TI 2002-089/2
Tinbergen Institute Discussion Paper

Financial Sector Competition, Services Trade, and Growth

Joseph F. Francois[1,2]
Felix Eschenbach[1]

[1] *Faculty of Economics, Erasmus University Rotterdam, and Tinbergen Institute,*
[2] *CEPR.*

Tinbergen Institute
The Tinbergen Institute is the institute for economic research of the Erasmus Universiteit Rotterdam, Universiteit van Amsterdam and Vrije Universiteit Amsterdam.

Tinbergen Institute Amsterdam
Keizersgracht 482
1017 EG Amsterdam
The Netherlands
Tel.: +31.(0)20.5513500
Fax: +31.(0)20.5513555

Tinbergen Institute Rotterdam
Burg. Oudlaan 50
3062 PA Rotterdam
The Netherlands
Tel.: +31.(0)10.4088900
Fax: +31.(0)10.4089031

FINANCIAL SECTOR COMPETITION, SERVICES TRADE, AND GROWTH[†]

Joseph F. Francois
Tinbergen Institute and CEPR

Felix Eschenbach
Tinbergen Institute

This version September 2002

Keywords: financial services trade, financial sector openness, service trade and imperfect competition, trade in services and growth, banking and growth

JEL codes: [F40], [F13], [F43], [G15]

†. This paper represents our opinions, and is not meant to represent the official position or view of any organization with which we may have ever been affiliated. All remaining errors are due to confusion on the part of the authors.

ABSTRACT

We explore dynamic linkages between financial/banking sector openness, financial sector competition, and growth. We first develop an analytical model, highlighting links between long-run economic performance and services trade, through scale economies and market and cost structures in the financial services sector. This is followed by an econometric exercise based on data for 130 countries for the 1990s. Our results point to a strong positive relationship between financial sector competition/performance and financial sector openness (meaning foreign bank access to domestic markets), and between growth and financial sector competition/performance. They also point to the presence of scale economies in the sector.

Keywords: financial services trade, financial sector openness, service trade and imperfect competition, trade in services and growth, banking and growth

JEL codes: [F40], [F13], [F43], [G15]

Joseph F. Francois
Faculty of Economics, H8-18
Erasmus University Rotterdam
Burg. Oudlaan 50
3062PA Rotterdam
NETHERLANDS

voice: +31 10 408 1256
fax: +31 10 408 9146
email: francois@few.eur.nl
http://www.intereconomics.com/francois

Felix Eschenbach
Tinbergen Institute
Erasmus University Rotterdam
Burg. Oudlaan 50-H16-10
3062PA Rotterdam
NETHERLANDS

Voice: +31 10 408 8924
Fax: +31 10 408 9146
Email: eschenbach@few.eur.nl
http://www.tinbergen.nl

NON-TECHNICAL SUMMARY

This paper explores issues that straddle two different literatures. First, they relate directly to the nascent literature on trade in services, and to the impact of services trade, in terms of foreign bank/institutional participation in domestic capital markets, on economic performance. Second, they are also closely related, though not identical, to those issues found in the strand of the finance and growth literature involving capital market liberalization and financial flows restrictions. The mechanisms we highlight are linked to the pro-competitive effects of openness, and come on top of those emphasized in the current literature on financial sector development.

Our approach involves a mix of theory and empirics. We first formalize linkages between banking/financial sector competition, scale, openness, and growth. These analytics motivate an empirical exercise, based on a sample of 130 countries that covers their experience in the 1990s. These date include standard cross-country growth indicators (macroeconomic stability, inflation, etc.), along with finance sector indicators (financial openness, banking concentration, etc.). In cross-country regressions on data for 130 countries in the 1990s, we find that there is a strong positive relationship between financial sector competition and financial sector openness, and between growth and financial sector competition.

FINANCIAL SECTOR COMPETITION, SERVICES TRADE, AND GROWTH

Joseph F. Francois
Tinbergen Institute and CEPR

Felix Eschenbach
Tinbergen Institute

Abstract: We explore dynamic linkages between financial/banking sector openness, financial sector competition, and growth. We first develop an analytical model, highlighting links between long-run economic performance and services trade, through scale economies and market and cost structures in the financial services sector. This is followed by an econometric exercise based on data for 130 countries for the 1990s. Our results point to a strong positive relationship between financial sector competition/performance and financial sector openness (meaning foreign bank access to domestic markets), and between growth and financial sector competition/performance. They also point to the presence of scale economies in the sector.

Keywords: financial services trade, service trade and imperfect competition, trade in services and growth, financial competition

JEL codes: [F40], [F13], [F43]. [G15]

I. INTRODUCTION

In the early neoclassical growth literature, financial services played a passive role, simply funneling household savings to investors. Goldsmith [1969] and McKinnon [1973] were among the first to make a break from this mold, emphasizing a more active role for financial services in promoting growth. Since then, a considerable theoretical and empirical literature has emerged analyzing the role of finance in growth and development.

This paper explores issues that straddle two different literatures. First, they relate directly to the nascent literature on trade in services, and to the impact of services trade, in terms of foreign bank/institutional participation in domestic capital markets, on economic performance.[1] Second, they are also closely related, though not identical, to those issues found in the strand of the finance and growth literature involving capital market liberalization and financial flows restrictions.[2] The mechanisms we highlight are linked to the pro-competitive effects of openness, and

[1] Traditionally, the formal trade literature has focused on trade in goods, with the literature on services trade being a relatively limited and recent addition. While there is a sizable empirical literature on service sector policy and deregulation, this is largely focused on domestic deregulation. A thorough overview is provided by WTO 1998).

[2] See the survey of Edison, Klein, Ricci, and Sløk (forthcoming).

come on top of those emphasized in the current literature on financial sector development.

The recent empirical literature emphasizes two ways in which financial services affect growth -- capital accumulation and 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 general, the approach involves employing financial sector development indicators as independent variables in growth regressions. Most of this literature has looked at (i.) indicators of banking sector development, and the degree of private sector involvement in financial services and the allocation of savings, and (ii.) distortion and financial service cost measures. In addition, a few studies have examined the relationship between stock-market development and growth. No real emphasis is placed on the role of traded financial services. By this, we mean focus on identification of a possible causal chain linking financial sector openness, financial sector performance, and growth performance.

