1] This realization helped to overcome some of the early resistance by developing countries to launching negotiations on trade in services and the creation of the WTO General Agreement on Trade in Services (GATS) in 1994. Building on the early analysis inspired by the Uruguay Round, there is now a growing CGE literature on market access in services.[2]

For services, market access can be difficult to define. In practice, it is often hard to judge just how open a particular nation is to foreign participation because explicit (discriminary) barriers will be complemented by domestic regulation, standards and business practices. For this reason, improved market access — as market opening is known in WTO jargon — has tended to be qualitative as opposed to quantitative (e.g. an X percent reduction in a tax-equivalent). In the case of trade in goods the focus of negotiators is on tariffs and non-tariff barriers (quotas, and so on). For analysts, these are relatively straightforward to model, as tariffs can be incorporated directly into models and non-tariff barriers can be converted into tariff equivalents. In the case of services there is much less scope for negotiators to target numeric measures of policy *per se* (e.g. the analogue of a 10% reduction in tariffs). The focus of policy makers has instead been on qualitative commitments regarding specific policies that affect the cross-border

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[1] The revealed comparative index is a measure of relative specialization, defined as the share in total exports of a country of a given product divided by the same ratio for the world as a whole. If this measure is greater than one a country is said to have a revealed comparative advantage in the product. The concept was first defined and used in Balassa (1965).

[2] See WTO (1998) for a survey of the early literature in this area.

movement of consumers and providers of services, or the establishment of foreign providers in a market, and to agree to disciplines on the use of measures that explicitly discriminate against foreign suppliers of services.

There is an inconsistency between the basic or balance of payments definition of trade, and the legal definition of trade enshrined in the WTO's GATS. Under the GATS, four "modes of supply" are defined through which trade can occur. These include foreign direct investment (FDI) and temporary cross-border movement of suppliers. As a result there is a tension between how trade in services has come to be defined in policy circles, and how trade is defined in the national accounts and balance of payments, which does not consider movement of factors of production as international trade *per se*.[3]

In this chapter, we examine how the recent multicountry CGE literature has moved from goods trade into quantification of market access in services. This includes both a discussion of measuring barriers to trade and investment (generally with a mix of firm surveys, price comparisons and econometrics), and a discussion of how changes in these barriers, however measured, have been implemented in the CGE literature.

Until the Uruguay Round, and reflecting the focus of the policy community, the CGE literature mostly focused on goods trade, with services treated as an explicit non-tradable sector. As models have been modified since the mid-1990s to reflect services trade as well as goods trade, three challenges have emerged. (i) Identification, in an analytical sense, of how trade in services takes place and how market access is therefore affected by policy. (ii) To find data on services trade and FDI that is sufficiently robust for modeling purposes. (iii) Linked to the data problem, quantifying the barriers to be examined. We provide an overview of each of these in turn, before turning to the applied policy literature itself. In Section 25.2 we cover data issues, including challenges linked to quantifying basic trade and investment relationships. In section 25.3 we focus on how services fit into economy-wide patterns of production and trade, and highlight features we believe deserve serious attention when modeling market access in a CGE framework. In Section 25.4 we focus on implementation strategies. Building on the discussion in Sections 25.2 and 25.3, we stress both policy benchmarking, and methods used to specify benchmark economic structure and policy impact in service sectors. We then turn to the applied CGE literature more generally with respect to services. Section 25.5 surveys the early contributions as well as recent advances in incorporating FDI and productivity effects of liberalization. In Section 25.6 we discuss issues raised by the heterogeneity of services sectors. In Section 25.7 we provide an example of how to model productivity gains linked to domestic regulatory and market access reforms in Italy. We discuss

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[3] See Stern and Hoekman (1987), Francois (1990), and Francois and Hoekman (2010) for further discussion. In practice, market access negotiations in services involve a mix of rules on FDI movement of persons and cross-border commerce, and thus analysis and models must consider these various modes of supply.

problems and priorities for future research in Section 25.8. This is followed by closing remarks in Section 25.9.

25.2 DEFINITIONAL AND DATA ISSUES

As already mentioned, in the WTO, trade in services is defined broadly to include transactions that involve the movement of factors of production. Specifically, four so-called modes of supply are defined in the GATS. The first of these, mode 1 in GATS-speak is cross-border supply and applies when service suppliers resident in one country provide services in another country without either the supplier or the buyer/consumer moving to the physical location of the other. An example would be call center services from India to a consumer located in Canada. Mode 2, consumption abroad, refers to a consumer resident in one country moving to the location of the supplier(s) to consume a service. Examples include international tourism or a patient going to another country to obtain medical services. Mode 3, commercial presence, refers to legal persons (firms) moving to the location of consumers on a long-term basis to sell services locally through the establishment of a foreign affiliate or branch. Note that what is measured as mode 3 trade are the sales of the services by the foreign-owned entities, generally termed foreign affiliate trade in services, and not the value of the associated foreign direct investment flow or stock. The fourth mode of supply, mode 4 or presence of natural persons, refers to a process through which individual service suppliers temporarily move to the country of the consumer or client to provide the service. An example would be management consulting services provided by an employee of a firm based in the UK to a client in Russia. Although technology is making mode 1 increasingly feasible, for many services the need for provider and client or consumer to be in the same place (the proximity burden) remains so strong that delivery must be local, so that foreign ownership (establishment) or temporary movement of provider or consumer is required (modes 2, 3 and 4).

The reason why trade in services is defined to span these four modes reflects the characteristics of services. Most services are intangible and they are often difficult to store. As a result, they are inherently more difficult to trade than tangible goods. Many services can be exchanged only if a provider and consumer or client are in the same place at the same time, which will imply that for trade to occur use will need to be made of modes 2, 3 and 4. An implication for modeling and analysis is that ideally account needs to be taken of all four modes, the factors that affect the costs of using alternative modes and the degree to which the modes are complements or substitutes.

Services trade data are available from a number of sources. The OECD, Eurostat and the UN all provide data in some form on bilateral services trade flows (both imports and exports) by partner for up to 24 sectors and subsectors. The most comprehensive coverage of reporting countries among the three sources is the UN, which at present

count provides data on roughly 190 countries. Eurostat and OECD provide data for a more limited number of reporters, although with more sector detail than the UN. Eurostat covers 27 EU members plus Croatia, Iceland, Japan, Norway, Turkey, Switzerland and the US, while the OECD covers 28 countries (all the OECD members apart from Chile, Iceland, Israel, Slovenia, and Switzerland). Time coverage is the deepest with Eurostat, which reports data starting from 1995. International Monetary Fund (IMF) data cover almost as many countries as the UN, and for a longer time span, but only for trade with the world.[4]

The construction of datasets for both econometrics and CGE work has required the reconciliation and merging of these data in some form. For econometrics, the main issue is reconciling multiple sources and mirroring is often used to deepen coverage. This means that where country x reports trade with country y, this can be used as a replacement where country y does not itself report its trade with country x. Reconciled bilateral datacubes, expanded to include countries that do not report services trade, are available on this basis.[5]

While mirroring reduces the extent of missing data in the bilateral datacube, for CGE modeling this is not enough. This is because, to balance trade data, we need to somehow allocate missing destinations if we are to reconcile bilateral data with total values of trade with world (e.g. based on data from the IMF). On top of this, official statistics can be inconsistent, in that services data can vary widely depending on the reporting countries. In the case of international shipping and transport, reported data may be inconsistent with flows implied by the c.i.f. (cost, insurance and freight) − f.o.b. (free on board) margins for goods. The most comprehensive attempt to confront these challenges in the context of balancing global and bilateral service flows has been through the GTAP (Global Trade Analysis Project) project. The efforts to reconcile services data within the project are well documented and reflect rather creative approaches, based on entropy methods, to flesh out the pattern of trade enough to allow construction of a global dataset for modeling cross-border trade in services (see MacDougall and Hagemejer, 2005; as well as Van Leeuwen and Lejour, 2006). Indeed, for the transport and shipping logistics sector, reconciliation of trade data in services is explicitly linked to the parallel reconciliation of data on trade in goods, as services play a critical role in bridging the gap between reported export flows for goods in one country's national accounts data and reported import flows in another country's data (Gelhar, 1996).

While data on cross-border services trade have a reputation for being crude, they are easy to work with and much more complete in comparison with data on FDI stocks and flows in services. FDI data are plagued by limited coverage, as well as by confidentiality constraints that imply that even if available they cannot legally be reported. As discussed

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[4] See Francois and Pindyuk (2010).
[5] Again, see Francois and Pindyuk (2010).

below, FDI data compilation efforts have sometimes been linked to specific modeling projects, like FTAP (Hanslow *et al.*, 2000), the Michigan model (Brown and Stern, 2001) and the Worldscan model (Lejour *et al.*, 2008). As an alternative, the French research institute CEPII has endeavored to follow the entropy and reverse gravity methods pioneered for merchandise trade flows to map out a picture of the geographic pattern of FDI refined enough for CGE modeling (Boumellassa *et al.*, 2007). However, such estimates reflect potential FDI (based on what we observe, we guess at what we do not know), and so do not necessarily reflect actual stocks and flows. On top of these concerns with FDI stock and flow data, to actually model establishment trade in services (mode 3), ideally we need foreign affiliate trade statistics (FATS) — data on the value of sales of services by foreign affiliates — as well as value added and employment. As things stand, data on stocks of FDI are often used as a proxy for this more comprehensive, but largely unavailable set of FATS data requirements.

25.3 CONCEPTUAL ISSUES

What is different about trade in services compared with trade in goods?[6] Services are very heterogeneous and span a wide range of economic activities. Conceptually, this diversity masks a fundamental economic function that many services perform: they are inputs into the transaction side of production. One dimension of this "input function" is that services facilitate transactions through space (transport, telecommunications) or time (financial services) (Melvin, 1989). This transaction aspect is additional to the role of services as inputs in production. Services are frequently direct inputs into economic activities that determine the productivity of the "fundamental" factors of production — labor and capital — and that generate knowledge, goods and other services. Education, R&D and health services are examples of inputs into the production of human capital. In this section, we focus conceptually on channels or mechanisms by which services may be important in an economy-wide context and on the mechanics of international services trade. Section 25.3.1 builds on this discussion when mapping from the issues spelled out here to discuss practical implementation in numerical models.

25.3.1 Downstream linkages and direct cost channels

For applied general equilibrium modeling, the relevance of a focus on services largely hinges on the strength of economy-wide linkages. To illustrate the strength of such linkages, here we discuss recent evidence, focusing on how value-added structures and services linkages to trade have evolved over time. Thanks to repeated updating of the

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[6] What follows draws in part on Francois and Hoekman (2010) and Francois *et al.* (2012a).

GTAP dataset, we have data for both cross–border linkages in recent years and how these have changed since the early 1990s.

Table 25.1 provides a broad overview of services exports (excluding transport and distribution) on a gross and value added basis for Brazil, China, Korea and the US (Francois *et al.*, 2012a). There are three sets of values in Table 25.1. The first, "Gross," refers to exports by sector from standard balance of payments statistics. The second, "Direct VA," refers to the direct value added contained in exports. These values reflect an adjustment to gross export values to include only the value of primary factors employed directly within a given sector in production for exports (or domestic absorption). The last set of values, "Total VA," reflect adjustments to gross export values to include both direct value added and also value added in a particular sector exported indirectly through downstream linkages. This includes, for example, business services value added embodied in the production of steel for export.

