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Banking Sector Openness and Economic Growth

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Abstract

Banking sector openness may directly affect growth by improving the access to financial services and indirectly by improving the efficiency of financial intermediaries, both of which reduce the cost of financing, and in turn, stimulate capital accumulation and economic growth. The objective of the paper is to empirically reinvestigate these direct and indirect links, using a more advanced econometric technique (GMM dynamic panel estimators). An illustrative model is presented to link financial market development with investment. The empirical results confirm the presence of direct and indirect links, and thus provide support for countries planning to open their banking sector for international competition.

JEL Classification: G21; O16; O40; F10; F21.

Key words : Banking sector openness; foreign banks; efficiency of banks; economic growth; capital accumulation.

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1. Introduction

Financial sector openness is expected to be directly linked to economic growth through enhancing the access to financial services, and indirectly through increasing competitiveness of domestic financial markets, both of which reduce the cost of financing. This, in turn, spurs economic growth through higher capital accumulation and higher efficiency. These links have been extensively investigated in the literature, giving special emphasis on the indirect one since previous empirical studies have failed to find a robust direct link between financial market openness and economic growth.[1]

The indirect link between openness and economic growth is investigated in two steps: i) financial development is essential for economic growth, and ii) financial openness improves the level of financial development. Financial development is one of the important engines of economic growth.[2] The basic roles played by financial markets in the process of transferring savings to borrowers are risk sharing, providing liquidity, information, and improving allocative efficiency. The development level of financial markets depends on how well they provide these financial services. If financial markets are well-developed, they improve the availability of funds to support domestic borrowers, and channel the funds to where the rates of returns are higher. These positive effects are expected to increase economic growth through larger capital accumulation due to a lower cost of financing, and increased efficiency. However, in developing countries, financial markets are often underdeveloped and market failures exist everywhere.

[1] Levine (1996 and 2001) provides an extensive survey study about the link between international financial liberalization and growth. He points out the importance of international financial integration in promoting growth through improvements in the domestic financial markets.

[2] Examples of papers investigating the link between economic growth and financial development include Levine (1997, 1998), Levine, Loayza, and Beck (2000), King and Levine (1993a and b), Demirguc-Kunt and Maksimovic (1998), and Rajan and Zingales (1998).

The internationalization or liberalization of financial markets matters for financial development as well as for productivity growth. First, the main direct positive effect of foreign banks on the level of financial development is to improve the access to financial services and lower the cost of borrowing, and at same time, it will also improve the quality of banking services. Second, foreign bank entry also has the indirect effect of increasing the competitiveness and efficiency of the domestic banking sector, and providing incentives to improve accounting, auditing, and rating institutions, as well as encouraging learning by doing by local banks (Aghion and Howitt 1992). Through entry and exit, new banks bring new knowledge, more varieties /products and innovative processes to the market and force-out some inefficient domestic banks. Productivity improves through resources reallocation from inefficient banks to more efficient ones.[3] Consumers and firms in nonfinancial sectors benefit from more efficient banking services and better products. [4]

Empirical studies investigating the direct link between foreign banks and growth could not find any robust results. For example, Demirguc-Kunt, Levine, and Min (1998) cannot find any direct link between foreign banks and long-run economic growth after controlling for other factors associated with growth. Given the lack of empirical evidence on a direct link between banking sector openness and economic growth, researchers have

[3] Schumpeterian creative destruction (Schumpeter, 1942) may explain the effects of entry and exit of firms and higher competition on productivity, in turn, on growth. For example, Aghion and Howitt (1992) produce an endogenous growth model in which vertical innovations, developed by a competitive research sector, are the source of economic growth. One implication of their model for service trade liberalization is that the entry and exit of firms and competition are good for improving productivity since the process encourages innovation and reallocation of resources from inefficient ones to efficient ones.

[4] Besides these positive effects, there might be some costs associated with foreign bank entry: some argue that they may dominate the entire domestic financial market, and others consider that they may foster capital flight. But these arguments are relatively weak considering the new generations of trade and growth models and recent evidence associated with them.

been studying the indirect links. For example, Claessens, Demirguc-Kunt, and Huizinga (2001) and Bayraktar and Wang (2004 and 2005) show that foreign banks play a statistically and economically significant role in improving the efficiency and competitiveness of domestic banks by reducing costs, profits, and net interest margins. Thus, foreign banks are expected to increase economic growth by improving the functioning of domestic banks, as well as the development level of financial markets. Recent studies have shown strong linkage from the opening of services trade (including banking sector) to the productivity of the manufacturing sector, and thus the growth impact of opening trade in services (Arnold, Javorcik and Mattoo 2006, Eschenbach and Hoekman, 2005; Eschenbach and Francois 2005).