DeGregorio and Guidotti [1995] report a significant link between private sector credit and economic growth, while Demetriades and Hussein [1996] and Jung [1986] 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. Arestis, Demetriades and Luintel (2001, 5 countries using time-series techniques) find only weak evidence for the hypothesis that stock market activity accelaretes growth. The empirical results of the latter attribute more weight to the role of banks in promoting growth.

While the empirical literature has moved us from assumptions of a passive financial intermediation mechanism to explicit linkages between intermediation and growth, the role of open markets in general, and financial sector openness (in a trade sense) in particular, has not been emphasized. However, one step in this direction is recent work linking openness with financial development and performance. For example, Claessens and Glaessner [1998] have shown that barriers to financial services trade have slowed down the development of financial markets in East Asia. while Claessens, Demirgüç-Kunt and Huizinga [1998] have shown that greater foreign presence reduces profit margins for domestic banks in developing country financial sectors. In our view, this suggests the first link in the causal chain explored here between financial sector openness, financial sector performance, and economic growth.

Our approach here involves a mix of theory and empirics, and is organized as follows. First, in Section II we develop a model that highlights linkages between banking/financial sector competition, scale, openness, and growth. This motivates our empirical exercise in Section III, which is based on a sample of 130 countries,

covering their experience in the 1990s. These date include standard cross-country growth indicators (macroeconomic stability, inflation, etc.), along with finance sector indicators (financial openness, banking concentration, etc.). We find strong evidence for a link between financial sector openness, competition in local financial service markets, and economic growth. We summarize in Section IV.

II. THEORY

A. Basic Structure

We start by exploring linkages between competition, openness and growth analytically. This helps to motivate the empirical exercise offered in the next section. We are primarily concerned with the location of finance firms at the nexus of the savings and investment mechanism, and the implications of services trade and competition for the working of this mechanism.

We first assume that the national GDP function is Cobb-Douglas.

$$Q = AK^{a}L^{1-a} \tag{1}$$

In equation (1), Q is GDP, K is production capital, L is labor and $0<a<1$. The composite Q also serves as the numeraire good. We assume a Ramsey-type long-run macroeconomic closure, with constant relative risk aversion (CRRA) preferences defined over consumption of the composite good Q and with consumers engaged in intertemporal optmization. This means the model has certain well-known properties. In particular, consumers strike a balance between present and deferred consumption, yielding the following modified version of the well-known steady-state condition in equation (2).

$$r = r + d + f \tag{2}$$

In equation (2), r is the return earned by capital in the steady-state, r is the subjective rate of time discount, d is the rate of capital stock depreciation, and f is the cost of financial intermediation (i.e. the payment made in units of numeraire Q as discussed below).

The critical assumption at this juncture is that financial service firms provide a necessary bridge between savings (i.e. the creation of financial capital) and actual investment (the creation of physical capital available for investment expenditures). The theoretical literature on financial intermediation is extensive, and offers numerous alternative explanations for the observation of intermediation activities.[3] All that we require here is that in the reduced form financial intermediation involves a

[3] Examples include Diamond (1984,1991), Leland and Pyle (1977), and Williamson (1987a, 1987b).

real resource cost that drives a wedge between the gross returns earned by physical capital and the net returns realized by financial capital owners.

To facilitate simplification of the analytics we employ several normalizations. These follow from the following assumption. While we have assumed a concave aggregate production technology in terms of K and L, we also assume Ricardian (i.e. linear) transform technology between the composite Q and each of its alternative uses as (i.) consumption good C, (ii.) investment good (physical capital) K and (iii) financial services F. Hence we define units so that one unit of Q yields one unit of C or K, and we assume that financial intermediation activities are also scaled so that one unit of financial services (at price f) is required per physical capital unit per period. The resource cost and pricing of financial services is discussed below.

The market for Q is competitive, as are factor markets. Capital and Labor both earn their value of marginal product measured in units of the numeraire Q. Hence, from the first order conditions, we will have $r = aQ/K$. Combining this with the steady-state condition in equation [2] allows us to derive the following steady-state values (for a given price of financial services):

$$\begin{aligned} Q^* &= A\Psi^{a/1-a} L \\ K^* &= \Psi^{1/1-a} L \\ S^* &= d\Psi^{1/1-a} L \end{aligned} \tag{3}$$

In equations (3) a * denotes a steady-state value while $\Psi = aA/(r+d+f)$ and S denotes the level of financial savings.

To close the system we specify the competitive structure of financial markets so that f is determined along with the other variables in equation (3). To do this we assume a Cournot-Nash equilibrium in the financial services sector, with constant marginal cost in the financial services sector (measured in units of Q) represented by b. There are n financial service firms. For now, assume that the value of n is simply set directly by regulatory authorities. These firms set quantities strategically in the sense that they are engaged in a game where they exercise market power by limiting the level of services supplied (or identically they strategically set the size of the investment basket they are willing to service). We adopt the classic Cournot assumption. Each firm believes that other firms will not adjust quantities when it does.

What does equilibrium look like in the region of the steady-state? From equations (3), we can derive the demand elasticity for financial services in the region of the steady-state:

$$e^* = -\left[\frac{f}{1-a}\right][r+d+f]^{-1} < 0 \tag{4}$$

The Nash equilibrium conditions combined with equation [4] then give us the following relationship between n and ϕ in the region of the steady-state.

$$f^* = -\frac{-bn-(1-a)r-(1-a)d}{n-(1-a)} \tag{5}$$

where $\partial f^* / \partial n = \frac{b}{n-(1-a)} + \frac{-bn-(1-a)r-(1-a)d}{n-(1-a)} < 0$ since $\frac{b(n-(1-a))}{(n-(1-a))^2} < \frac{bn}{(n-(1-a))^2}$.
Entry implies lower prices, and hence through equation (2) higher steady-state capital stocks, with related implications for the transition path from one steady-state to another. Directly lowering prices through trade will have similar effects, as would entry of foreign banks into a domestic oligopoly. We explore these issues in the next subsection.

