Financial Liberalization under the WTO and Its Relationship with the Macro Economy[*]

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Abstract

The focus of this paper is on the relationship between the liberalization of the financial sector, competition within the sector, and the sector's overall contribution to economic growth. To identify such a relationship, we follow the approach adopted in Eschenbach, Francois, and Schuknecht (2000), which involves cross-country growth regressions and includes a number of variables that seem to perform robustly in the literature. Our contribution is mainly to adjust the way in which financial liberalization is measured based on the financial commitments under the General Agreement on Trade in Services, by following the method presented by Hoekman (1995) and other related studies.

We find in this paper that, based on the GATS commitments in overall financial sectors throughout four modes of supply offered by ninety-three WTO members, the degree of liberalization in terms of market access and national treatment are highly correlated. Under mode 1 (cross-border supply), 2 (consumption abroad), and 3 (commercial presence), the degree of liberalization in regard to market access is positively correlated with the income level; however, there is no such link under mode 4 (movement of natural persons). When compared with the performance in terms of liberalization across the four modes, higher income members have, on average, the highest level of market access liberalization under mode 2. However, in regard to the national treatment part, mode 3 appears to have the highest degree of liberalization regardless of the income level. This paper also finds that there is a positive pattern linking the financial sector competition indicators with our measure of financial sector liberalization, and economic growth with the financial sector competition. Our findings, in a way that is similar to Eschenbach, Francois, and Schuknecht (2000), suggest that moving from a closed to a relatively open regime is correlated with significant pro-competitive pressures, and ultimately with large differences in growth rates.

JEL Codes: F43, G28

Keywords: financial liberalization index, pro-competitive pressures, GATS commitment

1 Introduction

A spate of empirical cross-country studies by Dollar (1992), Sachs and Warner (1995), Ben-David (1993), Edwards (1993) and Coe, et al. (1997) find that the impact of liberalization of trade in goods on the long run rate of economic growth is positive. By contrast, it is surprising to find that comparable studies that analyze the impact of the liberalization of trade in services on economic growth are far fewer.

As pointed out by Mattoo, Rathindran, and Subramanian (2001), the existing literature on the link between services and growth focuses primarily on the financial sector. The early neoclassical growth literature did not emphasize a role for financial services in promoting growth. Instead, financial intermediaries were assumed to play a passive role, simply funneling household savings to investors. The seminal works include Goldsmith (1969) and McKinnon (1973), which stressed the role of financial services in channeling investment funds to their most productive uses, thereby promoting the growth of output and incomes.

King and Levine (1993) claim that financial services can affect growth through enhanced capital accumulation and/or technical innovation. Gains in these areas can result either in temporarily higher growth rates (transitional or bounded growth effects), or in permanently higher growth rates. In bounded growth models, financial services induce higher savings and investment ratios, or more productive capital use. This, in turn, allows for higher per-capita income, and the transition period can be quite long, although ultimately growth reverts to its equilibrium rate. With permanent growth models, capital formation is influenced through induced changes in the saving rate, or in the rate of innovation in capital producing technologies. This results in permanently higher growth rates. Financial innovations can also alter the rate of technological change if they facilitate faster rates of technical progress.

A number of empirical studies apply both endogenous and bounded growth frameworks to identify the effect of financial service sector development on growth rates and per-capita income levels. In general, the approach adopted involves employing financial sector development indicators as independent

variables in growth regressions. Jung (1986) and Odedokun (1996) find that the depth and growth of financial markets has had a significant effect on growth in developing countries. King and Levine (1993a,b,c) also find that the depth and growth of financial markets (as measured by liquid liabilities and gross claims on the private sector) and the share of credit channeled through commercial banks (instead of the central bank) are positively related to investment, productivity, and real growth. Financial sector reforms have promoted financial sector developments that, in turn, have stimulated growth. De Gregorio and Guidotti (1995) report a significant link between private sector credit and economic growth, while Demetriades and Hussein (1996) find that financial sector development/depth and growth have a bi-directional relationship. Roubini and Sala-i-Martin (1992) and Mattesini (1996) both report a negative relationship between real interest rate distortions and lending-deposit spreads and growth. Finally, Levine and Zervos (1998, for 49 countries) and Harris (1997, also for 49 countries) provide evidence linking growth to stock market activities. Levine (1997) adopts a functional approach to provide a link between financial development and growth. He identifies five major functions that financial systems perform which help in minimizing transactions costs and improving the allocation of real resources. However, the author admits that research in this area does not sufficiently account for the role of international trade in financial services. Moreover, his paper is silent on the role of policy.