To generate these values, we begin by denoting a representation of intermediate and final demands as:

$$\mathbf{Y} = \mathbf{Z} - \mathbf{AZ}, \tag{25.1}$$

where $\mathbf{Y}$ denotes a final demand vector, $\mathbf{Z}$ denotes a gross output vector and $\mathbf{A}$ denotes a matrix of intermediate use coefficients. Equation (25.1) therefore defines final output with respect to intermediate input requirements. With some manipulation we arrive at the Leontief inverse matrix, also known as the multiplier matrix $\mathbf{M}$:

$$\mathbf{Z} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{Y} = \mathbf{MY}. \tag{25.2}$$

Table 25.1 Commercial services (% share of total exports; excluding trade and transport)

	1992	1995	1997	2001	2004	2007
Gross						
Brazil	0.9	1.2	7.6	9.2	6.6	4.9
China	12.8	3.9	1.8	2.1	3.1	1.8
Korea	3.7	6.0	7.3	6.0	4.6	3.7
US	12.9	14.8	15.1	17.8	18.4	15.9
Direct VA						
Brazil	2.1	2.5	15.1	18.3	13.7	10.1
China	24.5	7.6	2.7	3.3	6.5	3.9
Korea	6.5	11.0	13.5	12.3	9.6	8.0
US	18.7	19.0	21.7	24.9	27.0	23.9
Total VA						
Brazil	21.0	20.2	26.2	30.8	29.8	25.8
China	19.8	14.9	8.2	9.7	15.2	13.3
Korea	17.1	21.9	25.0	26.9	24.5	22.4
US	26.1	24.3	28.5	30.1	31.4	29.1

Source: Francois *et al.* (2012).

The multiplier matrix $\mathbf{M}$ measures the inputs contained in a unit of final output. In particular, if we assign the sector indexes i, j to the $\mathbf{A}$ and $\mathbf{M}$ matrices, then a representative element of the $\mathbf{M}$ matrix M_{ij} gives the direct and indirect inputs (and thus the sector i receipts) linked to each unit (e.g. each dollar) of sector j receipts in the data.[7] This implies real production activities measured by value of output. For our purposes, it provides a means to trace, through these income flows, the flow of gross activity and value added from intermediate to final goods and services, ostensibly across borders as well as sectors. As linkages will vary by industry, each industry will be characterized by different multipliers. To focus on value added, we note first that in terms of gross output values $\mathbf{Z}$, some share of this involves value added within each sector. We define $\hat{\mathbf{B}}$ as the diagonal matrix indexed over i, j with diagonal elements equal to the value added shares of output $\mathbf{Z}$. We then use $\mathbf{M}$ to provide a breakdown of the flow of value added across activities in the form of the matrix $\mathbf{V}$:

$$\mathbf{V} = \hat{\mathbf{B}}\mathbf{M}. \tag{25.3}$$

Similar to the Leontief inverse matrix itself, the $\mathbf{V}$ matrix identifies the inputs of value added in each sector related to a unit of final demand. If we multiply $\mathbf{V}$ by the diagonal matrix $\hat{\mathbf{Y}}$ whose non-zero elements are the vector of final outputs, the matrix yields a breakdown of economy-wide value added (the primary component of GNP on a source basis). Similarly, if we multiply $\mathbf{V}$ by the diagonal matrix $\hat{\mathbf{X}}$ whose non-zero elements are the national export vector, we can recover the value added content of exports $\mathbf{X}$ (both direct and indirect):

$$\mathbf{G} = \mathbf{V}\hat{\mathbf{Y}} \tag{25.4}$$

$$\mathbf{H} = \mathbf{V}\hat{\mathbf{X}}. \tag{25.5}$$

The $\mathbf{G}$ matrix and the $\mathbf{H}$ matrix give us the set of linkages, both direct and indirect, between value added across sectors. We provide an example for Italy in Tables 25.2 and 25.3. These are based on GTAP data, aggregated to 10 sectors as indicated. Starting with Table 25.2, we can see that 41.76% of value added was located in various commercial or market service activities (e.g., financial, professional, transport and ICT services). This follows from reading the bottom row of column S9, which provides the value added in this sector, broken down into the various sectors where these activities fed, ultimately, into final demand. At the same time, much of this actually served as intermediate inputs, so that in terms of final demand for commercial services, this accounted for 33.2% of value added (the last column in Table 25.2). Basically, on a cost basis, almost 10% of value added of the economy as a whole involves commercial services used as intermediate

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[7] In multiplier analysis with fixed input coefficients, these values also represent fixed unit input requirements in value terms, although of course in CGE models one can allow for these coefficients to be endogenous.

Table 25.2 Value-added content of final demand $\mathbf{G}'$, Italy (% share in 2007)

	Supply sectors										
	Demand sectors										Total
	S1 Primary production	S2 Processed foods	S3 Textiles, clothing	S4 Chemicals, petrochems	S5 Autos	S6 Other machinery	S7 Other manufacturing	S8 Utilities, construction	S9 Market services	S10 Public services	
S1 Primary production	0.80	0.03	0.00	0.02	0.00	0.01	0.03	0.03	0.10	0.01	1.02
S2 Processed foods	0.62	2.04	0.01	0.11	0.00	0.06	0.24	0.16	1.10	0.06	4.41
S3 Textiles, clothing	0.11	0.04	1.88	0.10	0.00	0.05	0.16	0.12	0.87	0.04	3.39
S4 Chemicals, petrochems	0.07	0.03	0.02	1.13	0.00	0.05	0.16	0.16	0.52	0.03	2.17
S5 Autos	0.03	0.02	0.02	0.09	0.65	0.15	0.43	0.09	0.64	0.03	2.16
S6 Other machinery	0.12	0.08	0.04	0.27	0.02	5.05	1.39	0.34	2.69	0.13	10.13
S7 Other manufacturing	0.17	0.10	0.06	0.22	0.01	0.15	4.28	0.36	1.85	0.10	7.29
S8 Utilities, construction	0.16	0.07	0.03	0.29	0.01	0.28	1.28	7.13	2.59	0.19	12.02
S9 Market services	0.46	0.51	0.12	0.73	0.04	0.49	1.17	0.92	28.34	0.41	33.21
S10 Public services	0.10	0.11	0.04	0.23	0.01	0.28	0.42	0.42	3.05	19.54	24.20
Total	2.66	3.03	2.23	3.20	0.74	6.56	9.56	9.72	41.76	20.55	100.00

Source: Own calculations, using GTAP8 data.

inputs by other sectors (the difference between the column and row totals for S9). If we focus on other machinery, in terms of sales for final consumption (again, the last column), roughly 10% of total value added goes into output in this sector. However, only 6.56% of economy-wide value added (or about two-thirds of the total) involves value added in the sector itself. The rest involves inputs from other sectors (again, including market or commercial services, which account for roughly 26.5% of total value-added costs in the other machinery sector).

We next turn to the export structure of Italy on a value added basis. From Table 25.3, market services account for 37.2% of Italy's exports, in terms of the activity content of trade (last row of S9). What we mean by this is that for every €100 of value added contained in exports in 2007, €37.2 originated in the market services sector. However, if we focus on the value added contained in exports on a sector basis (e.g. how much value added was embodied in steel exports), we see that manufacturing is where Italy's exports are concentrated. For example, motor vehicles and machinery account for 28.3% (last columns of rows S5 and S6). Like the results for total final demand in Table 25.2, in terms of exports, 25.5% of total value-added costs for other machinery exports follow from inputs of market services (column S9 and column total for row S6). In terms of market access, there is a dual message here. Italy exports a substantial amount of services through the manufacturing sector. As such, the machinery sector has an interest in increased competitiveness and efficiency in the upstream services sectors. At the same time, the service sector clearly has an interest in improved market access for machinery, as this is an indirect channel for export. We return to these issues in Section 25.7.

Returning to Table 25.1, note that values are influenced by net export positions. For example, the US runs a net trade surplus in services. As such, while the share of services in total exports on a value-added basis is roughly 30%, most of this is because of direct exports rather than linkages to (and exports contained in) manufacturing. Thus, 23.9% of value added in exports is in services and follows from direct services exports, while just 5.2% is linked to indirect exports and downstream linkages. In contrast, for both Korea and Brazil, although commercial services are a relatively low share of exports on a gross value or direct value-added basis, they are clearly a major factor in the total cost structure of industry. In both cases, services account for roughly one-quarter of the activity content of exports on a value-added basis. For Korea, commercial services accounted for only 3.7% of Korean exports on a gross value basis and 8% on a direct value-added basis, but for 22.4% of all value added contained in exports when embodied exports are included. China proves a notable example as well. While China has opened up and become a dominant exporter of manufactured goods (especially machinery), the contribution of services to total export value added has actually decreased. Indeed, there is an interesting dynamic to China's service intensity. As China experienced a dramatic increase in exports of manufactured goods, the initial stages used for production saw a drop in total domestic value added in exports, with a rising share of manufactured

Table 25.3 Value-added content of exports $\mathbf{H}'$, Italy (% share in 2007)

	Supply sectors										Total
	Demand sectors										
	S1 Primary production	S2 Processed foods	S3 Textiles, clothing	S4 Chemicals, petrochems	S5 Autos	S6 Other machinery	S7 Other manufacturing	S8 Utilities, construction	S9 Market services	S10 Public services	
S1 Primary production	10.56	0.18	0.02	0.23	0.01	0.12	0.23	0.28	1.79	0.09	13.51
S2 Processed foods	0.91	1.94	0.01	0.08	0.00	0.03	0.16	0.12	1.03	0.06	4.35
S3 Textiles, clothing	0.26	0.02	1.92	0.12	0.00	0.03	0.12	0.12	0.86	0.05	3.50
S4 Chemicals, petrochems	1.79	0.09	0.04	5.35	0.01	0.11	0.40	0.56	2.68	0.19	11.23
S5 Autos	0.15	0.03	0.03	0.20	2.92	0.29	0.67	0.18	1.82	0.13	6.41
S6 Other machinery	0.51	0.09	0.06	0.50	0.05	12.04	2.07	0.59	5.59	0.42	21.92
S7 Other manufacturing	0.90	0.09	0.07	0.39	0.02	0.20	8.48	0.68	3.32	0.19	14.33
S8 Utilities, construction	0.05	0.00	0.00	0.02	0.00	0.02	0.11	0.71	0.24	0.01	1.18
S9 Market services	0.36	0.18	0.03	0.40	0.04	0.17	0.44	0.51	19.61	0.29	22.03
S10 Public services	0.02	0.01	0.00	0.01	0.00	0.01	0.02	0.04	0.20	1.23	1.54
Total	15.52	2.62	2.17	7.30	3.07	13.04	12.69	3.80	37.13	2.66	100.00

Source: Own calculations, using GTAP8 data.

goods. However, as China has progressed to higher stages of processing, with machinery replacing textiles and clothing as a major export category, there has been a recovery in the total service intensity of China's exports, from a low of 8.2% in 1997 to 13.3% in 2007.[8]

Here, we have highlighted the importance of services as inputs to manufacturing and how this relates to the activity content of exports. In terms of the political economy of market access, service firms have an interest in improved market access for downstream manufacturing sectors, while those same downstream firms have an interest in greater competition (more open markets) for upstream service sectors. Such linkage effects will be captured in CGE models, but missed in partial equilibrium models. We focus on these linkages further in our example application in Section 25.7.