Making a substitution into equation (3) yields the steady-state per-capita capital stock.

$$k^* = \left[\frac{n(r+d+b)}{aA(n-(1-a))}\right]^{\frac{1}{-(1-a)}} \tag{6}$$

So far we have assumed the number of firms is set endogenously. To close the system, we are now going to add conditions sufficient to determine the number of firms n. In formal terms, we specify a limit entry condition. If unit profits are below a critical level π, firms exit, and if they are above this level, we have entry. The critical level could, for example, represent a regulatory target for long-term financial institution health. (It could also, of course, be zero). With symmetry across banks we then have:

$$f^* = p + \frac{cn}{Lk^*} + b \tag{7}$$

where c represents fixed costs (if any) and b again represents marginal costs. Together, equations (5), (6), and (7) are sufficient to define f, n, and k in the region of the steady-state.

B. Trade and Market Size

There are several ways in which trade may affect long-run capital stocks (and hence transitional and long-run economic performance) in our analytical framework. The simplest approach is to assume a small country, with directly imported financial services setting a maximum price in the domestic market. Regulation and related

trade barriers can be assumed to influence the import price, and hence the domestic price level, directly. From equation (3), we then have:

$$\frac{\partial k^*}{\partial f} = \frac{1}{-(1-a)aA}\left[\frac{r+d+f}{aA}\right]^{\frac{2-a}{-(1-a)}} < 0 \qquad (8)$$

If cross-border services trade barriers are reduced, and this leads to a reduction in financial service prices domestically, we then expect k^* to rise as well.

Under the WTO, "trade" is actually defined as a mix of cross-border trade and local establishment (FDI) in the case of services. We are therefore also interested in the case where foreign banks are allowed to enter the domestic market, where they then act like other banks in the local market. For simplicity, we assume they are subject to local cost conditions in the pure FDI case. This scenario effectively increases the size of n. Assuming that n is allowed to increase (which may require adjustment of any regulatory target for π set by the government), we then have the following effect related to entry of foreign banks from equation (6):

$$\frac{\partial k^*}{\partial n} = \left[\frac{n(r+d+c)}{(n-(1-a))aA}\right]^{\frac{1}{-(1-a)}} > 0 \qquad (9)$$

As in cross-border trade, local establishment can also be expected to have positive medium- and long-run effects related to the evolution of the capital stock.

What happens (as is often the case in developing countries) if the government sets a quantity limit for the foreign banking sector, leaving the rest of the domestic market to domestic firms? If we define $\overline{K}$ as the regulated size of the foreign banking sector, the demand elasticity for the domestic sector is directly related to the size of the foreign banking enclave:

$$\tilde{e}^* = e^* \frac{K^*}{K^* - \overline{K}} \qquad (10)$$

Note that $\overline{K}$ may be set under our trade or FDI scenario. In either case, working through the rest of the system as defined above, market power is weakened by an expansion of $\overline{K}$, implying lower prices and a higher value for k^*.

Next, consider market size. The reader can verify that, under constant returns (i.e. when c=0), the size of the market simply does not matter. However, with scale economies in the banking sector, size plays a pro-competitive role, leading to entry and an increase in the overall capital stock k^* in the steady-state. If we differentiate the system defined by equations (5), (6), and (7), we have the following:

$$\frac{\partial n^*}{\partial L}_{d,a,b,c,p,r} = \frac{c(n^* - (1-a))^2 n^*}{L[(1-a)b + (1-a)r + (1-a)d + (1-a)Lk^* + (n-(1-a))(n-(2-a))c]} > 0 \quad (11)$$

$$\frac{\partial k^*}{\partial L}_{d,a,b,c,p,r} = \frac{ck^*(n-(1-a))}{L[(1-a)b + (1-a)r + (1-a)d + (1-a)Lk^* + (n-(1-a))(n-(2-a))c]} > 0 \quad (12)$$

As is the case with industry studies, we can expect scale economies to imply a link between country size and pricing across a sample. In the present context, this will be reflected by an indirect linkage between country size, concentration, and k^*.

C. Transition Dynamics

The same mechanisms that link services trade in our model with long-run incomes also link financial sector openness with transitional or medium-term economic growth. Consider, for example, a constant returns world initially characterized by a closed banking sector and oligopoly pricing. Starting from the steady-state, prices are given by equation (7), and the steady-state levels of per-capita capital k^* and consumption c^* are then given by the two differential equation system:

$$\dot{k} = 0 = f(k) - (d)k - c \quad (13)$$

$$\dot{c} = 0 = -\Theta^{-1}[f'(k) - (r + d + f)] \quad (14)$$

where Θ is the coefficient of relative risk aversion, and $f(.)$ is the Cobb-Douglas production function defined in equation (1). From the $\dot{c}$ curve we can directly solve for the steady-state level of per-capita capital k^*, and obviously, if we introduce trade in services, such that the price f is driven below its steady-state oligopoly value (recall the discussion of equation [8]), then we will have an increase in steady-state capital stocks. The resulting transition path, with rising consumption (after an initial drop to seed the rise in the capital stock), and rising capital stocks k is shown in Figure 1. In turn, the growth of the capital stock implies a process of medium-term transitional economic growth, as the new capital accumulated through equation [13], fed through equation [1] also then yields GDP growth.

III. EMPIRICS

Following our discussion in Section II, we have a number of candidate relationships for empirical testing. First of all we expect banking sectors in smaller countries to be more concentrated due to economies of scale in the provision of financial services (equation 11). On top of that we want to test whether open financial systems tend to foster competition in the banking sector. More competition, i.e. less concentration in the banking sector, would then drive down market power as reflected in price. (equation 5). The final link in this causal chain is between market power and

economic growth. As the financial sector becomes more efficient the model predicts higher rates of capital accumulation and a transition to a higher steady state capital stock per capita (equations 6, 8, 9, 13). In short, we may expect higher growth rates in the transition, all other things being equal, for countries with more open financial systems and comparable income levels.