The aim of this paper is to empirically reinvestigate the direct and indirect links between foreign bank entry and economic growth, using a more advanced econometric technique, which is named generalized method-of-moments (GMM) dynamic panel estimators. This econometric technique has been recently used in the growth literature as an alternative to cross-sectional estimators.[5] More specifically, we use a system estimator introduced by Arellano and Bover (1995), which combines a specification in first differences with the one in levels.[6] The advantage of this GMM methodology is that it takes care of the econometric problems caused by unobserved country-specific effects and endogeneity of the independent variables in lagged-dependent-variable models such as economic growth regressions. The inclusion of both cross-country and time-series data introduces additional information about the over-time change in growth and its determinants, and, thus, helps us get more precise results.

[5] See Levine, Loayza, and Beck (2000), Easterly and Levine (1997), Chang, Kaltani, and Loayza (2005).
[6] Blundell and Bond (1997) show that this methodology improves both efficiency and consistency in Monte Carlo simulations.

The direct sensitivity of economic growth to financial openness is investigated using a model specification in which the growth rate of GDP per capita is the dependent variable and the foreign bank asset share is the key explanatory variable, and macroeconomic stability, efficiency of banking sector, public capital stock, and country-level risks are controlled for. On the other hand, the indirect link between the foreign bank share and growth is examined in two steps: (1) the effect of foreign bank share on the efficiency of domestic banks after controlling for other determinants of efficiency, and (2) the effect of improving the efficiency of domestic banks on growth after controlling for other possible determinants of growth. The efficiency indicators included in this study are overhead costs, before-tax profits, and net interest margins – all in percent of total assets. It is expected that the lower the value of efficiency indicators, the higher is the efficiency.

The data set consists of 28 developing and developed countries, which have already completed their financial liberalization process as defined in Kaminsky and Schmukler (2003). Our data set is restricted to the period of 1994-2003 because bank-level variables are used in calculating over-time country averages, and also because the main data source for bank-level variables, BANKSCOPE, reports variables only for the recent years. Given the length of the period, long-run growth analyses cannot be conducted. Thus, the focus is on short-term growth.

The results show that the asset share of foreign banks has an economically and statistically significant positive effect on the growth rate of GDP per capita after controlling for other determinants of growth, indicating a direct link between two variables. Similarly, the results imply that there is an indirect link between financial sector openness and growth in a way to support previous empirical findings. The first stage

results show that a higher share of foreign banks lowers overhead costs and net interest margins of domestic banks, indicating higher efficiency. In the second stage, we show that a higher efficiency increases economic growth. Both sets of results imply that financial sector openness may help improve economic growth.

The paper is organized as follows. Section 2 presents an illustrative model for direct and indirect links between foreign banks and growth. Section 3 describes the data set, empirical model and methodology. Section 4 presents econometric results. Section 5 concludes.

2. An Illustrative Model: Direct and Indirect Links between Banking Sector Openness and Economic Growth

Foreign banks are expected to play important direct and indirect roles in increasing economic growth, especially through improving the functioning of financial markets, thus raising capital accumulation. These possible direct and indirect effects of opening financial markets to foreign banks on economic growth can be illustrated using a simple neoclassical investment model. Assuming that the production function has been already maximized for labor, the profit function is determined by profitability shocks (A), private capital stock (KP), and exogenous public capital stock per capita (KG):

$$\Pi(A_t, KP_t, KG_t) = A_t.KP_t^{\alpha}.KG_t^{1-\alpha}, \quad (1)$$

where $0 < \alpha < 1$.[7] The profit function exhibits constant returns to scale, suggesting a competitive product market. The public capital stock is included to capture the possible complementary effects of public capital on private capital.[8]

[7] See Cooper and Haltiwanger (2003), Bayraktar, Sakellaris, and Vermeulen (2005) for similar specifications.