25.3.2 Intermediation and productivity channels

The growth of intermediation services is an important determinant of overall economic growth and development because such services support specialization. As firm size increases and labor specializes, a greater amount of effort must be devoted to coordinating and organizing the core businesses of companies. This additional activity is partly outsourced to external service providers. The "producer services" that are demanded and supplied as part of this process are not just differentiated inputs into production. They play an important distinct role in coordinating the production processes needed to generate ever more differentiated goods and to realize scale economies. The associated organizational innovations and expansion of "logistics" (network) services yields productivity gains that in turn should affect economy-wide growth performance (Francois, 1988, 1990a; Deardorff, 2001).

A range of service sectors help facilitate increased coordination in more complex economies. For example, low-cost and high-quality telecommunications may generate economy-wide benefits, as the communications network is a transport mechanism for information services and other products that can be digitized. Telecommunications are crucial to the dissemination and diffusion of knowledge — the spread of the Internet and the dynamism that has lent to economies around the world is telling testimony to the importance of telecommunications services. Similarly, transport services affect the cost of shipping goods and movement of workers within and between countries. Business services such as accounting, engineering, consulting and legal services reduce transaction costs associated with the operation of financial markets and the enforcement of contracts,

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[8] China has seen a dramatic drop in share terms for services, but this is not something linked to the level of services exports *per se*, but rather to the very dramatic increase in manufacturing exports since 1992. In 1992, almost half of exports were textiles and clothing, while services were a large share of a small base. Services exports have grown little since — China's exports are now dominated by machinery exports, on both a value added and gross value basis. See Francois *et al.* (2012a) for further discussion.

and are a channel through which business-process innovations are transmitted across firms in an industry or across industries. Retail and wholesale distribution services are a vital link between producers and consumers, with the margins that apply in the provision of such services influencing the competitiveness of firms on both the local and international markets. Health and education services are key inputs into — and determinants of — the stock and growth of human capital (Hoekman and Mattoo, 2009).

While there are serious difficulties that afflict productivity measurement for many service industries (because it is often a major challenge to define the real output of a service sector),[9] empirical analysis has found that many services sectors have registered significant productivity growth in recent decades. Differences in aggregate productivity levels and growth rates across countries are to a large extent driven by differences in the productivity levels/growth rates of producer and business services sectors. These differences varied over time and by the intensity of ICT investments (Triplett and Bosworth, 2004; Inklaar *et al.*, 2008; Harper *et al.*, 2010). Such variations may in turn be a reflection of policy variables such as regulation, limits on entry into or scaling up of business services, investment restrictions, etc., as well as factors such as the quality of the educational system in a country. An implication is that incorporation of policies affecting services sectors is important in understanding how such policies affect productivity performance.[10]

In addition to facilitating gains to specialization in goods, services may themselves benefit from increased specialization. Where this is the case, greater variety and quality of services may lead to reductions in (real) prices associated with specialization in services (outsourcing) and so to changes in productivity (welfare) of firms (households) that buy services. The productivity-enhancing role of services as inputs contrasts with a long-standing concern in the literature that a steadily expanding service sector may (must) be associated with a declining growth rate of the economy. These concerns have been driven by a presumption that limited potential for productivity improvements in services implies that over time the real costs of — and employment in — services must rise relative to other sectors, reducing the growth potential of the economy to that of the "stagnant" services sectors (the famous Baumol cost-disease, see Baumol, 1967). However, given that many services are inputs, an expansion of the service sector can increase growth even if there is limited scope for productivity growth in the services concerned, because greater outsourcing of services entails a reallocation of factors that increase overall output and aggregate productivity.

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[9] In contrast to goods it is often difficult to measure prices and thus the output of services industries. However, significant improvements have been made in recent years in measurement of both inputs used and output generated by service industries. See, e.g. Triplett and Bosworth (2004).

[10] See Francois and Hoekman (2010) for further discussion and references to some of the relevant literature, including the rapidly expanding firm- and industry-level econometric analysis of the spillover effects of reforms affecting the performance of upstream services sectors on the productivity of downstream sectors that use these services as inputs.

While service sector productivity maps to economy wide efficiency, it is reasonable to ask if such productivity in turn hinges on market access. There is an emerging body of evidence that this is indeed the case. This includes, for example, ECORYS (2012), Baron and Cingano (2011), Francois and Woerz (2008), and Schivardi and Viviano (2010). Much of this work relies on OECD regulation indicators, combined with a mix of input–output analysis (as in Section 25.3.1 above), econometrics and CGE modeling. The OECD's product market regulation (PMR) index project has produced indexes of regulatory regimes, in terms of their impact of efficiency and competition (OECD, 2006). These include indexes on specific issues like market access for foreign firms, and regulation of pricing and entry conditions, as well as composite indexes. The literature cited above links these measures of regulation to productivity, export performance and the sector composition of employment.

A stylized representation of a basic lesson to be taken from this literature is presented in Figure 25.1. This plots two different OECD PMR indexes of regulatory restrictions in services for several OECD countries against an index of absolute productivity in services. The two PMR indicators include an index of policy discrimination against foreign firms and an index of domestic regulation of prices. These indexes range from 0 to 7, where a low number implies an open, "good practice" regime while a high number implies an over-regulated and relatively closed regime. On the horizontal axis, we have plotted estimates of absolute productivity
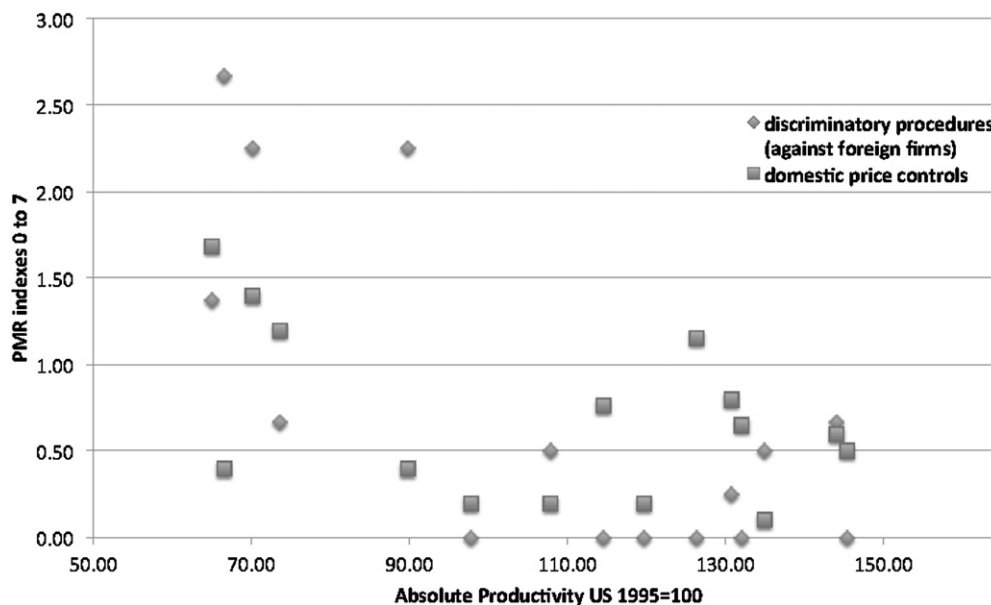

Figure 25.1 OECD regulatory indexes and market service productivity.

levels for firms in commercial services, relative the US.[11] What can be seen in Figure 25.1 is that openness in services appears to be linked to observed patterns of productivity. Greater openness and better regulation (meaning lower index values) is associated with higher productivity. Given downstream linkages discussed in Section 25.3.1, such productivity effects should in turn matter for downstream sectors as well. Francois and Hoekman (2010) survey a number of empirical papers along these lines, investigating the productivity effects of services trade and FDI liberalization. This work provides more evidence that greater availability of services has a significant positive impact on the productivity of sectors that use the services.[12]

25.3.3 Delivery modes and market access channels

Delivery of services often has an element of "jointness in production" in the sense that complementary inputs including other services are needed to allow effective exchange of (trade in) a service to occur. While this is often also true for goods — various inter-mediate inputs are needed to produce a unit of final output — jointness in production for services goes beyond this in the sense that often the buyer or consumer is part of the production process. Think, for example, of management consulting or a doctor's visit: the quality or value of the transaction will be determined in part by the information that is provided by the client or patient. These complementary inputs can be related to addressing the location or proximity requirements that must be satisfied for many service transactions to be feasible. Where there is a need for proximity in exchange, factors like distance place a cost burden on certain forms of services delivery. Christen and Francois (2009) have labeled this the "proximity burden." The proximity burden is recognized implicitly in the policy community, where the cross-border and local presence (or commercial establishment) components of international service transactions are referred to as modes of supply. Indeed, an important paper by Sampson and Snape (1985) that developed a typology of four modes of exchanging services that includes the establish-ment aspect of services trade was influential in leading policy makers to define trade in services in the GATS as spanning the four modes of supply.

The GATS modes translate into logical channels for modeling services trade and the impact of policy. Modes 1 and 2 will both manifest themselves as more or less standard cross-border trade. What is less obvious is that mode 3 (FDI and FATS) can also involve cross-border trade, because FDI can facilitate trade where imported services are ulti-mately delivered through foreign affiliates. As such, restrictions on FDI can manifest themselves, econometrically, as effective determinants of cross-border trade (Francois and Hoekman, 2010). In our view, the apparent complementarity between FDI policy

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11 Figure 25.1 is taken from Francois *et al.* (2012b). Productivity calculations are based on EU-KLEMS data. In Section 25.7 we use these data in an illustrative policy experiment. This includes regression analysis of the data in Figure 25.1.

12 Noteworthy contributions include Arnold *et al.* (2011) and Fernandes and Paunov (2012).

and cross-border flows implies that the CGE literature should move toward more explicit linkages between affiliate sales and cross border sales. Even in models where FDI-based delivery is not modeled explicitly (meaning the bulk of the literature), a focus on cross-border trade implies an implicit role for FDI policy, and for joint modeling of modes 1, 2 and 3 trade. As discussed below, the approach in the CGE literature has so far involved rather crude modeling of non-tariff barriers to trade in services as a mix of trade costs and rents, although increasingly with a better basis in firm surveys and econometrics.

25.4 IMPLEMENTATION ISSUES

25.4.1 Quantifying policies

The need to consider trade, FDI and cross-border movement of people (suppliers, consumers) has meant that efforts in the research community to characterize and quantify barriers to market access in services (a basic requirement if we want to gauge liberalization in a CGE model) have been problematic. The initial approach (see Hoekman, 1996) was to establish inventory measures of policies, distinguishing between different modes of supply. This involves simply counting the instances in which certain types of measures and policies are observed for various services sectors and modes of supply—cross-border trade, FDI, and so on.[13] As an alternative approach, there has also been a branch of research based on price and cost comparisons by industries across countries (see Kalirajan *et al.*, 2000; Nguyen-Hong, 2000; OECD, 2009). More recently, there is an increasing emphasis on integrating econometric estimates of trade costs from gravity models with firmlevel, survey-based information on access to and quality of services inputs (e.g. energy, finance, etc.) that can be used to determine what share of observed price margins can be attributed to the effects of policy, which in turn can be used when defining services policy reform experiments in CGE models. Such estimates are admittedly crude, but may be the best immediate way forward for the purposes of simulating the effects of liberalization.