We follow the approach of the recent empirical literature. This involves cross-country growth regressions, wherein we include a number of variables that seem to perform robustly in the literature. To this mix of variables, we also add measures of financial sector openness and the degree of competition in the financial services sector. Our data are drawn from a number of sources, and provide a set of indicators for 130 countries for the period 1990-1999, including most of the transition economies. (These data are available from the authors upon request.) The variables we work with are summarized in Table 1. We are ultimately interested in economic growth, for which we take the average growth rate for per-capita income for the period 1990-99. Based on the literature, we also work with the standard deviation of inflation over this period (as an indicator of macroeconomic stability), the degree of trade openness (measured by the share of trade in GDP, and corrected for country size and income level), political stability, and a dummy for the transition economies. Initial per-capita GDP serves as an overall indicator of base period development. Country size is measured by GDP, and scaled by world GDP. Population growth is also the average for the 1990-99 period.

Finding general cross-country measures of the degree of competition in banking is problematic at best. The measures we work with are rough: the share of domestic banking assets held by the three largest banks (effectively a proxy for concentration as developed in the previous section), an index of bank profitability, and a measure of bank markups (see *CONCENT*, *PROFIT*, and *NIM* in Table 1). For financial sector openness we have four measures. One is a crude estimate of tariff-equivalents for financial services trade, based on GATS (General Agreement on Trade in Services) commitments within the WTO. (For details see Hoekman 1995). A second is the Heritage Foundation's "Bank Freedom" index. More definition is provided under the headings *TARREQ, BANKFREE*, and *FOREIGN* in Table 1.

We estimate a simple simultaneous system of three equations. The results are presented in Table 2. The results in Table 2 are based on the following system(s):

$$CONCENT_i = \mathbf{A}\mathbf{X}_{1,i} + e_{1,i} \tag{15.1}$$

$$NIM_i \text{ (or } PROFIT_i) = \mathbf{B}\mathbf{X}_{2,i} + e_{2,i} \tag{15.2}$$

$$PCGR_i = \mathbf{C}\mathbf{X}_{3,i} + e_{3,i} \tag{15.3}$$

The variables included in the right hand side of equations 15 are listed in Tables 2, 3, and 4. Because we are interested in the linkages between growth, competition, and

openness, a system estimation approach makes sense. We then have a number of estimation options available, including three-stage least squares and maximum likelihood. We want to avoid an estimation approach that requires a square dataset (i.e. if we are missing observations from one of the three equations, we drop that observation from all three equations). Given the uneven coverage for some of our indicators (especially when we work with tariff-equivalent data), we are otherwise excluding information available from the full dataset. In addition, our measures of bank markups are themselves rough, and we expect them to be prone to error as well (as implied by the structure of equation 15.2, where *CONCENT* appears on the right hand side, and equation 15.3, where *NIM* or *PROFIT* appears on the right hand side). This means we will have some correlation between right hand side variables and error terms, with transmission of error terms across equations. To handle this and filter the transmission of error terms, we use an approach similar to iterative three stage least squares. Basically, where we have estimated values from elsewhere in the system, we substitute right hand side exogenous variables with the model estimates (or more formally the estimated means conditional on exogenous variables within the system) to then obtain least squares estimates. Like instrument methods, this allows us to effectively sweep error terms transmitted from right hand side variables out of the regression equations above. Unlike those methods, we salvage information in observations dropped under some other approaches (and effectively assuming zero errors for these observations, which will be true on average in large samples) by leaving the actual observations of right-hand side endogenous variable in the regressions if they cannot be estimated elsewhere in the system. To obtain parameter estimates, the entire system is then estimated simultaneously as a constrained minimization problem for the sum of the system squared errors in GAMS (a non-linear programming language used for large-scale numerical problems). [4] The constrained minimization problem is

$$\min \sum_{j=1}^{n}\sum_{i=1}^{3} e_{i,j}^2$$
$$s.t.\ 15.1,\ 15.2,\ 15.3 \qquad (16)$$

We refer to these as "simultaneous error correction" or SEC-based estimators. Note that without the replacement of right-hand side endogenous variables by system estimates, this simply collapses to ordinary least squares estimation.

We are first interested in the relationship between financial sector openness and competition. These estimates (equation 15.1) are presented in Table 2. In equation 15.1, $\mathbf{X}_1$ includes *SIZE* and one of the openness indicators. SIZE is included

[4] GAMS code is available from the authors upon request. Solutions to the problem of system estimation under such conditions can be traced to Theil (1953). The present approach combines instrument variable strategies for non-linear system estimation with sparse information sets methods now being explored for large-scale general equilibrium system estimation (see Francois 2002).

because (see Section II) larger markets imply more scope for competition when scale economies are present. *TARREQ, BANKFREE,* and *FOREIGN* are included as our measures of financial sector openness. The *SIZE* variable emerges as consistently significant at the .01 level. Smaller economies are highly correlated with a greater degree of concentration. Critical to the present exercise, our financial sector openness variables, *TARREQ, BANKFREE,* and *FOREIGN*, all emerge with coefficients that are significant at the .01 level as well. We will examine the policy "significance" of these coefficients, in terms of the size of this effect, after we look at growth.

Consider next the link between market concentration and financial pricing (measured by *NIM* and *PROFIT*). These are included in $\mathbf{X}_2$ above, and are reported in Table 3. They emerge, under all specifications, with significance at the .01 level. Our parameter for financial crisis is less robust, typically being generally significant at the .05 or .10 level.

Finally consider the growth results. These are reported in Table 4. Generally, the standard cross-country growth variables emerge with significant coefficients in the .01 to .05 range. Our measures of financial sector performance, *NIM* and *PROFIT*, all emerge with significant coefficients at the .010 level. This estimated effect is highly robust to the model specification chosen (in terms of openness indicator).