The scope for international trade in financial services has grown rapidly over the last two or three decades through the development of new technologies, especially in telecommunications, and the expansion of foreign direct investment. In the meantime, the recognition that the efficient supply of financial services is a precondition for stable development is leading to increased deregulation and liberalization within the sector. Among the few studies that have paid attention to the liberalization of international trade in services, Claessens and Glaessener (1998) point out that, apart from other benefits, internationalization has helped build more robust and efficient financial systems by introducing international practices and standards, by improving the quality, efficiency and breadth of financial services, and by

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allowing more stable sources of funds. Claessens and Glaessener (1998) also show that barriers to trade in financial services have slowed down the development of financial markets in East Asia. Claessens, Demirguc-Kunt, and Huizinga (1998) study the effects of foreign bank entry on the efficiency of domestic banks. The experiences of various countries seem to suggest that a foreign bank presence can facilitate increased competition, improve the allocation of credit, and help increase access to international capital markets. Henry (2000) and Beakers and Harvey (2000) show that the liberalization of equity markets, through a reduction in the cost of capital, leads to an increase in real economic growth on an annual basis. Francois and Schuknecht (1999) regress the growth of per capita real GDP on a measure of the general degree of openness in trade, on certain macroeconomic variables and on the concentration ratio for the financial sector. They find a strong positive relationship between growth and competition within the financial sector.

Eschenbach, Francois, and Schuknecht (2000) also place emphasis on the pro-competitive effects of trade in financial services. Since financial services are the nexus of the savings and accumulation mechanism that drives economic growth, they consider it appropriate to emphasize trade in services and growth. By working with a cross-country sample of 93 countries, Eschenbach, et al. (2000) find that there is a strong positive relationship between competition within the financial sector and financial sector openness, and between growth and financial sector competition. Their results suggest that moving from a closed to a relatively open financial services regime is correlated with significant pro-competitive pressure, and ultimately with large differences in growth rates.

A further issue considered in this paper concerns the relationships that exist among the liberalization of the financial sector, competition within the sector, and the sector's overall contribution to economic growth. To identify such relationships, we follow the approach adopted in the recent empirical literature and referred to in Galetovic (1996), Levine (1997), and Eschenbach, Francois, and Schuknecht (2000). This involves cross-country growth regressions, wherein we include a number of variables that seem to perform robustly in the literature. To the mix of variables, we also add measures of

financial sector liberalization and the degree of competition in the financial services sector. Our contribution is mainly to adjust the way in which financial liberalization is measured, which is discussed in the next section, based on the GATS financial commitments.

2   Measures of Financial Sector Liberalization

A key feature of impediments to trade and investment in services is that they tend to be in the form of non-tariff barriers (NTB), such as licensing requirements, standards, outright prohibitions, and so on, which are less transparent and more difficult to measure. An index methodology has thus been used. For instance, McGuire and Schuele (2000) propose a restrictiveness index for banking services and Mattoo, et al. (2001) present a financial index of openness to quantify the nature and extent of restrictions on international trade in financial services.

The liberalization or internationalization of financial services is a complex issue as it is closely related to structural reforms in the domestic financial sector with some perceived implications for macroeconomic stability. The General Agreement on Trade in Services (GATS) schedules for financial services serve as the starting point for compiling a list of liberalization commitments in each economy. After failure to reach agreement at the end of the Uruguay Round, following an interim agreement in July 1995, the negotiations on financial services in the context of the GATS were finally concluded in December 1997. The largest service sector, including all banking and other financial services, and all insurance and insurance-related services, became fully subject to multilateral trade rules. Not only did the agreement consolidate the relatively open policies of industrial countries that account for much of the world trade in financial services, but it also evoked wide participation from both developing countries and countries in transition. The critical point of the GATS negotiations has been the content of schedules for specific commitments that have been submitted by WTO members since 1994. The inclusion in the GATS of the principle of "progressive liberalization (Article XIX)," however, reflects a collective acceptance that liberalization would be gradual.