A range of gravity and price- and cost-based estimates of trade costs in services, much of which is surveyed in Francois and Hoekman (2010), concludes that the extent of barriers to trade in services may be very substantial, and potentially larger than the barriers presented by conventional trade measures such as tariffs and subsidies (see, e.g. Deardorff and Stern, 2008; Dee *et al.* 2003; Dee, 2005; Department of Foreign Affairs and Trade, 1999; Francois, 2000; Francois and Hoekman, 1999; Fontagne *et al.*, 2010). Most often, these findings have been incorporated in CGE analyses in the form of tax or tariff equivalents.

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[13] See Hoekman and Primo-Braga (1997) for a survey of the early literature on barriers to trade in services.

Information on the extent to which policies affect prices and costs is important for accurate modeling of policy reforms, including whether policies create "rents" as opposed to being resource-using (generating "waste"), and the identity (ownership) of the entities and groups to whom any rents accrue. This is a well-known issue that is not specific to services regulation,[14] but given the prevalence of the regulation of services markets this can have a major bearing on the magnitude of the welfare impacts of policies and policy reforms. For example, if a policy generates rents for domestic groups and liberalization results in a share of these rents accruing to foreign entrants, the result may be lower national welfare.[15]

Figures 25.2 and 25.3 illustrate these concepts. We focus on distinctions between rent and cost-generating barriers, and between discriminatory and non-discriminatory market access barriers. In Figure 25.2, the left panel illustrates domestic demand (the line D) and home supply (the line HS) for services. The gap between these at a given price defines the import demand function M that is mapped in the right panel. The foreign supply line (FS) closes the system. In Figure 25.2, we have imposed a trade barrier that raises the price for imported services, represented as a shift in the FS line to FS′. The result is higher prices. The welfare impact depends on the nature of the barrier. If it is a barrier that generates rents, then we have a consumer (or downstream industry) loss equal to area (1−8−7−2), and revenues or rents equal to area (1−8−4−6), of which terms of trade gains are (3−4−5−6). The net welfare effect is the difference between areas (1−2−3)+(8−5−7) on the one hand, and the terms of trade effects (3−4−5−6) on the other. What is critical is the incidence of the rents. If they accrue to foreigners, then the full area (1−4−6−8) is lost and the entire exercise generates a welfare loss. Similarly, if the barriers actually raise the cost of foreign delivery, then there are no terms of trade gains and the full rent area (1−4−6−8) is foregone. In this case, the national welfare/ income effect is approximated by area (1−8−7−2), which represents a loss.

In Figure 25.3 we instead introduce a set of regulatory policies that raise cost of operation for both domestic and foreign firms. In this second example, we have structured the cost impacts so that we have the same volume of imports as in Figure 25.2 and no change in domestic supply relative to the benchmark (prebarrier) regime. Here, the impact of the regulations is modeled as something akin to an uncollected trade tax. In this second example, there is no benefit to domestic firms, imports fall and there is a net welfare/income loss for the economy of area (9−10−11−12). This area exceeds the discriminatory trade barrier loss (1−8−7−2) in Figure 25.2. This is because there are even higher prices at home, as domestic firms are also affected and thus are limited in

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[14] For example, it featured prominently in estimates of the net gains from the EU Single Market program for goods (see, e.g. Venables and Smith, 1986) and is a matter that has been the subject of much analysis in the public choice literature.

[15] This is of course not a normative argument against liberalization. Instead, it points to the importance of ensuring that liberalization results in a more competitive marketplace and thus lower prices for consumers.
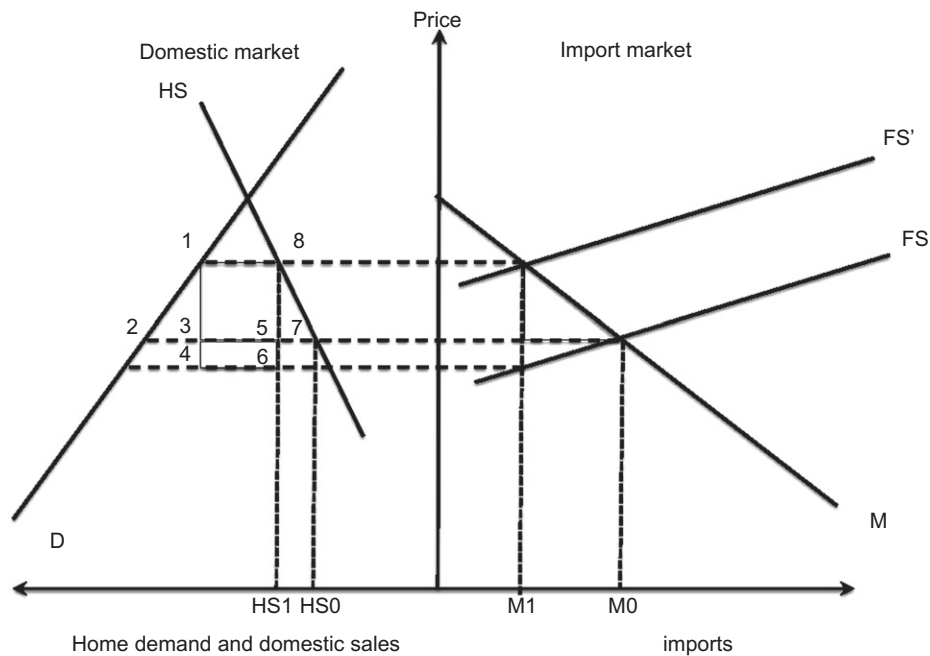
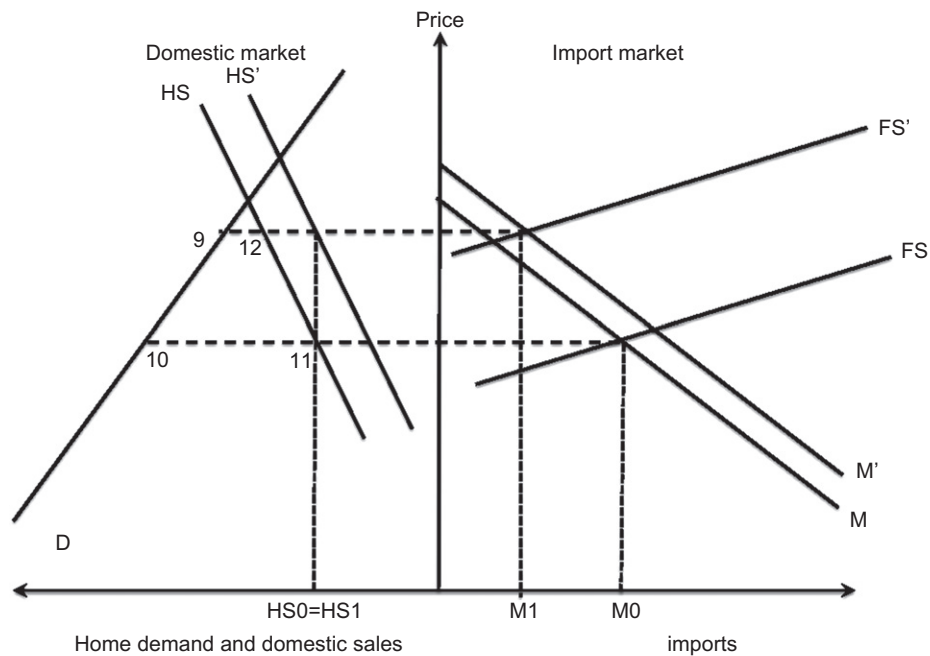**Figure 25.2** Discriminatory market access barriers.

Figure 25.3 Non-discriminatory regulatory barriers.

their ability to offset higher foreign supply prices. The outcome involves higher prices, overall income losses and potentially losses (depending on the domestic cost impact) for domestic firms.

Along the lines illustrated in Figures 25.2 and 25.3, the characterization of services barriers as a mix of deadweight costs and rents has been important in CGE-based assessments of potential multilateral liberalization and regional integration schemes.[16] An implication for empirical efforts to determine the effects of policy is that it is not enough to focus on modeling price—cost margins as that does not allow one to disentangle the two effects. Better econometrically based decomposition of the various price and cost margins linked to international service transactions is an important and sorely needed building block in guiding policy formation. In addition, recent focus has also shifted to the potential cost burdens imposed by regulations on domestic and foreign firms alike. As Figure 25.3 illustrates, domestic firms may benefit (or at least not be hurt) from liberalization when it actually involves lifting burdens on both home and foreign firms.

Another question in quantifying the effects of trade agreements, whether WTO or regional, is the extent to which policies on the ground correspond to commitments on paper. This is important if the impacts of new commitments are to be assessed. Both the OECD, with its services trade restrictions database, and the World Bank, with a similar exercise, offer evidence on this question. Gootiiz and Mattoo (2009), for example, have created an index measuring the restrictiveness of actual policies in services trade suitable for comparison to the commitments made by countries in the WTO or in regional trade agreements. In the case of the GATS, their work suggests that currently applied policy regimes are much less restrictive than the regimes to which countries are formally committed. That is, the policy bindings negotiated under the GATS allow countries to substantially increase the level of applied trade restrictiveness if they desire to. An implication is not just that there is great scope to lock in the more liberal applied policy regimes, but that modeling the changes in commitments made by countries as a result of a WTO negotiation will overstate the extent of the liberalization achieved in the negotiation. In such cases, new commitments may limit room for policy maneuver, but they imply little change in actual policy.

25.4.2 Approaches to modeling changes in policy

There have been two basic approaches followed in CGE modeling of changes in policies, once prevailing polices have been somehow benchmarked. The first approach involves a focus on cross-border delivery of services. This includes not only modes 1 and 2 under the GATS, but also mode 3, to the extent this involves cross-border sales through affiliates. For example, from the US data we know that exports through affiliates are

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[16] See, e.g. Dee and Hanslow (2001) and Hoekman and Konan (2000, 2001) for early CGE applications analyzing the importance of whether services policies generate waste (red-tape) or rents.

a prominent aspect of cross-border trade. Consistent with this observation, there is also evidence that FDI restrictions in services do lead to less cross-border trade as well.[17] A common approach in CGE modeling of barriers to cross-border trade in services involves using estimates of deadweight costs generated by a gravity model regression (or alternatively estimated from price comparisons).[18] However, while recent practice has focused on pure trade costs, emerging evidence (e.g., ECORYS, 2009) suggests that the best practice most likely lies in modeling a combination of deadweight costs and rents.[19]

A problem with much of the early literature is the absence of any empirical estimates of the extent to which policies generated rents and which groups benefitted from such rents. Instead, authors tended to provide a range of results based on different assumptions regarding the extent to which estimated price or cost wedges reflected rents as opposed to waste. In a prospective analysis of services liberalization in Tunisia, for example, Konan and Maskus (2006) assumed that barriers were half rent-creating and half resource-wasting in the absence of empirical evidence on this matter. Subsequent work by Dee and Diop (2010) based on better empirical estimates of the welfare effects of barriers concludes that the impacts of services trade reforms will be smaller than those estimated by Konan and Maskus — although in part this also reflects a different baseline and changes in the Tunisian economy during the 2000s. It is obviously important that models incorporate empirical estimates of the magnitude of any rents. There has been extensive recent effort to quantify the effects of non-tariff measures affecting trade in services and to break down the extent to which they generate rents or costs in the context of regional integration negotiations.[20] ECORYS (2009) estimates, based on firm surveys, that there is an approximate 60:40 split in the extent to which barriers increase the cost of doing business for all firms and the extent to which generate rents for domestic firms. They also provide a CGE-based assessment of reduction in non-tariff measures affecting trade between the US and the EU, which suggests that service barriers are at least as important as barriers to trade in goods.