In the model, firms face two types of costs in the investment process: the actual cost of new capital and the cost of financing, where the second one may be caused by financial market imperfections. The actual investment cost includes both payments for new capital, as well as additional capital adjustment cost, which is assumed to be convex:

$$C(KP_t, I_t) = pI_t + \frac{\gamma}{2}.\left[\frac{I_t}{KP_t}\right]^2 KP_t, \tag{2}$$

where p is the price of new capital, I_t is investment, and γ is the coefficient indicating the magnitude of the convex capital adjustment cost.

Firms may finance investments by either retained earnings or borrowing funds in the financial markets. It is assumed that the only source of external finance is through debt. In the presence of financial market imperfections, the cost of borrowing might be higher than the risk-free interest rate since financial intermediaries, in this case, may charge an external finance premium. The assumption is that the external finance premium is a function of firm's financial health, captured by the ratio of its debt to capital. Thus, the external finance premium is:[9]

$$\eta(K_t, D_t) = \phi \frac{D_{t-1}}{KP_t},$$

where D_{t-1} is the level of debt borrowed in the previous period and ϕ determines the magnitude of the external finance premium, in turn, the financial market imperfections.[10] The expected sign of η is positive, indicating that a higher leverage ratio (D_{t-1}/KP_t) needs

[8] See Barro (1990), Barro and Sala-i Martin (1995),and Aschauer (1988) for details.
[9] Gilchrist and Himmelberg (1998) present this kind of external finance premium. But they do not assign any functional form to it. Jaramillo, Schiantarelli, and Weiss (1996) use an explicit form of external finance premium, which is linear in the leverage ratio.
[10] Bayraktar, Sakellaris, and Vermeulen (2005) estimate the value of ϕ as 0.012 for German firms.

to pay a higher premium. Any factor reducing the external finance premium is expected to increase the level of investment. Assuming that debt contracts are for one year, the debt payment by firms would be $(1+r)(1+\phi\frac{D_{t-1}}{KP_t})D_{t-1}$, where r is the risk-free interest rate.

The value function maximized by a manager is:

$$V(A_t, KP_t, KG_t, D_{t-1}) = \max_{\{I_t, D_t\}} \Pi(A_t, KP_t, KG_t) + D_t - C(KP_t, I_t)$$
$$-(1+r)(1+\phi\frac{D_{t-1}}{KP_t})D_{t-1} + \lambda E_{A_{t+1}|A_t} V(A_{t+1}, KP_{t+1}, KG_{t+1}, D_t) \quad (3)$$

subject to equations (1) and (2), and

$$I_t = KP_{t+1} - KP_t(1-\delta),$$

where $V(.)$ is the value function, λ is the discount factor, and δ is the depreciation rate. $E_{A_{t+1}|A_t}$ is the expected value of profitability shock in period t+1, A_{t+1} , given A_t. It is assumed that profitability shocks are serially correlated over time. Another assumption is that investment gets productive with one-period lag.

The 2-period version of the model is sufficient to show the link between investment and the cost of financing which depends on the development level of financial markets. In this case, investment and borrowing takes place in period 1, and debt payment will be made in period 2:

$$V(A_1, KP_1, KG_1) = \max_{\{I_1, D_1\}} \begin{bmatrix} A_1.KP_1^{\alpha}, KG_1^{1-\alpha} + D_1 - pI_1 - \frac{\gamma}{2}\left[\frac{I_1}{KP_1}\right]KP_1 + \\ \lambda E_{A_2|A_1} A_2 KP_2^{\alpha} KG_2^{1-\alpha} - \lambda(1+r)(1+\phi\frac{D_1}{KP_2})D_1 \end{bmatrix}, \quad (4)$$

where 1 stands for period 1, and 2 for period 2. After dividing both sides of equation (4) by KP_2, we get:

$$v(A_1, kg_1) = \max_{\{i_1, d_1\}} \left[\begin{array}{l} A_1.kg_1^{1-\alpha} + d_1 - pi_1 - \frac{\gamma}{2} i_1^2 + \\ \lambda E_{A_2|A_1} A_2 (i_1 + (1-\delta))^{\alpha} kg_2^{1-\alpha} - \lambda(1+r)(1+\phi \frac{d_1}{i_1 + (1-\delta)}) d_1 \end{array} \right]$$

where $v(.) = V(.)/KP_1$, $kg_1 = KG_1/KP_1$, $d_1 = D_1/KP_1$, $i_1 = I_1/KP_1$, and $kg_2 = KG_2/KP_1$.