The GATS commits member governments to engaging in negotiations on specific issues and to entering into successive rounds of negotiations to progressively liberalize trade in services. The first round had to start no later than five years from 1995. Accordingly, the services negotiations started officially in early 2000 under the Council for Trade in Services. The Doha WTO Ministerial of 2001 recognized the large number of proposals submitted by members for a wide range of sectors and also reaffirmed the Guidelines and Procedures for the Negotiations adopted by the Council for Trade in Services on 28 March 2001 as the basis for continuing the negotiations. Participants were to submit initial requests for specific commitments by 30 June 2002 and initial offers by 31 March 2003.

Hoekman (1996) and Hoekman and Primo Braga (1997) compiled overall and sectoral indices of commitments for all GATS members based on the situation prevailing in April 1994. They used values of 0, 0.5, and 1 for "unbound", "bound" and "none" commitments, respectively, relative to the maximum number of sub-sectors listed in the GATS. Kono, et al. (1997) provide summary tables of GATS commitments for four country groupings (developed, transition, developing, and least developed countries), for 1993-1995. Sorsa (1997) contains an annex of selected countries' market access commitments in banking, securities and other financial service sectors, differentiated by mode of supply and by conditionality for the situation as of July 1995. WTO (1998) contains a summary list indicating whether countries have commitments in financial services, as of December 1998. Mattoo (1998) updates and deepens the previous analyses of commitments, and also examines some of the economic implications. McGuire and Schuele (2000), in order to capture financial sector developments in some economies, compile a list of non-prudential regulations on entry and operations for banking services from various sources, where the GATS schedules are supplemented by the information from APEC Individual Action Plans, WTO Trade Policy Reviews, and information provided by several countries to the IMF as a requirement for receiving standby credit facilities, etc. Mattoo (2000) constructs commitment

indices for the Second Protocol using a specific weighting scheme, considering the importance of modes[‡] (based on U.S. data) for 105 countries' market access commitments in banking (deposits and lending) and direct insurance (life and non-life).

In line with Mattoo (2000), although differing in a few respects, Valckx (2002) presents a comprehensive computation of the WTO financial services commitments from the Fifth Protocol (1997-1999) for all 92 signatories. When a country explicitly states it is "unbound" against a sector/mode, Valckx (2002) believes that this is slightly better than a blank entry, and hence the score 0.05 is given instead of 0. Licensing subject to requirements was given a slightly higher score than discretionary licensing, to make a distinction between the two limitations (0.30 and 0.35 instead of 0.25).

The estimates of the measures for the liberalization of services trade in the previous literature, however, still have several shortcomings. The revisions deployed in this paper thus include:

(i)   **Further Scoring for Partial Commitments:**

With respect to each mode, in most studies, a numerical value of 0 was attached to entries that were "unbound" and a value of 1 to entries that were characterized by "none". Due to the difficulty in judging how the presence of specific restrictions is to be evaluated, Hoekman (1995) and Mattoo (1998) assigned scores for each partial commitment (the parts besides those denoted as "unbound" and "none") in the GATS schedules by each member in total as "0.5". In this way, however, the information involved

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[‡] The GATS provides a detailed breakdown of sub-sectors within the financial services sector and also distinguishes between four possible modes of supply, listed as cross-border supply (Mode 1), consumption abroad (Mode 2), commercial presence (Mode 3), and the presence of natural persons (Mode 4). Basically, modes 1, 2 and 4 are all different forms of cross-border supply, whereas mode 3 generally involves investment in the service-importing economy.

within different degrees of liberalization was lost. This paper thus adopts the formula proposed by Switzerland (TN/S/W/51, September 2005) to deal with this issue more delicately.

In the methodology developed by Switzerland, each member's specific commitments are entered into an Excel sheet according to an arithmetic formula (continuous function) defined as follows:

$$C^n$$

where:

C = any coefficient between 0 and 1. For practical purposes, the coefficient is set at 0.5. However, it could be any number given that it equally applies to all schedules. The value of the coefficient is not of particular relevance since comparability across commitments and members is at the heart of the exercise; n = number of scheduled restrictions in one entry.

The formula is based on two considerations. First, each limitation to market access and/or national treatment is an additional burden for the service supplier (or consumer). Therefore, an accurate and reliable methodology has to allow barriers to trade for every scheduled limitation to be tracked. Second, it is assumed that the marginal burden that falls on the service supplier due to an additional limitation is decreasing.