A second approach taken in CGE modeling of the effects of changes in policies focuses on both direct trade costs and the ancillary effects of policies affecting FDI. Reflecting our

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[17] See, e.g. Table 7 in Francois and Hoekman (2010).

[18] In multiregion CGE models, modeling services barriers as iceberg or deadweight trade costs was pioneered with support from the EC to study services trade under the the Millennium Round — now known as the Doha Round (Francois 1999, 2000). This approach has grown from an extension in Francois (1999) to a now standard feature of the GTAP model, following Hertel *et al.* (2001). It has featured in the joint Canadian government and EC (2008) joint study on a EU—Canada Trade Agreement, as well as the ECORYS (2009) study on EU—US non-tariff barriers.

[19] This issue figured prominently in work by Denise Konan (see, e.g., Hoekman and Konan, 2001; Konan and Maskus, 2006; Konan and Kim, 2005; Konan and Van Assche, 2007).

[20] For example, the EC has sponsored studies on NTMs in services in North America and Japan. These include ECORYS (2009) and Sunesen *et al.* (2009), as well as several earlier path-breaking Australian studies, focused on the Asia—Pacific region. Several of the latter are included in Findlay and Warren (2000), and are surveyed in Dee (2005) and Deardorff and Stern (2008).

discussion of productivity channels in Section 25.3, this literature places emphasis on direct linkages between productivity and liberalization. A key feature of papers embodying this approach is to allow for imperfect competition and to consider the role of FDI in increasing competition and productivity. This includes, for example, changes in domestic transport margins, and general productivity and pricing changes in marginal sectors like transport and financial intermediation. Examples include Rutherford et al. (2005, 2008), and the FTAP model (Dee and Hanslow, 2001). This approach fits well with recent evidence that greater cross-border competition in service sectors leads to increased competitive pressure and lower price—cost margins in services.[21]

A starting point in much of the FDI modeling is Petri's (1997) assumption that some share of capital is sector- and country-specific (essentially a variation on the Armington assumption), and that FDI allows firms in country r to employ some of their country/sector capital in country s. This can follow, for example, from affiliates serving as bridgeheads for import of home country r primary factors, embodied in imports of intermediates, that are then combined with local primary factors and other inputs to provide services locally in destination market s. Indeed, this is consistent with recent evidence (Fillat-Castejón et al., 2008; Christen and Francois, 2009) that establishment sales are linked to both FDI levels and cross-border sales through affiliates.

Whether models emphasize cross-border trade with implicit sales through affiliates, or a mix of direct cross-border sales and explicit modeling of affiliates, it is important to accurately model the extent to which policies raise costs for all firms competing in a market as opposed to creating rents for a subset of (local) firms, and to accurately model where rents, if any, accrue. Rents under imperfect competition can be highly relevant. Theoretically, it is possible that the liberalization of a highly concentrated market leads primarily to a shift of domestic rents to foreign providers, with a resulting loss in domestic welfare (Francois and Wooton, 2001b). An extreme example would be a situation where liberalization entails a shift from a domestic monopoly to foreign monopoly. Less extreme would be a shift from a purely domestic monopoly or oligopoly/duopoly to a situation where the market remains highly concentrated, but with ownership now shared between domestic and foreign firms. Such outcomes can in fact be the objective of a specific policy reform if this is conceived and implemented as part of a bilateral or regional preferential trade agreement.[22] Of course, this is not a services-specific issue, but is more one that highlights the general importance of

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[21] See, e.g. Molnar and Bottini (2006). Working with firm-level data for the OECD, they find large variations over industries and across countries in estimated markups that are associated with differences in the restrictiveness of policies in these sectors. See also Inklaar et al. (2008).

[22] Jensen and Tarr (2011) and Balistreri and Tarr (2011) find exactly this type of result in their modeling of liberalization in Armenia and Kenya, respectively, where the potential gains for Armenia from preferential liberalization with the EU proves lower if Armenians lose rents from barriers against foreign service-providers that are then shifted abroad. See also Konan and van Assche (2007) for an analysis of telecommunications in Tunisia.

ensuring that markets are contestable and entry barriers are removed, which is much more likely to be the case if reforms are implemented on a non-discriminatory basis.

25.5 MODELS OF SERVICES LIBERALIZATION

25.5.1 Pioneering work

Early CGE models of multilateral liberalization focused on trade in goods, motivated by the Tokyo Round of multilateral trade negotiations (Deardorff and Stern, 1981, 1982; Whalley, 1982). These pioneering efforts treated services as non-tradables. One of the first attempts to move beyond trade in goods and consider services was an application of the Deardorff and Stern Michigan model to assess the possible impact of the Uruguay Round as it related to services. Building on early barrier estimates by Hoekman (1996), Brown *et al.* (1996a, 1996b) revised the Michigan model to allow for services trade. Confronting problems now well known (and outlined above), but less appreciated at the time, extending the model required the Michigan team to estimate services trade flows from the Swiss cheese of aggregated and bilateral trade data (conceptually a data cube, but full of holes). In a procedure similar to the one followed in future extensions of the GTAP database, Brown *et al.* (1996b) used a RAS-type routine to estimate the full bilateral trade matrix.

Given Hoekman's assessment that the Uruguay Round did not actually yield any actual liberalization, the analysis of Brown *et al.* is more of an estimate of what might be accomplished in future rounds. In this context, they model reductions in tariff equivalents of policies restricting trade in services and conclude that future services liberalization had the potential to yield gains comparable to past accomplishments under the GATT in goods, measured in terms of GDP and trade volumes. More recent estimates suggest that the tariff equivalents grounded in earlier counts of the number of non-tariff barriers, like those from Hoekman, overstate the actual price impacts of barriers to services trade. At the same time, because the barriers were modeled as tariff-equivalents rather than as non-tariff barriers with associated deadweight costs, these early analyses probably also understated the potential welfare gains from liberalization.

An important weakness of the early Michigan modeling of trade in services was that FDI was not incorporated into the analysis. In a pioneering contribution to the applied CGE literature, Petri (1997) developed a model that included FDI as well as cross-border trade in services. FDI in the Petri model gives rise to affiliates (foreign-owned plants) that differ from domestic firms in the same sector by using inputs "imported" from the parent company as well as domestic factors of production. By assuming that consumer demand is differentiated both by place of production (along Armington lines) and nationality of ownership of plants it becomes possible to model the effects of policies that increase the costs of foreign firms that are established in a given market (have engaged in FDI). Petri recognized and allowed for the fact that in practice such costs may be discriminatory in nature or affect all firms in a sector, and may affect either entry or ongoing operations.

25.5.2 Post-1990s CGE modeling of services liberalization

Subsequent to the early analyses motivated by the Uruguay Round, the CGE literature on multicountry services liberalization has continued to focus on both on the potential of further (future) WTO-based liberalization of trade and on regional trade agreements. For example, Francois (1999, 2000), Francois, van Meijl, and van Tongeren (2005), and Kinnman and Lodefalk (2007) model the services trade as part of a comprehensive liberalization package under auspices of the WTO. They focus on the multicountry pattern of impacts of improvements in market access on a most favored nation basis, with the emphasis on cross-border trade (mode 1). Other multicountry CGE models that incorporated estimates of services trade barriers and simulated the impacts of liberalization include Hertel (2000), Dee and Hanslow (2001), Brown et al. (2001), Robinson et al. (2002), Decreux and Fontagne (2006), and Fancois and Wignaraja (2008). While the earlier work with the Michigan model included monopolistic competition, Francois (1999, 2000) explored alternative market structures, including both Cournot and monopolistic competition settings. Alternatively, these lead to the primary margin of impact being along either the markup or variety-based productivity channel.[23]

Major improvements in modeling have centered on incorporating FDI into global models, better representation of deadweight aspects of policy barriers, and incorporating linkages between market structure, prices and productivity. Building on the initial Petri (1997) paper, working within the ORANI and GTAP family of models,[24] Hanslow et al. (2000) and Dee and Hanslow (2001) integrated FDI into the FTAP model. As a result of the FTAP initiative the Australian Productivity Commission pioneered the extension of a standard, static modeling framework to include bilateral FDI in services. Working with the model, Dee and Hanslow (2001) reported estimates that full liberalization of services would yield greater gains than liberalization of remaining barriers to goods trade, driven in a large part by greater flows of FDI from industrialized, high-income countries to developing nations.

A key difference between the Petri (1997) and the Dee and Hanslow (2001) approach is that Petri modeled customers as first choosing among firms (suppliers) on the basis of their ownership and then among the locations that the firms were based in. This treatment assumed that in any given sector, Japanese-owned firms were closer substitutes for each other than for Australian firms in the relevant sector, irrespective of location. By contrast,

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[23] The earlier literature calibrated elasticities from estimated markups, while more recent monopolistic competition specifications for services are calibrated so that markups fit assumed trade substitution elasticities. The size of these elasticities is itself a problem. If one is willing to assume that the marginal impact of variation in delivered costs is proportional to the marginal variation in non-tariff barrier measures themselves (i.e. roughly log-linear with respect to non-tariff barrier indexes) then gravity-based non-tariff barrier elasticities can be used for this purpose, as in the case of the non-tariff barrier elasticities applied in Francois and Hoekman (2010).

[24] See Dixon et al. (1982) and Hertel (1997), respectively.

Dee and Hanslow (2001) assumed that customers choose between phyisical location first (where the services are produced) and then select between suppliers in a given geographic location on the basis of ownership (nationality). As noted by Dee (2003), from an Australian perspective, a US multinational located in Australia is assumed to be a closer substitute for an Australian-owned firm than it is for a US firm located in the US.

Others have followed the example of the Dee and Hanslow/FTAP effort, including the Central Planning Bureau in the Hague, which extended its WorldScan model to include FDI in services (Lejour *et al.*, 2008), and Brown and Stern (2001) and Brown, Deardorff and Stern (2001), who extended the Michigan model to include FDI along Petri lines. A major limiting factor here is the lack of detailed bilateral FDI data by sector. In addition, an issue rarely discussed is the use of FDI data as a proxy for actual (unobserved) sales of services by foreign affiliates when representing the operations of multinational enterprises.