The first order condition with respect to i_1 produces:

$$-p - \gamma i_1 + \lambda E_{A_2|A_1} \frac{\partial \pi_2}{\partial i_1} - \lambda(1+r)\phi \frac{d_1^2}{(i_1 + (1-\delta))^2} = 0, \tag{5}$$

where $\pi_2 = A_2 (i_1 + (1-\delta))^{\alpha} kg_2^{1-\alpha}$, and the first order condition with respect to d_1,

$$\frac{[1-\lambda(1+r)]}{\lambda(1+r)} \frac{[i_1 + (1-\delta)]}{2\phi} = d_1. \tag{6}$$

After plugging equation (6) in (5), we get:

$$-p - \gamma i_1 + \lambda E_{A_2|A_1} \frac{\partial \pi_2}{\partial i_1} - \frac{[1-\lambda(1+r)]^2}{4\phi\lambda(1+r)} = 0. \tag{7}$$

After rearranging equation (7), it becomes:

$$i_1 = \left[-\frac{1}{\gamma} p + \frac{1}{\gamma} \lambda E_{A_2|A_1} \frac{\partial \pi_2}{\partial i_1} + \frac{1}{\gamma} \frac{[1-\lambda(1+r)]^2}{4\phi\lambda(1+r)} \right]. \tag{8}$$

The equation implies that the investment rate, i_1, is a negative function of cost of capital, p, convex cost parameter, γ, and the parameter measuring the external finance premium, ϕ; and a positive function of expected future returns on capital, $\frac{\partial \pi_2}{\partial i_1}$. Thus, any factor

decreasing the cost of borrowing, or capital adjustment increases the level of investment, in turn, economic growth.

In this structure, foreign banks may play an important role in reducing the magnitude of the external finance premium since lowering barriers to foreign banks tends to improve the functioning of the domestic financial sector due to foreign banks' direct or indirect positive effects on the quality, pricing, and availability of banking services (see Levine, 1996). Some of the direct effects of foreign banks on the domestic financial markets are new and better management techniques, technology, and services. They may also improve access to international markets, and help the development of ancillary institutions by improving the flow of information about borrowers.[11] Thus, foreign banks may directly reduce firms' cost of borrowing, and increase the level of investment and the efficiency of the combination of labor and capital in production; in turn, the level of economic growth. [12]

On the other hand, the indirect effects of foreign banks are to encourage financial regulation, and to improve domestic banks' efficiency by increasing competition through lowering profits and overhead expenses. [13] Claessens, Demirguc-Kunt, and Huizinga (2001) and Bayraktar and Wang (2005) show that an increasing foreign bank share increases competition in the domestic banking sector by reducing costs, profits, and net interest margins. A higher level of competition in domestic financial markets increases the efficiency of them, which leads domestic financial intermediaries to provide better

[11] Claessens and Glaessner (1998) show that restrictions in financial service trade have negatively affected financial market development in East Asia.
[12] See Levine (1996) for details.
[13] Glaessner and Oks (1994) predict significant improvements in Mexico's laws and regulations related to financial intermediaries in order to be able to enter U.S. financial markets after signing the NAFTA.

services in risk sharing, information, and liquidity. All of these factors are expected to spur faster economic growth due to their effects on the development level of financial markets. For example, King and Levine (1993a,b) present evidences that financial development and growth are linked. They use two indicators of financial development, which are liquid liabilities of the financial institutions and the share of deposit-bank domestic credit in total domestic credits, both of which are related to growth.[14] Demirguc-Kunt, Levine, and Min (1998) show that increased efficiency in the domestic banking sector, which is captured by lower overhead expenses, is a statistically and economically significant determinant of economic growth. In addition to these papers, Roubini and Sala-i-Martin (1992) show a negative relationship between real interest rates and growth. DeDregario and Guidotti (1995) report a strong link between domestic credits to the private sector and growth.

In sum, given positive direct and indirect effects of foreign banks in domestic financial markets, we expect to see that as the share of foreign banks increases, economic growth improves as well.