For simplicity, the number of scheduled restrictions affecting market access and national treatment is counted according to the classification specified in Bosworth, Christopher, Trewin and Warren (2000), where, to avoid missing any other kind of restrictions, one more measure affecting market access, i.e. "other", is added besides the classification specified in Article XVI of the

GATS:

A. Measures affecting market access

(a)   Limitations on the number of service suppliers;

(b)   Limitations on the total value of service transactions or assets;

(c)   Limitations on the total number of service operations or on the total quantity of service output;

(d)   Limitations on the total number of natural persons that may be employed in a sector;

(e)   Measures which restrict or require specific types of legal entity or joint venture; and

(f)   Limitations on the participation of foreign capital;

(g)   Other measures affecting market access

B. Measures affecting national treatment

(a)   Discriminatory taxes;

(b)   Discriminatory incentives/subsidies;

(c)   Government procurement policies;

(d)   Local content requirements;

(e)   Nationality, citizenship or residence requirements; and

(f)   Other measures affecting national treatment

(ii)   **Covering Mode 4 and All Sub-Sectors Listed in the Annex on Financial Services:**

Most of the studies in the literature, including Hoekman (1995),

Barth, Caprio, and Levine (2001), and Mattoo, Rathindran, and Subranmanian (2001), do not take into account the commitments in relation to Mode 4---the movement of natural persons. McGuire and Schuele (2000) and Claessens and Glaessner (1998), on the other hand, do cover Mode 4, though not completely. This paper computes the scores of the index for this part based on the classification summarized in the WTO document (JOB(03)/195), which describes frequently-used categories of natural persons included under Mode 4 in the horizontal section of members' schedules of specific commitments. The four main categories are intra-corporate transferees (ICT), business visitors (BV) and service salespersons (SS), contractual service suppliers (CSS) (this includes employees of juridical persons and independent professionals), and other categories (such as graduate trainees and spouses and partners of ICT).

In addition, this paper takes into account the overall sub-sectors listed in the Annex on Financial Services, which most studies, such as Claessens and Glaessner (1998), Mattoo (1998), and McGuire and Schuele (2000), do not cover as completely.

Table 1. Scoring Liberalization Index for M4

The criteria for the scoring liberalization index for M4	Score
1．Unbound	0
2. (1) Only referring to general requirements for entry, including the economic need test (ENT) or making reference to laws and regulations, or	0.25
(2) Conditionally allowing the entry of 1~2 kinds of the above-mentioned natural persons	0.25

3. (1) Unconditionally allowing the entry of 1~2 kinds of the above-mentioned natural persons	0.5
(2) Conditionally allowing the entry of 3~4 kinds of the above-mentioned natural persons	0.5
4. Unconditionally allowing the entry of 3~4 kinds of the above-mentioned natural persons	0.75
5. None, except for prudential regulations	1

(iii) Weighting on Four Modes:

The available statistics do not enable a precise identification of the patterns of trade based on different modes. The only country that reports statistics on establishment trade on a regular basis is the United States. We therefore follow Mattoo (1998), which adopts the data in "United States Financial Services Trade by Mode of Supply, 1994" to decide the weight of each mode when calculating the final index for each member[§]. Since Mattoo (1998) does not include Mode 4, our modal weights presented in Table 2 are not quite the same as those in Mattoo (1998). In our calculation, establishment trade in the sub-sector of insurance is four times that of cross-border trade in the same sector. In banking and securities services, establishment trade is two and a half times the cross-border trade. Besides, cross-border trade is about four times the consumption abroad regardless of whether the trade takes place in insurance or in banking and securities services. A key difference between cross-border trade and

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[§] In the "Symposium on the Cross-border Supply of Services," which was held on 28-29 April 2005 in the WTO, the Secretariat of the GATS reported the weights for the four modes, as 0.35, 0.12~0.15, 0.5, and 0.01~0.02, respectively. However, these figures are derived on an aggregated level covering all service sectors.

consumption abroad is that, under the GATS, commitments to allow the cross-border supply of a service oblige a member to allow the necessary capital movements, while those that allow consumption abroad do not. Therefore, the former commitments can be argued to have much greater value than the latter. It is recognized, nevertheless, that these weights provide only the roughest idea of the relative importance of modes, and we find, compared with another result based on the calculation that involves using a simple-weighted average, that the results are not very sensitive to changes in their values.