While the inclusion of FDI further increases the data challenges confronting modelers (Hanslow *et al.*, 1999; Stone *et al.*, 1999), extending CGE models to include FDI is critical as it is a major channel for the international exchange of services. As discussed subsequently, the extension of CGE models to include FDI has been shown to be very important from a welfare (real income) and growth (productivity) perspective. The results of the simulations of liberalization that emerge from the various CGE models all suggest that there are significant potential welfare gains from further liberalization, with both developed and developing countries having an export interest in services liberalization, as well as potentially benefitting from greater import competition (Francois *et al.*, 2005). More recent work that is anchored on the Markusen (1997) knowledge-capital model of FDI suggests that a major potential source of gain from liberalization comes from reducing barriers to entry into services and the increase in the variety of services that is associated with FDI inflows and subsequent "downstream" productivity impacts.[25]

A stream of the literature has centered on country-focused assessments of the impact of services liberalization. A key feature of the models that are used is to allow for Dixit—Stiglitz endogenous productivity effects generated by FDI inflows following a reduction in (liberalization of) policies that restrict entry into these activities, which by their nature often require that foreign providers establish a physical presence in the market (i.e. require FDI). An early example is Konan and Maskus (2006), where a Dixit—Stiglitz structure with FDI leads to productivity gains (and losses) linked to variety (similar to the trade-only specification of Francois, 2000; Francois *et al.*, 2005). They focus on Tunisia, concluding that the most important component of potential welfare gains from liberalization (which is assumed to be implemented on a

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[25] The knowledge-capital model postulates that firms can separate the knowledge (skill)-intensive dimensions of their activities (so-called headquarter services) from production of output, which may be dispersed across different locations as a function of differences in factor endowments and minimization of trade and transactions costs.

non-discriminatory basis by Tunisia) is the removal of barriers against FDI in services sectors. Konan and Maskus argue that increasing international competition on service markets will reduce the "cartel effect" (the markup of price over marginal cost that incumbents are able to charge due to restricted entry) and attenuate what they term the "cost inefficiency effect" (the fact that in an environment with limited competition marginal costs of incumbents are likely to be higher than if entry were allowed). The latter is most important as inefficiency imposes a cost on all sectors and households that consume the services involved. They conclude that removing policies that increase costs can have much greater positive effects on national welfare than the removal of merchandise trade barriers. Instead of the "standard" 0.5–1% increase in real income from goods liberalization, introducing greater competition on services markets that removes cost inefficiencies raises the gains to 6–8%. These large potential effects of services liberalization reflect both the importance of services in the economy and the extent to which they tend to be protected through policies that create barriers to entry.

In a series of papers, Jensen et al. (2006, 2007, 2010), Rutherford and Tarr (2008, 2010), Jensen and Tarr (2008), and Balistreri et al. (2010) model both direct trade and Petri-type FDI under monopolistic competition, combining both approaches found in the literature. Extending the earlier work on services trade with Dixit–Stiglitz variety effects (Francois, 2000; Francois et al., 2005; Konan and Maskus, 2006), a key finding of the various Jensen, Rutherford, Tarr and Balistreri papers is that in an applied CGE setting with FDI, the downstream productivity growth effects of greater competition and choice (variety) in services markets can be very important.[26] Rutherford et al. (2005, 2008) assess the impact on Russia of the liberalization of trade in goods and services associated with accession to the WTO. Their estimates are decisively affected by the liberalization of FDI in business services sectors and endogenous productivity effects in business services and goods.

25.5.3 Modeling regional services liberalization

The recent CGE literature has also shifted focus to services when examining regional integration issues. This is very similar to global or country-based analyses, with the exception of work that is motivated by the EU and European integration, which centers more on the impacts of differences in national regulation of services. For example, Lejour et al. (2008) emphasize efforts within the EU to deepen integration of European services markets. The EU is not (yet) a customs union for services (Langhammer, 2005) and

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[26] Dixit–Stiglitz variety effects are a common feature of the endogenous growth literature, the new economic geography literature, the Krugman style international trade models that incorporate imperfect competition and models that allow for heterogeneous firms. Their implications for productivity effects are discussed by Francois (1995) and Francois and Martin (2010). Indeed, it is well understood that variety effects can provide a micro-founded basis for productivity effects of trade, in contrast to *ad hoc* exogenous productivity shocks that are sometimes assumed in older CGE models.

deeper integration in this area is politically contested. Lejour *et al.* estimate that while there are potential gains from further integration of EU markets, magnitudes depend on the extent to which intra-EU barriers protect rents or actually involve deadweight costs. Hence, they support the notion that how we treat barriers to services trade is important. Political economy factors (generally not found in CGE models) also matter. Kox and Lejour (2006) project that the original 2004 EU Services Directive could have increased intra-EU services trade by 30–60% and direct investment in services by 18–36%. The revised directive that was adopted in 2006 is unlikely to have such effects given that key aspects of the initial proposal were removed, in particular acceptance of home country regulation. The EU experience illustrates the difficulty for (unwillingness of) polities to converge on common norms and to allow for regulatory arbitrage even in situations where, in principle, all are agreed that common minimum standards exist. Research on the potential gains from further integration of EU services markets confirms the findings of the work by Tarr *et al.* discussed above that what matters in welfare terms is to new entry by foreign firms (FDI). Lejour *et al.* (2008) conclude that although further integration of EU services markets resulting from the revised directive will be beneficial, relative to initial GDP the increases will be limited (less than 1% of GDP) because they are unlikey to stimulate a significant net increase in investment as a result of the continued prevalence of country-specific regulation (i.e. differences in regulatory regimes will continue to create country-specific fixed costs of entry).

Dee (2006) is representative of CGE analysis of shallower forms of regional integration of services markets than the EU. She focuses on the regional trade agreements that have been proliferating in Asia and investigates whether these have tended to target regulatory restrictions that discriminate explicitly against foreigners, and if so, if these are the restrictions that matter most, in an economic sense. Focusing on banking, distribution, ports, professions, telecommunications, air passenger transport and electricity generation, she argues that because the agreements covering services are preferential, they liberalize only relatively unimportant services trade barriers. That is, they do not deal with the policies that result in the greatest markup of prices over costs, which the empirical literature increasingly has found to be associated with non-discriminatory domestic regulatory policies that raise fixed costs and have the effect of restricting entry and reducing competition.

Studies of the potential impacts of regional trade agreements often conclude that these can generate significant gains if the effort extends to the liberalization of trade in services. In contrast to the literature on modeling of preferential liberalization of trade in goods, services modeling efforts devote less attention to issues of trade diversion and the impacts of discriminatory removal of trade barriers for selected (preferred) trading partners. The assumption frequently is that liberalization—even in the context of a regional agreement—will be applied on a non-discriminatory basis. The extent to which this is indeed the case, however, is of course an empirical matter, and brings us back to the distinction between resource-wasting policies and rent-creating measures,

and knowing who gets the rents if there are any. Some CGE analyses of prospective preferential trade agreements model services liberalization as the removal of price wedges (tax equivalents) that accrue to the country that liberalizes. This may be inappropriate.[27] The papers by Konan and Van Assche (2007), Balistreri and Tarr (2011), and Jensen and Tarr (2011) among others discussed above illustrate clearly that preferential (partial) liberalization can be welfare diminishing if market structures are such as to generate significant rents and the partial reforms result in transfer of such rents to foreign firms.

25.6 MODES OF SUPPLY AND SECTOR SPECIFICITY

In an overview of the prospective quantitative literature on the potential impacts of services trade liberalization, Whalley (2004) argues that a basic problem with the CGE literature is that the heterogeneity of service activities is typically neglected, even though this may have important implications. Liberalization of trade in services touches on aspects of capital movement (FDI) and the (temporary) movement of people, both service providers and services consumers. Indeed, temporary movement of service suppliers (mode 4 in GATS parlance) might offer (arguably) a partial solution to the dilemma of how international migration is best managed given the substantial political resistance that exists against it in many high-income countries. Building on Walmsley (1999) and working with a multiregion CGE model, Walmsley and Winters (2005) estimate that if OECD countries were to expand temporary access to foreign service providers by the equivalent of 3% of their labor force, the global gains would be greater than those associated with full liberalization of merchandise trade. These gains are driven by higher labor productivity and thus wages of the workers that are permitted to move to locations where labor is scarcer. The gains to those who move outweigh losses incurred by those who stay behind, although these losses are partially offset by income that is expected to be remitted back to source countries (based on observed average rates of remittance transfers). Both developed and developing countries (including the citizens that are permitted to move) would share in these gains, and they would be largest if both high-skilled mobility and low-skilled mobility were permitted. There are of course large political obstacles that must be overcome for such mode 4 trade expansion to be feasible, but movement towards liberalization may be possible if designed appropriately. While this is an area where the GATS could play a role, it is more likely that countries will continue to rely on bilateral arrangements to manage such trade, which in turn may be sector-specific.[28]

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[27] This is case for some of the studies that commissioned by the EU to assess ex ante the likely effects of new free trade agreement with Asian countries, e.g. Boumellassa *et al.* (2008) and Decreux and Mitaritonna (2007). These assume that the wedges were initially fully captured by the EU by treating them as an export tax, all of which is "transferred" to the Asian partner following the conclusion of the free trade agreement.

[28] See, e.g. Pritchett (2006). See Mattoo and Carzaniga (2003) and Hoekman and Ozden (2010) for discussions of mechanisms that could facilitate agreements to liberalize mode 4 trade.

Rutten and Reed (2009) focus on the impact of health worker movement on the cost structure of the UK health system. They find that while a rise in the National Health Service budget yields overall welfare gains, a nominally equivalent policy of enhancing access to the UK for foreign healthcare providers (yielding the same increase in services) yields even higher overall welfare gains. Cross-border health worker movement, whether temporary of permanent, is likely to become increasingly important given demographic trends in the OECD and the willingness of middle-income countries to train such workers (as in the Philippines) for export.

Trade in health services can also occur through mode 2-type transactions insofar as patients move to the location of providers for treatment. While other modes will surely also play a role, e.g. providers may want to establish a commercial presence (engage in FDI) or send health providers abroad on a temporary basis, there is great potential for expanding mode 2 trade. A barrier to such trade is the lack of portability of health insurance in many countries. For example, US federal or state government reimbursement of medical expenses is limited to certified facilities in the US or in a specific US state. This constraint is also significant because it deters elderly persons from retiring abroad. Those who do retire abroad are often forced to return home to obtain affordable medical care. The potential impact of permitting portability could be substantial. Mattoo and Rathindran (2006) find that extending health insurance coverage to overseas care for just 15 types of tradable treatments could produce savings for the US of over $1 billion a year even if only one in 10 American patients travel abroad. The lower costs of health services abroad offer the opportunity to extend medical benefits to people who currently are not insured. This is a mode of trade that has tended to be ignored in CGE analyses.

These examples illustrate that CGE modeling needs to consider the interactions and complementarities between modes of supplying and obtaining services. Each service sector will have distinct features that affect supply and demand, including regulatory requirements. Thus, analysis must take into account the sector-specific nature of policies that affect trade by impacting on the incentives (ability) to utilize the various modes of supply that are relevant for a particular sector. To date, the CGE literature has not focused on such issues. This is one area where future research could have a high payoff, as in the absence of an accurate characterization of the relationships between modes of supply simulations of the effects of policy reforms may be far off the mark.