3. Empirical Analysis

The aim of the empirical section of the paper is to investigate direct and indirect links between foreign bank entry and economic growth, using GMM instrumental variable estimation method in order to control for endogeneity and country-level factors.[15] The data set is pooled into cross-country and time-series data; thus, it allows for examining

[14] Some examples of the studies investigating the link between the level of financial intermediary development and economic growth are Levine (1997, 1998), Levine, Loayza, and Beck (2000), Demirguc-Kunt and Maksimovic (1998), and Rajan and Zingales (1998).
[15] See Dollar and Kraay (2004), Levine, Loayza, and Beck (2000), and Chang, Kaltani, and Loayza (2005).

comparative information from within country changes. In the first subsection, information about the data set is given. In the second and third subsections, the regression specifications designed to investigate possible direct and indirect links between foreign banks economic growth, and empirical methodology to solve them are introduced.

3.1 Data

The data set includes 28 countries: Argentina, Brazil, Canada, Chile, Colombia, Denmark, Finland, France, Germany, Hong Kong, Indonesia, Ireland, Italy, Japan, Korea, Malaysia, Mexico, Norway, Peru, Philippines, Portugal, Spain, Sweden, Thailand, Turkey, United Kingdom, United States, and Venezuela. These countries have already completed their financial liberalization process as presented in Kaminsky and Schmukler (2003).

The BANKSCOPE database is the main data source for bank-level variables such as net interest margin, total assets, overhead costs, and before tax income.[16] All domestic banks in the banking sector are included. The exceptions are France, Germany, Italy, Japan, Spain, United Kingdom, and United States, for which we include only the top several hundred banks with the highest total asset level. The banking sector variables are constructed at the bank level for each country. It includes 4437 banks, 740 of which are foreign banks. Domestic banks incorporate both private and state banks. Banks are defined as foreign-owned if at least 51 percent of their shares is foreign-owned. The share of foreign banks at the country level is measured by their asset shares in total assets in the banking sector. The asset share of foreign banks and the number of banks included in each country are presented in Table 1.

[16] Appendix A gives detailed information about the variables and descriptive statistics.

The correlation coefficient between asset share of foreign banks and the growth rate is 0.06. This indicates a low relationship between economic growth and foreign bank entry without controlling for other determinants of growth.

Since we use country-level variables while estimating the regression equations, the banking sector variables at the country level are calculated as averages of the corresponding variables at the bank level.

Our data set covers the years from 1994 to 2003. Since BANKSCOPE reports banking sector variables only for the most recent years, it is not possible to conduct longer-term growth analysis. Thus, the focus, in the following sections, is on the short-term economic growth.

3.2 Regression Specification

We use two different sets of regression specifications to study direct and indirect links between the economic growth rate and the share of foreign bank assets. The basic regression equation for the direct link is as follows:

$$y_{i,t} - y_{i,t-1} = \psi_0 y_{i,t-1} + \psi_1 FBS_{i,t} + \psi_2 X_{i,t} + T_t + F_i + \varepsilon_{i,t}, \quad (9)$$

where i is the country index and t is the year index. T_t is the time dummies and F_i is the country dummies, and $\varepsilon_{i,t}$ is the error term. The economic growth is measured as the log difference of GDP per capita in real terms, $y_{i,t} - y_{i,t-1}$. The initial level of GDP per capita is introduced as the first explanatory variable to control for initial conditions. This variable makes the equation dynamic. $FBS_{i,t}$ is the over-time asset share of foreign banks in each country. $X_{i,t}$ stands for control variables for other determinants of growth. These variables are chosen according to their significance in determining growth and their

potential effects on growth through private capital accumulation. In this group, we include variables to control for efficiency of financial markets, macroeconomic stability, public infrastructure, and risk factors.[17] The inflation rate is one of the most commonly used variables to control for macroeconomic stability. It is expected that higher inflation tends to reduce growth due to a high level of price instability. Three different variables are used in controlling for the efficiency of financial markets, which may play an important role in reducing the cost of borrowing for firms. These are the level of net interest margin, profits before tax, and overhead costs.[18] It is expected that as the level of these variables drops, the efficiency of banks increases, indicating a higher level of competition. The net interest margin is defined as the ratio of net interest income to total assets. This variable showing the difference between earnings from interest and expenses on interest is an important indicator of competitiveness since as a banking sector gets more competitive, the lending rate is expected to drop, but the deposit rate is expected to increase. The share of before tax profits in total assets is another efficiency indicator used in this study. In closed and imperfectly competitive banking sectors, the profit rate is expected to be higher. In such sectors, banks pay low interest rates for funds, and also charge higher interest rates on loans. They also require high service fees. Because of this, profits are expected to decrease with increasing competition. The ratio of overhead costs to total assets is also expected to fall with rising competition. Another control variable is the composite risk index from International Country Risk Index, introduced to capture financial, economic and political risk. This index is constructed in a way that higher numbers indicate lower risk. Thus, it is

[17] Even though it would be important to include the level of human capital investment as a significant determinant of growth, any appropriate measure, such as the share of people with secondary education, could not be found due to missing data points.