From the results for equations 15, we have identified the following pattern in the data. Open financial sectors appear to be more competitive, leading ultimately to lower financial service prices and profits. Those regimes featuring more competitive financial sectors are in turn strongly linked with higher growth rates. Note also that this effect comes in addition to the effect of other financial variables, as is highlighted in the established literature. The coefficients of the standard growth regression variables including the dummy for transition economies all have the expected signs and generally emerge at high significance levels.

Finally we are interested in how strong the effects are that we have identified. Within our sample, protection in the financial services sector (or identically closed financial sectors) is concentrated in the lower income countries. This is illustrated in Figures 2 and 3. The OECD countries in the sample tend to have the most open financial service sectors, so that the question of gains from liberalization can also be viewed as one particularly relevant for developing countries. Figures 2 and 3 present a striking picture of differences in financial openness mapping to differences in growth. However, many of these differences also follow from other factors (hence the regressions above). Consider our estimates for the *BANKFREE* and *TARREQ* openness indicators. Working from these estimates, and holding all else constant, if a "typical" lower income countries were to move from the openness level characterizing the average lower income regime to the more liberal openness level characterizing the average higher income regime (i.e. a roughly 50% liberalization of financial services trade by these measures), our results suggest that this implies a

difference in growth rates of between roughly 0.4 and 0.6 percent. In other words, based on the coefficients in Table 2, moving across our sample from the average level of openness among the developing countries in our sample to the average among the higher income countries is associated with an increased degree of competition in the financial services sector and in turn with growth rates that are then higher (in the range of 0.4 percent to 0.6 percent per year on a per capita basis). This is in line with other recent estimates of financial development and growth linkages, though the mechanism is different, being grounded in market structure and competition.

IV. SUMMARY

Recent empirical studies have applied both endogenous and bounded growth frameworks to assess the effect of financial service sector development on growth rates and per-capita income levels. In general, the approach involves employing financial sector development indicators as independent variables in growth regressions. Most of this literature has looked at indicators of banking sector development and the degree of private sector involvement in financial services and the allocation of savings, and at distortion and financial service cost measures. In addition, a few studies have examined the relationship between stock-market development and growth.

Along these lines, this paper examines the pro-competitive effects of trade in financial services. We highlight the role of financial services at the nexus of the savings and accumulation mechanism that drives economic growth. Following a brief review of the literature, we develop an analytical model in Section 2 characterized by Ramsey accumulation and an oligopolistic financial services sector. This model is used to highlight channels through which financial services trade may lead to dynamic, pro-competitive effects. This analytical exercise helps motivate the econometric exercise in Section III. In cross-country regressions on data for 130 countries in the 1990s, we find that there is a strong positive relationship between financial sector competition and financial sector openness, and between growth and financial sector competition.

REFERENCES

Arestis, P., Demetriades, P.O., Luintel, K. B., "The Role of Financial Development in Growth and Investment," *Journal of Money, Credit, and Banking* 33 (1), February [2000], 16-41.

Blanchard, O.J. and S. Fischer, *Lectures in Macroeconomics*, MIT Press: Cambridge MA [1989].

Bureau van Dijk, *Bankscope (Financial Sector) Database*, Brussels [2000].

Claessens, S., Demirguc-Kunt, A., and Harry Huizinga "How Does Foreign Entry Affect the Domestic Banking Market," Washington: World Bank Mimeo [1998].

Claessens, S., and Glaessner, T., "The Internationalization of Financial Services in Asia," World Bank PRWP no. 1911 [1997].

De Gregorio, J., Guidotti, P., "Financial Development and Economic Growth," *World Development* 23(3), March [1995], 433-48.

Demetriades, P.O., Hussein, K.A., "Does Financial Development Cause EconomicGrowth? Time-Series Evidence from Sixteen Countries," *Journal of Development Economics* 51(2), [December 1996], 387-411

Diamond, D.W., "Financial Intermediaries and Delegated Monitoring," *Review of Economic Studies* [July 1984], 393-414.

Diamond, D.W., "Monitoring and Reputation: the Choice Between Bank Loans and Directly Placed Debt," *Journal of Political Economy*, [August 1991], 689-721.

Edison, Hali, Michael Klein, Luca Ricci, and Torsten Sløk, "Capital Account Liberalization and Economic Performance: A Review of the Literature," IMF Working Paper (Washington: IMF) [forthcoming].

Francois, J.F., "Flexible Estimation of Non-Linear Systems." Tinbergen Institute working paper [2002].

Goldsmith, Raymond W., *Financial Structure and Development*. New Haven, CT: Yale U. Press [1969].

Hoekman, Bernard, "Assessing the General Agreement on Trade in Services," in Will Martin and L. Alan Winters (eds.) *The Uruguay Round and the Developing Economies*, Discussion Papers No. 307, Washington DC.: The World Bank [1995].

Leland, H. and D. Pyle, "Informational Asymmetries, Financial Structure, and Financial Intemediation," *Journal of Finance* [May 1977], 371-387.

Mattesini, F., "Interest Rate Spreads and Endogenous Growth," *Economic Notes*, 25:1, [1996], 111-29

McKinnon R.I., *Money and Capital in Economic Development*, Washington D.C.: Brookings Institution [1973].

Roubini, N. and Sala-i-Martin, X., "Financial Repression and Economic Growth," *Journal of Development Economics* 39 [1992], 5-30.

Williamson, S.D., "Costly Monitoring, Loan Contracts, and Equilibrium Credit Rationing," *The Quarterly Journal of Economics* [February 1987a], 135-145.

Williamson, S.D., "Financial Intermediation, Business Failures, and Real Business Cycles," *Journal of Political Economy* [December 1987b], 1196-1216.

World Trade Organization (WTO), "Economic Effects Of Services Liberalization: Overview Of Empirical Studies," Background Note by the WTO Secretariat, document S/C/W/26/Add.1, 29 [May 1988].