While these statistics confirm that commercial presence is currently the most important mode for supplying financial services, as pointed out by Mattoo (1998), its relative importance is likely to differ between sub-sectors. For instance, it would seem that consumers are much less likely to make cross-border purchases of life insurance than freight insurance. Similarly, they are less likely to deposit money in a bank located abroad than to borrow money from a bank located abroad.

Table 2.   Distribution of Weights among Four Modes in the Financial Sector

Sub-sector Mode	All Insurance and Insurance-Related Services	Banking and Other Financial Services
Mode 1	0.18	0.24
Mode 2	0.045	0.06
Mode 3	0.75	0.6
Mode 4	0.025	0.1

This research shows that, based on the GATS commitments in the overall financial sectors throughout the four modes of supply offered by ninety-three WTO members, the degree of liberalization in terms of market access and national treatment are highly correlated. In other words, a member with a high (low) degree of liberalization in relation to market access normally possesses a high (low) degree of liberalization with respect to national treatment. In addition, the correlations in terms of the liberalization index between the

insurance industry and the banking-and-others industry during the periods 1994-2000 and 2001-2005 are 70.04% and 71.03%, respectively. This implies that a member with a high (low) degree of liberalization in one of these two sub-sectors in financial services tends to have a high (low) degree of liberalization in the other sub-sector.

Under mode 1 (cross-border supply), 2 (consumption abroad), and 3 (commercial presence), the degree of liberalization of market access is positively correlated with the income level; however, there is no such link under mode 4 (movement of natural persons). In the WTO, the group of developing countries, due to their abundant labor resources, promotes liberalization under mode 4 the most. By contrast, the group of developed countries is modest in terms of liberalizing under mode 4 and focuses more on the issues of improving transparency and procedures related to the movement of natural persons.

When compared with the performance of liberalization across the four modes, higher income members (including high-income OECD countries, high-income non-OECD countries, and upper-middle-income countries) have, on average, the highest level of market access liberalization under mode 2. Considering the difficulty involved in regulating consumption abroad, many WTO members therefore choose to liberalize the market access under mode 2. However, with regard to the national treatment part, mode 3 appears to have the highest degree of liberalization regardless of the income level.

Under the GATS, more commitments have been made in the financial services sector than in most of the service sectors, although these commitments are generally characterized by a concern to allow foreign equity in existing institutions and to protect the position of incumbents rather than to encourage the new entry of additional foreign institutions. With the extent of new liberalization affected by GATS commitments in regard to financial services still somewhat limited, however, the degree of liberalization over the 2001-2005 period, as shown in Table 3, is overall higher than that during the 1994-2000 period. It can be found that the group of low-income countries and high-income non-OECD countries has improved the most.

In fact, many members in the past bound either at the level of their existing practice or at a level lower than their existing practice. In the latter cases, GATS commitments were of course a misleading indicator of the extent to which liberalization had actually taken place. Subsequent unilateral liberalization by some members widened the gap between GATS commitments and actual practice. The "binding" of such new unilateral liberation initiatives is a possible objective in the Doha Development Agenda (DDA) negotiations on services, and "credit" for such "autonomous liberalization" is an important negotiating issue for those economies that have engaged in it, for example, Korea and Taiwan (PECC International Secretariat, 2003).

Table 3.　Comparison of the Liberalization Index for Financial services in the Two Period 1994~2000 & 2001~2005 ---Classified by Income Level

(Sub) Sector / Income Level	Number of Countries Included[1]	All Insurance and Insurance-Related Services （1）		Banking and Other Financial Services （2）		Financial Services （3）		
		1994~2000 (Weighted-Average among Modes)	2001~2005 (Weighted-Average among Modes	1994~2000 (Weighted_Average among Modes)	2001~2005 (Weighted-Average among Modes)	1994~2000[2]	2001~2005[2]	%change from 1994~2000 to 2001~2005
High income OECD Countries	24	0.6904	0.7584	0.7173	0.7763	0.7038	0.7674	9.04%
High income non-OECD Countries	13	0.4821	0.6364	0.432	0.4708	0.4571	0.5536	21.11%
Upper middle income Countries	25	0.4947	0.5625	0.4569	0.4577	0.4758	0.5101	7.21%
Low middle income Countries	27	0.4428	0.4708	0.3625	0.3761	0.4027	0.4235	5.17%
Low income Countries	4	0.2658	0.3319	0.233	0.2852	0.2494	0.3086	23.74%