25.7 AN EXAMPLE

The literature reviewed above covers a broad range of issues. Here, we focus on an illustrative example. This builds on our earlier discussion of value-added linkages between the services sectors and the rest of the economy. We focus on the case of Italy. Table 25.4 provides a breakdown of the value added structure of the Italian economy. In Table 25.4, column A corresponds to values in Table 25.2, while column

Table 25.4 Italy: value-added composition of the economy, 2007

	Value added total economy (A)	Gross exports share of total value (B)	Value added in exports: forward linkages (C)	Value added in exports: backward linkages (D)
Primary sectors	0.03	0.01	0.04	0.02
Processed foods, beverages	0.03	0.05	0.03	0.05
Textiles, clothing	0.02	0.07	0.04	0.07
Chemicals, petrochemicals	0.03	0.14	0.08	0.11
Motor vehicles	0.01	0.07	0.02	0.06
Other machinery	0.07	0.28	0.15	0.28
Other manufacturing	0.10	0.21	0.20	0.22
Utilities, construction	0.10	0.01	0.05	0.01
Commercial services	0.42	0.15	0.36	0.18
Public services	0.21	0.01	0.02	0.01
Total	*1.00*	*1.00*	*1.00*	*1.00*

Source: Own calculations, using GTAP8 data.

C and D values correspond to row and column totals in Table 25.3.[29] Clearly Italy's economy is highly service intensive. On a value–added basis, 72% of activities are in the service sector (column A). This is also reflected in the structure of exports. On a gross value basis, 82% of exports in terms of gross value are in manufacturing (column B). However, when we focus on the activity content of exports on a sector basis (column C), this drops to 53% for manufacturing, while the services share of total value added in exports rises from 17 to 43%. This reflects forward linkages, by which we mean that while most Italian exports are in goods, the production of those goods requires a great deal of service inputs. As such, in terms of the activities where value added activities take place when producing for export, much of this is in services. Finally, the last column (column D) provides a breakdown of which export sectors actually contain domestic value added. Here, we are looking at the total value added content of exports, broken down by sector, e.g. the share of Italian value added contained in total exports that is embodied in exports of automobiles. Like the gross value basis in column B, manufacturing is the platform for most exports on a value–added basis (column D). Basically, Italy exports a great deal of intermediate services embodied in goods (machinery, vehicles, chemicals and petrochemicals, etc.), as reflected in the earlier discussion on Table 25.3.

[29] An Excel-based version of the calculations for Tables 25.2–25.4 is available on request, as well as GEMPACK code for replicating value-added decompositions for countries in the GTAP database and a RunGTAP version of the application reported here.

While Italy is similar to other high-income economies, in terms of service intensity, it is an outlier in terms of service sector productivity. We make this claim on the basis of estimates of absolute and relative productivity levels, using data from the EU-KLEMS database and following the methodology developed by Inklaar *et al.* (2008).[30] On this basis, US multifactor productivity (MFP) in market services (i.e. non-public) in 2007 was 145% of 1995 levels. At the same time, in 2007 Italy's productivity was 84.8% of the US level for 1995. Italy, along with a number of other Eastern and Southern European states (and Japan) lags relatively far behind Northern Europe and North America in terms of service sector productivity.

As a follow-up to our discussion in Section 25.3 regarding emerging evidence that the cross-country pattern of productivity in services is linked to regulatory regimes, in Table 25.5 we have organized the data from Figure 25.1, related to productivity and regulation indexes, transformed for regression analysis. As such, all data are in logs and we have rescaled the PMR indexes to range from 1 to 8. The resulting regression is summarized in Table 25.6.[31]

We assume that the coefficients capture, in a reduced form, the impacts of variations in openness and domestic regulation on MFP in the service sectors. On the basis of the coefficients above, we then construct an experiment wherein we move the Italian regulatory regime toward the North European norm, as proxied by the average regulatory index values for Northern European Members of the EU. From the estimated coefficients, and the indexes themselves, this implies a combined or composite productivity gain in market services in Italy of 66.3%. Of this, most follows from domestic regulation (38.0%), with the rest following from removing discriminatory barriers, i.e. greater openness (20.5%). Although closed by West European standards, Italy is actually relatively close to the OECD norm in terms of openness (Austria, Japan, Slovenia and the Czech Republic all rank more closed). It is an outlier in terms of domestic regulation, being near the upper range for overall domestic regulation issues.[32]

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[30] This involves first constructing detailed output (value-added) and input (labor and capital) price indexes, and then making productivity comparisons on the basis of Tornqvist indexes. The resulting data provide cross-country benchmarking of absolute productivity for selected years, implicitly linked by relative productivity growth rates for the intermediate years. See Francois *et al.* (2012b) for further discussion. The data used as the basis for our calculations are the EU-KLEMS database (November 2009 release) and the GGDC Productivity Level database (Inklaar *et al.* 2008).

[31] The correlation of MFP against various OECD PMR subindexes is stronger for some than others. The correlation between MFP and openness (discriminatory procedures against foreign firms) is 0.6799. The correlation between MFP and domestic regulation (here represented by the price regulation index) is 0.4989.

[32] From Table 25.5, we are estimating the impact of moving Italy from a log market access index of 0.510826 to 0.312551 and from a log price control index of 0.788457 to 0.339374.

Table 25.5 Productivity and regulation in services, 2007

	Productivity (US 1995 = 100) ln (A)	PMR market access ln (1+index)	PMR price controls ln (1+index)
Australia	4.741234	0.000000	0.565314
Austria	4.497638	1.178655	0.336472
Belgium	4.882857	0.000000	0.500775
Czech Republic	4.198892	1.299283	0.336472
Denmark	4.904586	0.405465	0.095310
Finland	4.680383	0.000000	0.182322
France	4.839986	0.405465	0.182322
Germany	4.873890	0.000000	0.765468
Hungary	4.299110	0.223144	0.587787
Italy	4.440765	0.510826	0.788457
Japan	4.250411	1.178655	0.875469
Slovenia	4.173714	0.864997	0.988611
Sweden	4.970974	0.510826	0.470004
UK	4.785076	0.000000	0.182322
US	4.979338	0.000000	0.405465

Basis: OECD and EU-KLEMS.

The CGE experiment involves an application of the basic GTAP model, using GTAP8 data (benchmarked to 2007, the same year as our regulatory and MFP data). The basic aggregation scheme is summarized in Table 25.7.

In the basic GTAP family of models, changes to MFP can be modeled through efficiency coefficients (Hertel *et al.*, 1997). In particular, national production is modeled as:

$$X_{i,r} = ao_{i,r}[\gamma_{VA,i,r} VA_{i,r}^{\rho_i} + \gamma_{IN,i,r} IN_{i,r}^{\rho_i}]^{1/\rho_i} \quad \text{where } \sigma_i = 1/(1 - \rho_i). \qquad (25.6)$$

Table 25.6 Regression analysis—MFP and regulation

	Ordinary least squares	Robust regression
Discrimination against foreign firms	−0.3796***	−0.3975***
Domestic price regulation	−0.3822**	−0.3735*
Intercept	4.9861***	4.9952***
Summary stats	R^2: 0.61	
	n: 15	*n*: 15
	$F(2,12) = 18.93$	$F(2,12) = 7.99$
	pr $> F = 0.0002$	pr $> F = 0.0006$

Regressions are based on 2007 MFP indexes.
Indexes are rescaled OECD PMR subindexes. All variables are in logs.
Significance levels: ***0.01, **0.05 and *0.1.

Table 25.7 Database aggregation

Sectors	Regions
Primary sectors	Italy
Processed foods, beverages	Rest of EU
Textiles, clothing	Rest of world
Chemicals, petrochemicals	
Motor vehicles	
Other machinery	
Other manufacturing	
Utilities, construction	
Commercial services	
Public services	

$$VA_{i,r} = ava_{i,r} CES(\Phi_{i,r} : \sigma_{i,VA}) \tag{25.7}$$

$$IN_{i,r} = CES(Q_{j,i,r} : \sigma_{i,IN}). \tag{25.8}$$

In Equations (25.6), (25.7) and (25.8), the terms X, VA and IN refer to domestic goods/services, composite value added and composite intermediate inputs, indexed for sector i and production region r. The elasticity of substitution at the uppernest, the value-added nest, and the primary input nests are represented by $\sigma_i, \sigma_{i,VA}$ and $\sigma_{i,IN}$. Primary factors are represented by Φ. $Q_{j,i,r}$ represents the set of intermediate inputs from sector j used by sector i in region r. Both value-added and intermediate inputs are modeled as inputs to a final CES-based production function (25.6). The full set of production equations for the system is CES, characterized for the value-added nest, for example, by the substitution elasticity $\sigma_{i,VA}$. The terms $ava_{i,r}$ and $ao_{i,r}$ are productivity parameters applied to the value added and final production nest for the block of Equations (25.6), (25.7) and (25.8). For the experiment here we will use our estimates of MFP gaps linked to regulation — total 66.3%, domestic regulation 38.0% and openness 20.5% — and apply them through the coefficient $ava_{i,r}$. The basic macroeconomic impact of our productivity experiment is summarized in Table 25.8; the effects on sectoral value added shares is reported in Table 25.9.

Table 25.8 Macroeconomic impact of service sector reform

	Total impact	Openness to foreign establishment	Domestic regulatory environment
GDP (% change)	21.86	5.00	16.87
Equivalent variation	23.58	5.48	18.09
Consumer prices	−10.02	−2.45	−7.58
Producer input prices for commercial services	−21.27	−5.26	−16.01

Source: Own estimates from CGE model and database.

Table 25.9 Comparison of value-added shares

	EU 26	Italy 2007 pre-experiment	Italy post-experiment
Primary	0.03	0.03	0.03
Manufacturing	0.22	0.25	0.27
Services	0.76	0.72	0.70

Source: Own estimates from CGE model and database.

Given the value added composition of the Italian economy as summarized in Table 25.4, the large impact on GDP should not be surprising. The market (commercial) services sector accounts for 42% of Italian value added. As such, a 66.4% productivity shock implies a 27.8% gain in value added, which is close to the GDP and equivalent variation changes in the CGE model — between 22 and 24%. Even here, the gains are not quite 27.8%, reflecting substitution effects in the model (adjustments in input mixes and trade substitution effects) as well as underlying distortions not reflected in the back-of-the-envelope estimate. As we move away from simple microeconomic comparisons, the more detailed estimates from the CGE model provide greater insight. For example, consumer prices drop substantially with regulatory reform in services (Table 25.8). They also drop with better conditions for foreign establishment. However, the greatest impact follows from domestic rules and regulations. Table 25.10 focuses on the resulting shift in the Italian structure of production. Here, we see the implications of productivity gains in services, combined with the tier—sector linkages summarized by Table 25.4. Comparing Tables 25.4 and 25.10, we see the

Table 25.10 Detailed value-added composition

	Value added total economy (A)	Gross exports share of total value (B)	Value added in exports: forward linkages (C)	Value added in exports: backward linkages (D)
Primary sectors	0.03	0.01	0.03	0.01
Processed foods, beverages	0.03	0.04	0.04	0.04
Textiles, clothing	0.02	0.06	0.04	0.06
Chemicals, petrochemicals	0.03	0.13	0.08	0.09
Motor vehicles	0.01	0.07	0.02	0.05
Other machinery	0.07	0.23	0.15	0.23
Other manufacturing	0.10	0.18	0.20	0.18
Utilities, construction	0.12	0.01	0.05	0.01
Commercial services	0.36	0.28	0.37	0.31
Public services	0.23	0.01	0.02	0.01
Total	*1.00*	*1.00*	*1.00*	*1.00*

Source: Own estimates from CGE model and database.

drop in value added for commercial services drives the shift shown in Table 25.9. The efficiency gains in the sector free-up resources, which are then shifted to other sectors. Owing to of the substantial drop in commercial service input prices for manufacturing firms (Table 25.8), this also means there is less value added from commercial services embodied in manufactured goods. Focusing on column (D) in Tables 25.4 and 24.10 the end result is that commercial services, being more competitive, are exported directly rather than indirectly through goods. The goods sectors also are more price competitive, as falling input prices upstream are effectively equivalent to productivity gains downstream. The end result therefore is more direct exports of services and a shift in value added toward manufacturing as resources are freed up in the now more competitive service sector.