Figure 1
Trade and transition dynamics

$$\dot{k} = 0 = f(k) - (d)k - c$$

$$\dot{c} = 0 = -\Theta^{-1}[f'(k) - (r + d + f)]$$

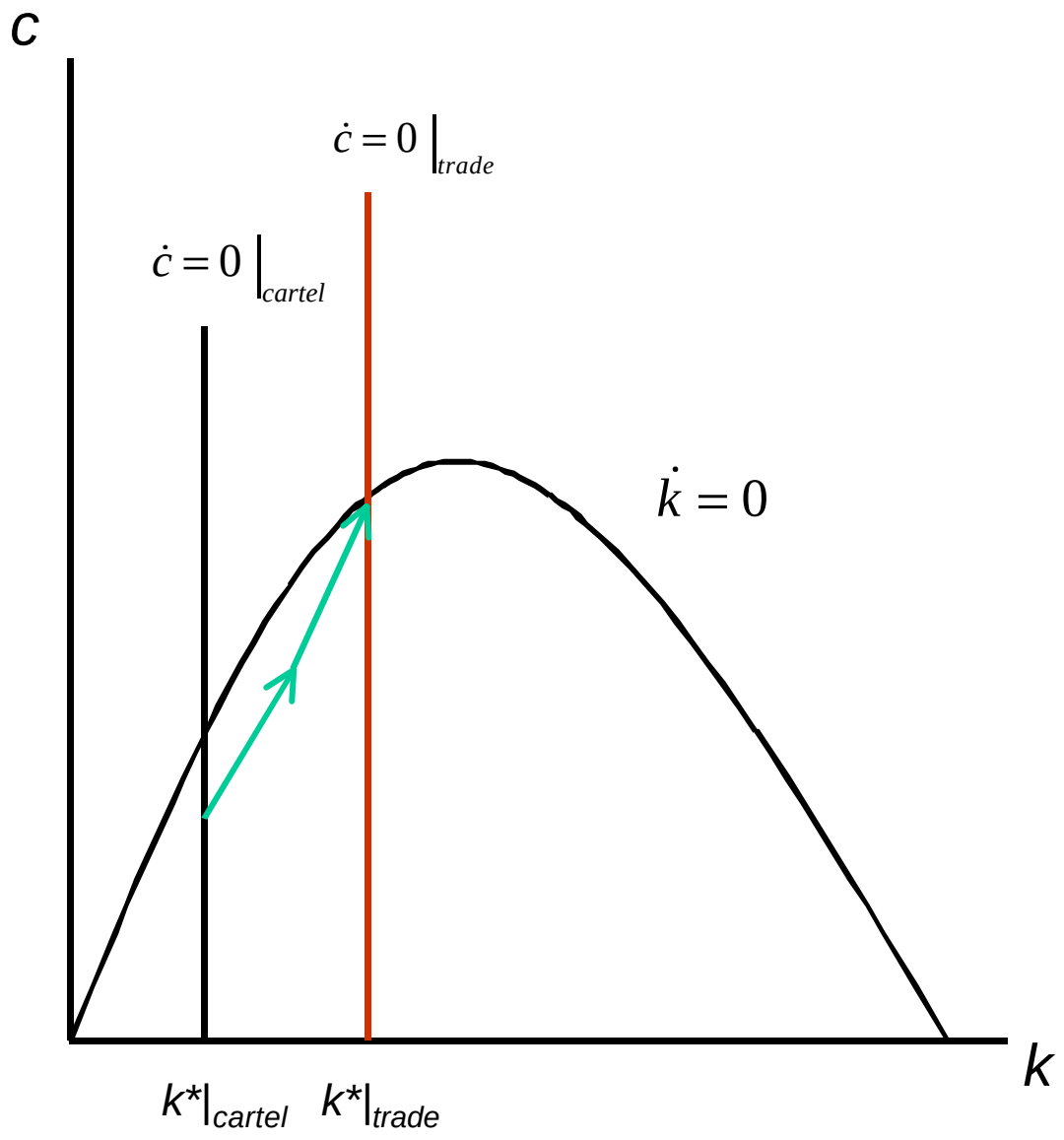
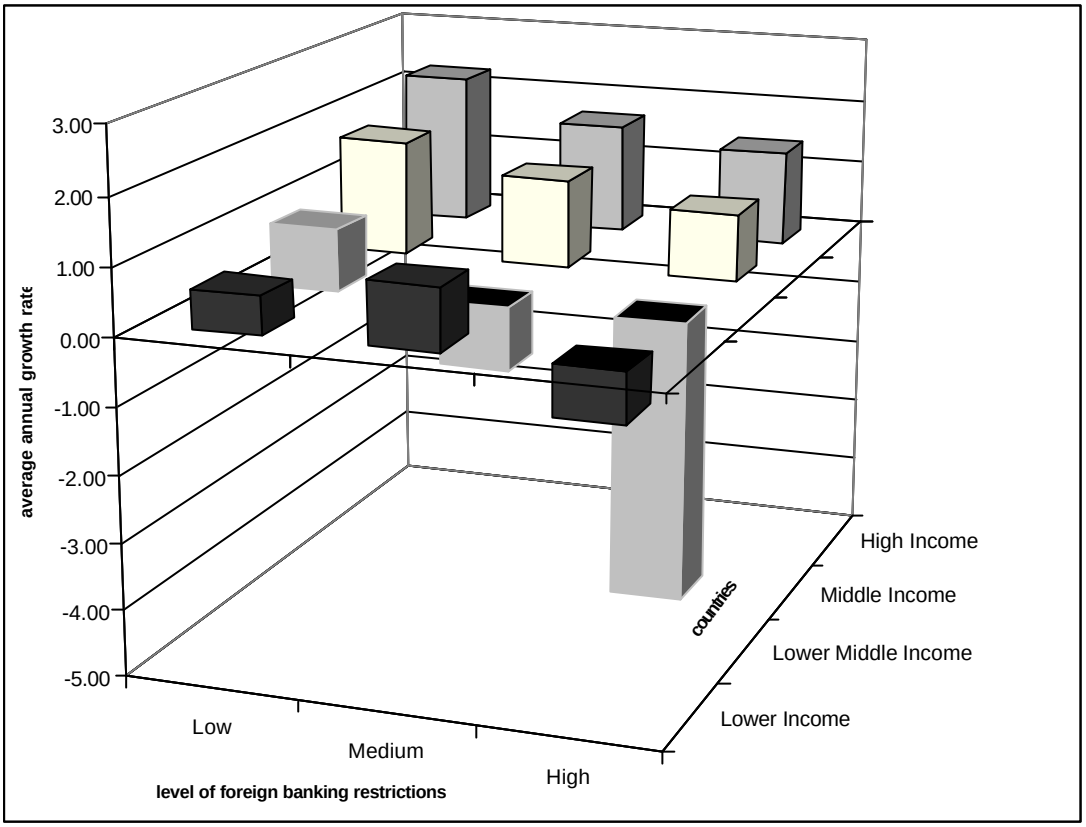