[18] These variables may also capture the effects of financial depth. Thus, variables such as liquid liabilities, private domestic credit are not included in the regression equation.

expected that the growth rate is positively linked to the composite price index. The last control variable is a proxy for public capital stock. As specified in section 2, it is believed that public capital stock, especially public infrastructure, is an important determinant of the level of investment, in turn, economic growth given that public and private capital stocks are complements. The average number of main telephone lines per capita is introduced as a proxy for public infrastructure.

The following two regression equations are estimated to investigate the indirect link between financial sector openness and growth:

$$EFF_{i,t} = \beta_0 FBS_{i,t} + \beta_1 CV_{i,t} + T_t + F_i + \varepsilon_{i,t}, \tag{10}$$

$$y_{i,t} - y_{i,t-1} = \overline{\psi}_0 y_{i,t-1} + \overline{\psi}_1 EFF_{i,t} + \overline{\psi}_2 X2_{i,t} + T_t + F_i + \varepsilon_{i,t}, \tag{11}$$

where equation (10) estimates the link between the asset share of foreign banks and efficiency of banking sector, and equation (11) estimates the link between the efficiency of banking sector and economic growth after other possible determinants are controlled for. $EFF_{i,t}$ includes the efficiency indicators of net interest margin, profits before tax, and overhead costs - all in percent of total assets. $CV_{i,t}$ are the control variables for macroeconomic and banking sector variables. The bank variables are equity, non-interest earning assets, customer and short term funding, and overhead costs - all in percent of total assets. The tax rate of banks which is measured as taxes paid by domestic banks over their pre-tax profit is also included in this group of variables. The macroeconomic indicators are the initial level of GDP per capita in real terms, the growth rate of real GDP, the inflation rate, the real interest rate, and the share of domestic credits by banking sector

in percent of GDP. In equation (11), $X2_{i,t}$ is a set of control variables consisting of the inflation rate, public infrastructure, and composite risk index.

3.3 Estimation Methodology

Given the dynamic nature of regression equations reported in the previous section, we use the generalized regression moments (GMM) estimation method for dynamic models of panel data, which has been developed by Holtz-Eakin, Newey, and Rosen (1988), Arellano and Bond (1991), and Arellano and Bover (1995). The first reason for choosing this methodology is to control for country-specific effects, which cannot be done with country-specific dummies due to the dynamic structure of the regression equation. The second reason is to control for a simultaneity problem caused by the possibility that some of the explanatory variables may be endogenous with growth or other dependent variables.

The first way of applying this methodology is taking the first difference of the original regression equation in order to control for unobserved country-specific effects. In this case, suggested instruments are lagged observations of the explanatory and lagged-dependent variables taken in levels. But, in this case, Allonso-Borrego and Arellano (1999) and Blundell and Bond (1998) show that when the explanatory variables are persistent over time, lagged levels of them are weak instruments for the regression equation in first differences. Thus, we estimate a system of equations, combining the regression equation in levels and in first differences in order to reduce possible biases associated with estimating the regression equation in differences only. This methodology has been introduced by Arellano and Bover (1995) and Blundell and Bond (1998).

To apply this methodology, the following system of equations corresponding to equation (9) is estimated by GMM:

$$y_{i,t} - y_{i,t-1} = \psi_0 y_{i,t-1} + \psi_1 FBS_{i,t} + \psi_2 X_{i,t} + T_t + F_i + \varepsilon_{i,t},$$

$$\Delta(y_{i,t} - y_{i,t-1}) = \psi_0 \Delta y_{i,t-1} + \psi_1 \Delta FBS_{i,t} + \psi_2 \Delta X_{i,t} + \Delta T_t + \Delta \varepsilon_{i,t}.$$

While estimating the system, the following orthogonality conditions are used: $E(\varepsilon_{i,t} \times \Delta y_{i,t-1}) = 0$, $E(\varepsilon_{i,t} \times \Delta FBS_{i,t-1}) = 0$, $E(\varepsilon_{i,t} \times \Delta X_{i,t-1}) = 0$, $E(\Delta\varepsilon_{i,t} \times y_{i,t-2}) = 0$, $E(\Delta\varepsilon_{i,t} \times FBS_{i,t-2}) = 0$, and $E(\Delta\varepsilon_{i,t} \times X_{i,t-2}) = 0$. The instrumental variables for the equation in first differences are the twice-lagged level of the dependent and explanatory variables. On the other hand, the instrumental variables for the equation in levels are the most recent lagged differences of the variables. Equations (10) and (11) are estimated following the same methodology.