3 Empirics of Financial Liberalization and Growth

This section reports our empirical examination of the relationship between

financial liberalization and macroeconomic performance. Our data are drawn from various sources and provide a set of indicators for WTO members for the periods 1994-2000 and 2001-2005. (These data are available from the authors upon request.) The variables we work with are detailed in Table 4. We are ultimately interested in economic growth, for which we take the average growth rate for per-capita income for the periods 1994-2000 and 2001-2005, respectively. Based on the literature, we also work with the role of the private sector in the financial sector as measured by the share of credit in the private sector (as a measure of financial development), the degree of trade openness (measured by the share of total trade in GDP), and the standard deviation of inflation over these two periods (as an indicator of macroeconomic stability). Initial per-capita GDP serves as an overall indicator of development. Country size is measured by GDP, and scaled by world GDP. Finding a general cross-country measure of the degree of competition in finance is problematic at best. We employ the share of domestic banking assets held by the three largest banks to measure the degree of competition in banking[**]. Other general economic indicators include schooling levels, institutional factors (measures of corruption, law and order, and bureaucratic quality), as well as population growth over the two periods.

For financial sector liberalization, as mentioned in the previous section, we use a crude estimate of tariff-equivalents for trade in financial services based on GATS commitments within the WTO. The GATS commitments on financial services submitted by each member within the periods 1994-2000 and 2001-2005 were adopted to calculate the liberalization index for financial services. A total of 93 out of 149 WTO members offered financial commitment schedules over the period 2001-2005. Some members even revised their commitment more than once (55 members submitted revised offers, while 38 members provided only initial offers). In this study, we use the most updated commitment that was submitted by each of these members

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[**] The concentration ratio is an outcome-based variable, and, moreover, a misleading indicator of the level of competition in the banking system because a concentrated market for banking services can still be contestable. A large number of developed countries such as Canada and many European countries have banking systems characterized by a small number of banks, but still produce competitive outcomes.

within these two periods. Due to the difficulties encountered in obtaining some of the data on the variables covered in the regression for some members, we will have to ignore these members in our analysis. The number of panel data for these two periods, nevertheless, is more than 140 altogether. Since our interest in this study is on the aggregate performance of financial liberalization for WTO members, any information regarding the degree of commitment for individual members will not be reported in this paper.

Table 4. Overview of Datasets

(1) *PCGDPGR*

The average of the per capita growth rate over the respective 1994-2000 and 2001-2005 periods.

(2) *COMMITTOBANK*

Score on the index of financial liberalization calculated from each WTO member's GATS commitments in financial services (excluding insurance).

(3) *COMMITTOALL*

Score on the index of financial liberalization calculated from each WTO member's GATS commitments in financial services (including insurance).

(4) *CONCENTRATION*

Concentration in the financial sector: the assets of the 3 largest banks as a share of total assets as a percentage, averaged over 1994-2000 and 2001-2005, respectively.

(5) *PRIVATE*

Credit to the private sector as a percentage of total credit.

(6) *TRADE*

Trade openness, exports plus imports over GDP, averaged for the periods 1994-2000 and 2001-2005, respectively.

(7) *INFLATION*

The standard deviation of the inflation rate over the respective 1994-2000 and 2001-2005 periods.

(8) *PCGDP90*

Per-capita GDP in 1990

(9) *SECOND90*

The secondary school enrollment ratio in 1990.

(10) *INSTITUTION*

General conditions of corruption, law and order, and bureaucratic quality (from Political Risk Services), ranging from 0 to 6 where 6 is the best, averaged for the periods 1994-2000 and 2001-2005, respectively.

(11) *POPGR*

Average rate of population growth over the periods 1994-2000 and 2001-2005.

(12) *SIZE*

Total value of GDP, averaged over the periods 1994-2000 and 2001-2005.