Figure 2

Foreign Banking Restrictions and Growth in the 1990s

(Bank Freedom Index as a Proxy for Restrictions on Foreign Banks)

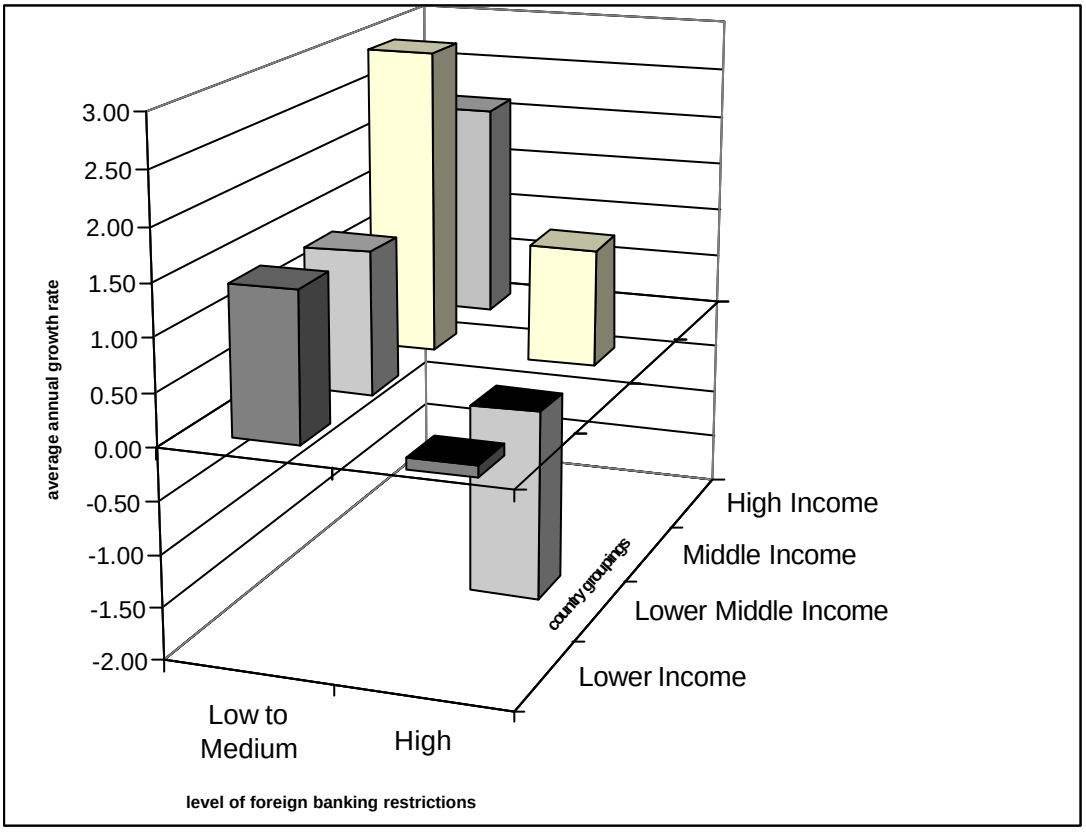


note: Growth rates are per-capita, while banking sector openness is based on the banking freedom index.
High income countries (24 in total) have 1990 GDP per capital above US $10,000 ; medium income countries (32 total) have incomes above US $2,500 US, lower middle income countries have incomes above US $1,000 per capita (27 in total) and lower income countries constitute the remainer (43 countries).
Low bank restrictions have an index value of 1 to 2.33, medium ranges from 2.4 to 3.66, and high ranges from 3.7 to 5.
The sample of high income countries with high banking restrictions includes only Greece.

Figure 3

Foreign Banking Restrictions and Growth in the 1990s

(Tarrif Equivalents as a Proxy for Restrictions on Foreign Banks)



High income countries (23 in total) have 1990 GDP per capital above US $10,000 ; medium income countries (32 total) have incomes above US $2,500 US, lower middle income countries have incomes above US $1,000 per capita (27 in total) and lower income countries constitute the remainer (43 countries).
Low to medium bank restrictions have a tariff equivalent index below 35. High ranges from 35 to 50.
The OECD countries with an index below 20 include Sweden, the United States, Canada, Switzerland, Austria, Australia, New Zealand, and Finland.

Table 1: Overview of dataset

1.A Macroeconomic indicators

FINCRIS:
Financial crisis indicator (based on economy-wide loan loss provisions over net interest revenue).

INFLATE:
The standard deviation of the inflation rate over the 1990-99 period.

PCGDP90:
Per-capita GDP in 1990.

PCGDPGR:
The average of per-capita growth over the 1990-99 period.

POLSTAB:
Political stability indicator from –2.5 to 2.5 (-2.5=most unstable, 2.5=most stable).

POPGR:
Average rate of population growth over the 1990-99 period.

SIZE:
Total value of GDP, averaged over 1990-99, and scaled by total value of world GDP.

TRADE:
Exports and imports as a share of GDP, averaged over the 1990-99 period.

TRANSEC:
Transition economy (1=yes, 0=no).

1.B Financial Sector Indicators

BANKFREE:
Openness of banking sector in terms of restrictions on ability of foreign banks to open branches and subsidiaries, barriers to domestic bank formation, government influence over credit allocation, government ownership of banks, government regulations like deposit insurance, and restrictions on providing all kinds of financial services from 1 to 5 (1= very low restrictions, 5=very high restrictions).