To check the validity of the instruments used in estimating the equations, two specification tests have been introduced by Arellano and Bond (1991) and Arellano and Bover (1995).[19] The first one is a Sargan test for overidentifying restrictions.[20] It tests the overall validity of instruments. The rejection of the null hypothesis means that instruments are not valid. The second test is for the null hypothesis that the differenced error term is not second-order serially correlated. The instruments are assumed to be valid if the null hypothesis is not rejected.

[19] Chang, Kaltani, and Loayza (2005) use these tests as well.
[20] In case of near singularity of variance-covariance of the moment conditions, the Sargan tests cannot be calculated.

4. Estimation Results

The two sets of regression equations are estimated for: (a) direct effect of foreign banks on economic growth, as specified in equation (9); (b) indirect effect of foreign banks on economic growth, as specified in equations (10) and (11). The estimation results are given in Tables 2 – 4. A GMM instrumental variable system estimator is used in estimating coefficients.

The results for the direct link are given in Table 2. Four different regression equations are estimated in this group. The results are given in columns. In the first column, the results without any efficiency indicator are reported. In the following columns, three different types of efficiency indicators are introduced: net interest margin, before tax profits, and overhead costs of domestic banks. As the level of these indicators increases, it is expected that the efficiency or competitiveness of the banking sector drops; in turn it slows down economic growth since capital accumulation would be restricted with a higher cost of borrowing. The coefficients of net interest margin and costs have an expected negative sign, implying that the higher the level of net interest margin and costs, the lower the level of growth is. On the other hand, even though the coefficient of banks' profit ratio is statistically significant, it has an unexpected sign. But this positive sign may be expected if we take higher profits as an indicator of higher level of financial activities. In this case, higher growth means higher level of financial activity, in turn higher profits for banks. Thus, the relationship between profits and growth can be positive.

In each case, the sign of the foreign bank asset share is positive and statistically significant, except when the net interest margin is the efficiency indicator, after the efficiency level of banking sector and other macroeconomic variables are controlled for.

These results are important to show that foreign banks play a statistically and economically significant direct role in improving the growth rate independent of their indirect effects on growth, which work through raising efficiency of domestic financial intermediaries.

The estimated coefficients of initial GDP per capita are negative and statistically significant.[21] This is generally taken as evidence of conditional convergence. Given the fact that a higher level of composite risk index corresponds to a lower risk level, the composite risk index, which combines economic, financial and political risk indices, has a positive and statistically significant impact on growth as expected. The sign of the indicator of public infrastructure, main telephone lines per 1000 people, has an expected positive sign in each equation, indicating a positive effect of higher infrastructure public capital stock on growth. But the coefficient is statistically significant only in the last column. The inflation rate, one of the most commonly used indicators of macroeconomic stability, is a negative and statistically significant determinant of growth, indicating a negative effect of price instability on growth.

Both test statistics support the model since we fail to reject the null hypothesis in each case. The Sargan test indicates that the instruments are not correlated with error term, and the second order test shows that the error terms in the first difference regression equation do not exhibit any second-order serial correlation.

It should be noted that all these explanatory variables are expected to affect growth by increasing the level of investment through reducing the cost of financing or increasing

[21] This was the case in Levine, Loayza, and Beck (2000) and Chang, Kaltani, and Loayza (2005) as well.

the expected returns on capital. A higher efficiency of domestic banks or asset share of foreign banks, on the one hand, improves the cost of financing. Macroeconomic stability, lower risk, and more public capital are expected to increase the expected returns on capital.