There are of course other ways to approach changes in Italian regulatory policy and openness. For example, in models with monopolistic competition in services (e.g. Balistreri *et al.*, 2010; Konan and Maskus, 2006; Francois *et al.*, 2005) productivity effects can follow from changes in service sector variety, again with downstream implications. However, this type of productivity effect is partially "implicit," in that national accounts-based MFP measures do not capture variety effects well. They would, however, reflect firm selection effects found in firm heterogeneity models. Thus, while variety and selection effects can work as an endogenous mechanism linked to *ava* and/or *ao* in Equations (25.7) and (25.6) above, the determinants are inherently different from basic MFP measures.[33]

25.8 SETTING FUTURE RESEARCH PRIORITIES

Given the prevalence of increasing returns and imperfect competition in many services industries, the welfare effects of liberalization will depend on market structure, the contestability of the service industries concerned and the nationality of ownership of firms. In the services context the prevalence of imperfect competition implies that liberalizing trade in services is likely to encourage greater specialization, thus helping to realize increasing returns where these exist (Francois, 1990b). Even if a country does not happen to have comparative advantage in certain services, liberalization may have a positive effect by encouraging further fragmentation of production activities, fostering exports of merchandise and/or other services. If mode 3 is the main mode of supply, the prices affected by liberalization are internal prices, so that the associated terms of trade effects can be neutral or even positive (as a result of improving international competitiveness, see Dee and Sidorenko, 2006).

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[33] See Francois *et al.* in Chapter 24 of this Handbook for a technical discussion on modeling variety effects. Indeed, one strategy is to explicitly link the coefficient *ao* in Equation (25.6) functionally to changes in varieties. The approach is explained in Francois (1998) with respect to the GTAP class of models.

One potentially important issue related to market structure is market power in trade and distribution sectors. This is closely related to the macroeconomic literature on price pass-through, which also highlights the structure of retail sectors in determining transmission of border prices to consumers and downstream industry. It points to potential impacts on goods trade linked to market structure in both international transport services and domestic distribution services. On the side of econometric and theory-based reasons to take this seriously, Raff and Schmitt (2009) examine the potential for trade liberalization in goods to lead to increased concentration in the retail sectors, while Francois and Wooton (2010) focus on the impact of combined oligopsony/oligopoly pricing in retail and wholesale trade on the gains from trade liberalization. They suggest that, at least in the EU context, market power in these sectors may effectively offset realized liberalization in goods sectors.

Bradford (2005) analyzes the impacts of distribution margins in eight OECD countries — defined as the ratio between the value of output in producer and consumer prices for 124 products. The focus is on deriving an estimate of the specific distribution margins (costs from factory gate to consumer, including wholesale/retail trade and transportation) by explicitly controlling for the impact of trade barriers on producer prices. His estimates range from a low of around 60 (i.e. 60 cents to move $1 worth of output measured at world prices from the domestic factory gate or from the dock to consumers) for Canada, the Netherlands, the UK and the US to a high of almost 100 for Japan. He uses a CGE model to assess the welfare impacts of inflated margins, running an experiment in which margins are reduced to the lowest level observed in the sample for each of the 124 products. Bradford's simulations suggest that inefficiencies in distribution reduce imports and impose substantial welfare costs, the magnitude of which is similar to that caused by border trade barriers. As is stressed in other CGE papers that analyze the impact of services policies, the extent to which inflated margins reflect excess costs or are captured by domestic agents as rents is important. If it is assumed that half of the excess margin generates rents, the simulation generates an increase in real income (equivalent variation) of 1.7% across the sample.[34]

Francois and Wooton (2001a) focus on a related issue — developing a theoretical structure where trade requires transport costs supplied by a shipping sector operating as an oligopoly. Working with both their theoretical model and numeric examples in a simple CGE model, they link shipping prices to the combination of supply and demand elasticities. Hummels et al. (2009) offer empirical support for such a framework, finding that shipping firms charge much higher freight rates when demand is relatively inelastic. In general, the message from this literature is that with intermediate service firms

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[34] In a parallel paper, Bradford and Gohin (2006) calculate that a 10% reduction in Japan's final goods distribution margins would benefit it as much as worldwide free trade would. In a finding similar to that of Konan and Maskus (2006), they also find that, compared to trade opening, reducing margins leads to smaller intersectoral production shifts and thus may engender less political opposition.

exercising market power on two price–cost margins (meaning they act collectively as both an oligopoly *vis-à-vis* final consumers and an oligopsony *vis-à-vis* producers), the gains from trade in goods hinge on the degree of competition in service sectors. As such, trade and FDI policy in services may impact directly and substantively on trade in goods. This issue is little explored in a CGE framework, in part due to data constraints.[35] In principle, the GTAP database includes estimates of bilateral shipping costs. These data are admittedly crude, and do not include information on market structure, per unit and per weight charges, and the variation in these charges by route. However, with new data sources emerging, this situation should improve.[36]

International trade in services is dominated by a small number of large firms and much of global trade takes place within these firms For example, trade within multinational companies (affiliate trade) accounted for 25.9% of US exports of private services in 2005 and for 22% of US imports of private services. Affiliated trade in business, professional and technical services accounted for 50.1% of total exports and for 69.6% of total imports in 2005. In the US, the top eight consumer lenders accounted for 75% of receipts, the top four international trade financing companies accounted for 70% of receipts, the top eight securities firms accounted for 50% of receipts and the top four direct life insurance carriers accounted for 81% of receipts. Similar concentration patterns hold in Europe (Christen and Francois, 2009). As such, an oligopoly approach to trade and FDI in services is likely to offer a better mapping than the large group, monopolistic competition approach now followed in the literature. Given the importance of large firms, there ought to be substantial payoff from more explicit modeling of services firm behavior in CGE models.

While the recent body of theory on firms and trade focuses on goods producing firms, the same basic theoretical framework also promises valuable insights for service firms, once we reinterpret physical transport costs as the costs that are associated with overcoming the proximity burden (see Helpman, 2006). The first insight relates to "natural" elements of firm costs (those that are independent of policy). Where the most efficient firms engage in internal trade and FDI, since in heterogeneous firm models market share primarily goes to the more efficient firms, we should see most cross-border services trade taking place within multinational firms rather than through unaffiliated (arms-length) sales. Going further, such "establishment transactions" should be more important than unaffiliated sales for the same reasons. Another insight relates to the impact of policy. In the theoretical literature, internalization hinges on a mix of costs affecting internal and arms-length delivery, as well as multiplant versus single-plant costs and distance costs. If we map these to the different modes of supplying services,

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[35] A related issue is restrictions on trade in cabotage services; see e.g. Arce *et al.* (1996).

[36] For example, the OECD (2011) has recently organized a dataset on precisely these values and indications are that this will be updated over time.

concessions made in trade agreements or unilateral changes in national policies that affect these different costs should affect the choice of modes, the relative importance of establishment sales and arms-length versus internal cross-border sales in predictable ways. This suggests a potentially fruitful application of the recent theory on goods-producing multinational enterprises and internalization of transactions costs to formulate questions that map to observed patterns in the services trade and policy data.

Yet another area where further research is a priority concerns explicit modeling of regulation that affects all firms in a sector or industry in addition to analysis of the impacts of discriminatory trade and FDI entry barriers. As noted previously and has been stressed in the policy literature, the measures that affect the contestability of services markets are often a mix of discriminatory and non-discriminatory taxes and regulation. The latter cannot be (are not) captured by tariff-equivalents-cum-estimates of price wedges. More important, a focus on discriminatory policies — while central to trade negotiations and thus of interest to policy makers and stakeholders — may neglect the fact that the non-discriminatory regulatory policies that prevail have a greater impact on welfare. One reason is that the latter have the potential of generating greater "waste" than discriminatory measures, which by their nature can be expected to generate rents for the domestic industry.

There are a number of papers in the literature that focus on the effects of domestic regulation as well as the impacts of discriminatory policies, e.g. Kox and Lejour (2006) and Lejour et al. (2008), as well as much of the Australia-based research covered above. Doing more to accurately characterize both types of measures and the likely impacts of reform is important for work in this area to be policy-relevant.[37]

25.9 CONCLUSIONS

Given the dominance of the service sector in most economies, it is clearly appropriate that CGE modeling of market access has begun to move away from an exclusive focus on goods trade. However, this is a relatively recent development, and there is a need for more investment in theory and data before incorporation of services trade and investment can move beyond being rather crude. The credence that should be placed in the numbers generated by CGE assessments of market access in services depends very much on the validity of the modeling assumptions made and the data that are used. While the

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[37] See the example in Section 25.7 as well as Balisteri et al. (2009). In the latter, the authors work with survey data to benchmark barriers to foreign service firms as well as regulatory barriers that affect both foreign and domestic business service providers in Kenya. They identify large potential gains from reform (up to 50% of baseline consumption in the longrun). However, this is not from removing prevailing market access restrictions per se, but rather from regulatory barriers that are applied on a non-discriminatory basis. This message is consistent with our own assessment of Italy in this chapter. Domestic regulation is likely as important, if not more so, as market access conditions.

accuracy of the specific numbers generated is certainly open to question, the conclusion that services liberalization can generate much larger welfare effects than goods liberalization is probably robust.[38] Yet clearly, to be more informative, CGE analyses need to be able to draw on empirical research that estimates the effects of policies on markups and costs.

This need includes investing effort in better representation of the role that services play in distribution, communications and investment in modern economies, their role as intermediate inputs and a determinant of aggregate productivity of the economy (through downstream as well as direct productivity impacts), and the interaction between market structure, trade, FDI in services and industry performance in goods. While the available econometric results are rough and imprecise, they suggest that service-related trade policy reforms that were implemented by most countries on a unilateral basis during recent decades may have been an important force for productivity growth. Evidence is also growing that the price effects of protection (trade costs) in the service sectors may be quite large compared to remaining import protection of goods sectors. Ignoring policies affecting trade and investment in services, and more generally regulatory policies that determine the performance of domestic services sectors, may be an important reason why CGE studies assessing the effects of trade reforms may miss the mark.

Notwithstanding the caveats regarding data quality and the limited specificity (accuracy) of the characterization of services trade policies and their effects on the different modes of supply, a basic message that emerges from the current literature is that liberalization of services matters, perhaps much more than trade in goods. However, much depends on how well the characteristics and economic functions of different services are captured, the accuracy of estimated or assumed impacts on costs and prices of services, whether policies create rents or simply raise costs, if there are rents, what share accrues to foreign factors, and whether policy reforms are applied on a discriminatory basis or not. These are all areas where future research should focus and is likely to have a high payoff.

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[38] One of the authors of this chapter recalls a presentation by Bob Stern of the Brown *et al.* (1996b) results. Stern characterized the modeling process at the time as follows: "With modeling, we are lifting policy rocks, looking underneath for big effects. We don't know much about services trade yet, but given the size of the sector, the rocks are big, and so the effects underneath are likely to be as well."

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