Three sets of equations are specified to identify patterns in the data with regard to the relationship between financial liberalization and macroeconomic performance:

- Model (A):

$$PCGDPGR_i = a_0 + a_1 COMMITTOBANK_i + a_2 CONCENTRATION_i + a_3 PRIVATE_i$$
$$+ a_4 TRADE_i + a_5 INFLATION_i + a_6 PCGDP90_i + a_7 SECOND90_i$$
$$+ a_8 INSTITUTION_i + a_9 POPGR + \varepsilon_i --------------(1)$$

$$CONCENTRATION_j = b_0 + b_1 COMMITTOBANK_j + b_2 SIZE_j + \varepsilon_j -------(2)$$

- Model (B):

$$PCGDPGR_i = a_0 + a_1 CONCENTRATION_i + a_2 PRIVATE_i + a_3 TRADE_i$$
$$+ a_4 INFLATION_i + a_5 PCGDP90_i + a_6 SECOND90_i + a_7 INSTITUTION_i$$
$$+ a_8 POPGR + \varepsilon_i -----------------------(1)$$

$$CONCENTRATION_j = b_0 + b_1 COMMITTOBANK_j + b_2 SIZE_j + \varepsilon_j -------(2)$$

- Model (C):

$$PCGDPGR_i = a_0 + a_1 COMMITTOALL_i + a_2 COMMITTOALL_i^2$$
$$+ a_3 CONCENTRATION_i + a_4 PRIVATE_i + a_5 TRADE_i + a_6 INFLATION_i$$
$$+ a_7 PCGDP90_i + a_8 SECOND90_i + a_9 INSTITUTION_i + \varepsilon_i ----- (1)$$

Equations (1) and (2) of model (A) test the direct and indirect links between banking liberalization and economic growth. *COMMITTOBANK* is included in equation (2) to reflect the impact of financial sector liberalization on competition, and is also included in equation (1) of model (A) to catch the effects related to trade in financial services missed by the competition link of equation (2). Model (B) (equation (2)) tests only the indirect link between banking liberalization and economic growth, where we have left out the direct *COMMITTOBANK* term in equation (1) and the effects related to trade in financial services is then subsumed into the *CONCENTRATION* term. In equation (2) of models (A) and (B), *SIZE* is included because, as discussed in Francois and Schuknecht (1999), larger markets can imply more scope for competition, particularly if scale economies are present. Model (C) explores the direct relationship between the total financial liberalization and economic growth (such as Mattoo, Rathindran, and Subramanian, 2001), where the term *COMMITTOBANK* is replaced by the term *COMMITTOALL* to take into account the impact of liberalization on the financial sub-sectors overall.

The two-stage least squares (TSLS) and weighted least squares (WLS) estimates of models (A) and (B) are presented in Table 5. The TSLS procedure is applied to remove the endogeneity effects so as to yield consistent estimates. The WLS is employed to take into account the heteroskedasticity problem. For model (C), WLS estimations are performed. In terms of the standard cross-country growth variables, they generally emerge with the expected sign, though not always with significant coefficients. The most robust variables in this regard are the initial per-capita GDP and the indicator of the general conditions of corruption, law and order, and bureaucratic quality (*PCGDP90* and *INSTITUTION*). Our measures of financial sector competition, *CONCENTRATION*, consistently emerge with a significant coefficient and the

expected sign. In equation (2) of models (A) and (B), our financial liberalization variable *COMMITTOBANK* emerges with a coefficient that is significant with respect to concentration at the 1% level and also possesses the expected sign. The *SIZE* variable is significant at the 10% level, and has the expected sign.

As to model (C), the estimated signs of the *COMMITTOALL* (negative) and *COMMITTOALL*^{2} (positive) show that the overall financial liberalization, that includes the insurance, banking, and other sectors, first has a negative impact on the economic growth, and then the impact becomes positive.

To sum up, these results with regard to financial sector competition and growth, which are taken together with the apparent link between competition and liberalization, point to the following pattern in the data. Open financial sectors are more competitive, and more competitive financial sectors are strongly correlated with higher growth rates. Hence, through pro-competitive effects, trade in financial services may enhance growth rates.

Table 5. Two-Stage Least Squares (TSLS) and Weighted Least Squares (WLS) Estimates