CONCENT:
Concentration in the financial sector: the assets of the largest three banks as a share of total assets in percent (corrected for income by using only largest 100 banks' assets), averaged over 1990-99 period.

FOREIGN:
The share of the banking sector accounted for by foreign banks.

NIM:
Net interest income over total banking assets in percent, averaged over 1990-99 period.

PROFIT:
Commercial banks' gross operating profits over total assets in percent, averaged over 1990-99 period.

TARREQ:
Estimated tariff equivalent of trade protection of the domestic banking and financial services sector in percent as derived from WTO Members' GATS commitments in financial services (excluding insurance); ranges from 0 (free) to 50 (most protectionist). Extended from the original set reported by Hoekman (1995) to include transition economies.

Datasources by variable:

FINCRIS: Bankscope (Bureau van Dijk)
INFLATE: IMF World Economic Outlook
PCGDP90: World Bank World Development Indicators
PCGDPGR: IMF World Economic Outlook
POLSTAB: World Bank Worldwide Governance Research Indicators Dataset
POPGR: World Bank World Development Indicators
SIZE: World Bank World Development Indicators
TRADE: World Bank World Development Indicators
BANKFREE: Heritage Foundation Index of Economic Freedom
CONCENT: Bankscope (Bureau van Dijk)
FOREIGN: Bankscope (Bureau van Dijk)
NIM: Bankscope (Bureau van Dijk)
PROFIT: Bankscope (Bureau van Dijk)
TARREQ: Hoekman 1995

Table 2. Banking concentration and financial openness: Dependent variable CONCENT

System no.	(1)	(2)	(3)	(4)	(5)	(6)
SIZE	-2.702 (0.584)***	-3.277 (0.661)***	-1.462 (0.502)***	-2.707 (0.584)***	-3.277 (0.661)***	-1.463 (0.502)***
TARREQ			0.693 (0.196)***			0.692 (0.196)***
FOREIGN		-1.202 (0.310)***			-1.200 (0.310)***	
BANKFREE	14.515 (1.763)***			14.508 (1.763)***		
TRANSEC	8.929 (4.212)**	11.989 (4.792)***	16.567 (5.395)***	8.941 (4.1212)**	11.999 (4.792)***	16.584 (5.395)***
Number of observations	128	121	77	128	121	77
R-squared 1/	0.48	0.31	0.60	0.48	0.31	0.60

* denotes significant (given expectation on sign) at 10% level
** denotes significant (given expectation on sign) at 5% level
***denotes significant (given expectation on sign) at 1% level

1/ R-squared is for error-corrected regressions. Standard errors are based on model fit given original (uncorrected) data.

Systems (1) – (3) dependent variable NIM, systems (4) – (6) dependent variable PROFIT

Table 3. Marketpower and banking concentration: Dependent variables NIM and PROFIT

System no.	(1)	(2)	(3)	(4)	(5)	(6)
CONCENT	0.063 (0.011)***	0.046 (0.011)***	0.036 (0.011)***	0.027 (0.006)***	0.030 (0.006)***	0.021 (0.006)***
FINCRIS	-0.019 (0.010)**	-0.015 (0.009)*	-0.014 (0.009)*	-0.007 (0.005)*	-0.008 (0.005)*	-0.005 (0.005)
TRANSEC	2.525 (0.760)***	2.641 (0.746)***	2.729 (0.744)***	1.467 (0.375)***	1.386 (0.378)***	1.472 (0.376)***
Number of observations	123	123	123	120	120	120
R-squared 1/	0.24	0.18	0.19	0.22	0.23	0.22

* denotes significant (given expectation on sign) at 10% level
** denotes significant (given expectation on sign) at 5% level
***denotes significant (given expectation on sign) at 1% level

1/ R-squared is for error-corrected regressions. Standard errors are based on model fit given original (uncorrected) data.

Systems (1) – (3) dependent variable NIM, systems (4) – (6) dependent variable PROFIT

Table 4. Per-capita GDP growth and marketpower: Dependent variable PCGDPGR

System no.	(1)	(2)	(3)	(4)	(5)	(6)
PCGDP90	-1.046E-04 (3.309E-05)***	-1.041E-04 (3.548E-05)***	-1.026E-04 (3.737E-05)***	-1.067E-04 (3.459E-05)***	-1.071E-04 (3.358E-05)***	-1.072E-04 (3.838E-05)***
POPGR	-0.420 (0.264)*	-0.424 (0.283)**	-0.438 (0.299)*	-0.312 (0.286)	-0.309 (0.278)	-0.308 (0.318)
TRADE	0.011 (0.005)**	0.011 (0.005)**	0.010 (0.005)**	0.011 (0.005)**	0.011 (0.005)**	0.011 (0.005)**
INFLATE	-8.344E-04 (3.1007E-04)**	-8.334E-04 (3.234E-04)***	-8.324E-04 (3.500E-04)***	-9.407E-04 (3.097E-04)***	-9.422E-04 (3.007E-04)***	-9.427E-04 (3.437E-04)***
NIM	-0.469 (0.102)***	-0.623 (0.109)***	-0.714 (0.115)***			
PROFIT				-1.078 (0.152)***	-0.970 (0.147)***	-1.400 (0.169)***
POLSTAB	1.235 (0.370)***	1.243 (0.397)***	1.268 (0.418)***	1.337 (0.391)***	1.330 (0.380)***	1.327 (0.434)***
TRANSEC	-3.187 (0.797)***	-2.755 (0.855)***	-2.535 (0.900)***	-2.930 (0.895)***	-3.142 (0.869)***	-2.420 (0.993)***
Number of observations	115	115	115	112	112	112
R-squared 1/	0.54	0.54	0.54	0.55	0.55	0.55

* denotes significant (given expectation on sign) at 10% level

** denotes significant (given expectation on sign) at 5% level

***denotes significant (given expectation on sign) at 1% level

1/ R-squared is for error-corrected regressions. Standard errors are based on model fit given original (uncorrected) data.