	Model A		Model B		Model C（WLS）	
	Coefficient	t-Ratio	Coefficient	t-Ratio	Coefficient	t-Ratio
Dependent variable	PCGDPGR		PCGDPGR		PCGDPGR	
COMMITTOBANK	0.4530	0.368				
COMMITTOALL					-6.2916**	-2.402
COMMITTOALL^2					5.4529**	2.433
CONCENTRATION	-0.0596**	-2.215	-0.0337*	-2.823	-0.0164**	-2.302
PRIVATE	0.0011	0.881	0.0013	1.182	-0.0012	-0.873
TRADE	0.0007	-0.194	0.0053**	2.169	0.0034	1.498
INFLATION	-0.0027	-1.311	-0.0019	-1.037	-0.0002	-0.196
PCGDP90	-0.0002*	-5.050	-0.0002*	-5.989	-0.0002*	-7.157
SECOND90	0.0021	0.168	0.0147	1.605	0.0363*	4.536
INSTITUTION	0.6473*	4.200	0.2949*	3.579	0.2688*	3.558
POPGR	-0.7436*	-3.127	-0.8606*	-4.830		
	R^2	0.322	R^2	0.299	R^2	0.205
	OBS	141	OBS	146	OBS	144

Weighted Least Squares Estimates,
(weight=SIZE*COMMITTOBANK)

	CONCENTRATION	
Dependent variable		
COMMITTOBANK	-24.5709*	-3.246
SIZE	-20.7968***	-1.813
	R^2	0.943
	OBS	161

1. The t-Ratio refers to the heteroskedasticity-robust t statistic.

2. * denotes significant at the 1% level; ** significant at the 5% level; *** significant at the 10% level

4 Concluding Remarks

In this paper, we adopt panel data covering the period from 1994 to 2005, including the WTO commitment schedule on financial services, which is currently the most comprehensive world financial liberalization information, to analyze the relationship between financial liberalization and economic growth. The WTO commitment schedules of 93 countries are covered, of which 38 had already proposed their initial offers and 55 (the EU member countries are treated as individual members) had proposed their revised offers. In the analysis, we introduce several amendments, based on the method adopted by Hoekman (1995) and other related studies, to calculate the financial liberalization indices. These amendments include further scoring for partial commitments, covering mode 4 and all sub-sectors listed in the Annex on Financial Services, and weighting on four modes. Regarding the model's specification, we deploy the empirical model developed by Eschenbach, Francois, and Schuknecht (2000), which we mainly use for the analysis of the relationship between financial liberalization and economic growth. Through our two-stage examination, which includes a negative correlation between the degree of concentration and the index of liberalization in the banking industry, as well as a negative correlation between the degree of concentration and economic growth, we conclude that there is a positive correlation between the liberalization of the banking industry and economic growth.

Under the GATS, more commitments have been made in the financial services sector than in most other service sectors, although these commitments are generally characterized by a concern to allow foreign equity in existing institutions and to protect the position of incumbents rather than encourage the new entry of additional foreign institutions. With the extent of new liberalization affected by GATS commitments in regard to financial services still somewhat limited, however, the degree of liberalization over the 2001-2005 period is overall higher than that during the 1994-2000 period. It can also be found that the group of low-income countries and high-income non-OECD countries has improved the most. When compared with the performance of liberalization across the four modes, higher income members

(including high-income OECD countries, high-income non-OECD countries, and upper-middle-income countries) have, on average, the highest level of market access liberalization under mode 2. One of the main reasons for this is that, considering the difficulty involved in regulating consumption abroad, many WTO members choose to liberalize the market access under mode 2. However, with regard to the national treatment part, mode 3 appears to have the highest degree of liberalization regardless of the income level. Besides, under modes 1, 2, and 3, the degree of liberalization of market access is found to be positively correlated with the income level. However, there is no such link under mode 4.

This study also shows that, based on the GATS commitments in the overall financial sectors throughout the four modes of supply offered by 93 WTO members, the degree of liberalization in terms of market access and national treatment are highly correlated. In addition, the correlations in terms of the liberalization index between the insurance industry and the banking-and-others industry during the periods 1994-2000 and 2001-2005 are both higher than 70%. This implies that a member with a high (low) degree of liberalization in one of these two sub-sectors in financial services tends to have a high (low) degree of liberalization in the other sub-sector.

Given that the increase in the intensity of competition through the liberalization of the banking industry contributes to higher economic growth, as shown in this paper, this implies that, at least in the case of Taiwan, the domestic competition structure should hold while the country tries to raise the global competitiveness of its financial institutions. Even though the financial institutions may need to enlarge their market sizes in response to the increased global competition, the larger market size is not necessarily better for the economy as a whole. Besides the size factor, it still necessary to cope with several other factors, such as improving R&D, management skills, and marketing strategies, etc. The relevant government regulation and policy should not be justified based on a single objective, as it could jeopardize domestic economic growth in the future.

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