The indirect link between the financial market openness and economic growth works through improving the efficiency of domestic intermediaries, thus the level of financial markets. To capture this link between foreign bank entry and growth, two regression equations (10) and (11) are estimated: (1) the effect of foreign bank entry on the efficiency of domestic banks; (2) the impact of financial efficiency of domestic banks on economic growth. The estimated coefficients of the first regression equation are given in Table 3. In each column, a different efficiency indicator is taken as a dependent variable. Foreign bank entry is expected to improve the efficiency level of domestic banks by reducing costs, profits, and net interest margins. The results show that the sign of foreign bank share is negative as expected, indicating that the efficiency and competitiveness rise with a higher asset share of foreign banks.[22] The net interest margin has the only statistically significant coefficient. The results also indicate that equity and non-earning assets, two of the bank-level variables, are significant determinants of the efficiency indicators. The availability of domestic credits, a measure of financial depth, improves the efficiency of domestic banks. On the other hand, high inflation and high real interest rates, both of which may signal macroeconomic instability, increase the level of efficiency indicators, in turn, drop the efficiency and competitiveness of domestic banks.

[22] Even though the estimation technique was different Bayraktar and Wang (2004 and 2005) report similar results.

The test statistics support the empirical model and instrumental variables used in the estimation process since we fail to reject the null hypothesis.

In the second step, the link between higher efficiency of domestic banks and growth is checked. The results are given in Table 4. The estimated coefficients are similar to the ones given in Table 2. Thus, our findings show that the results are robust. It is an expected result given the fact that the only missing explanatory variable in Table 4 is the share of foreign banks in the banking sector. The net interest margin and overhead costs have a negative effect on growth, indicating that a higher efficiency may improve economic growth. As was the case in Table 2, higher profits indicate higher economic growth. This would be an expected sign if higher profits are taken as evidence of more financial activity. The test statistics also support the empirical model since we do not reject the null hypothesis. Overall, the results support the presence of an indirect link between financial market openness and growth. Given these results, it is expected that investment, one of the important determinants of growth, would get higher with an increasing efficiency of domestic banks, partially reasoned by foreign bank entry, because the cost of borrowing is expected to be lower.

5. Conclusion

Previous empirical studies have failed to show a direct link between the share of foreign banks and growth, although an indirect link has been shown in the literature as foreign banks improve the efficiency of domestic banks. This study tries to assess whether this failure could have been caused by the estimation technique used in previous studies. Thus, the aim of the paper is to reexamine the direct and indirect empirical links between the presence of foreign banks and economic growth, using a more advanced econometric technique named GMM dynamic panel estimators, which has been used in estimating growth equations in the literature. The main advantage of this methodology is that it solves the problems caused by unobserved country-specific effects and endogeneity of the independent variables in lagged-dependent-variable models.

First, an illustrative model is presented to show that if foreign banks manage to reduce the cost of borrowing by providing cheaper funds and higher-quality financial services, they may directly improve economic growth thanks to a higher level of investment. Similarly, foreign bank entry may raise the level of economic growth indirectly if it increases the efficiency and competitiveness of domestic banks. In this case, domestic financial intermediaries are expected to function better through competition and learning by doing, with a higher level of financial development.

Second, different empirical specifications are estimated to check the availability of each type of link. The empirical results support the presence of both types of links. As the share of foreign banks rises, the growth rate also increases after controlling for other possible determinants of economic growth and efficiency indicators of domestic banks. In terms of indirect link, the results show that as the asset share of foreign banks increases,

the efficiency indicators of domestic banks, such as net interest margin, profits, and overhead costs decline –indicating a higher efficiency level. As the efficiency and competitiveness of domestic banks become higher, the growth rate increases as well.

The issue of whether financial market openness improves economic growth is crucial for countries planning to take actions in this regard such as China and Vietnam. The empirical results in this paper provide support that opening foreign bank entry does improve access to financial services, improve banking sector efficiency and promote economic growth directly and indirectly. Thus, the results may encourage policymakers who may be reluctant to remove restrictions on foreign bank entry to change their minds and introduce international competition.

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Table 1: Number of Banks and Ranking of Countries According to the Share of Foreign Banks, 1994-2003

	Total number of banks	Total number of foreign banks		Asset share of foreign banks (in % of total assets)
Argentina	156	41	China	0.2
Brazil	213	39	Sweden	1.7
Canada	81	22	Japan	2.1
Chile	39	8	Taiwan, China	4.6
China	61	5	Italy	5.1
Colombia	64	8	Korea, Rep.	5.3
Denmark	125	12	Germany	5.4
Finland	23	3	Thailand	6.1
France	372	69	Spain	6.8
Germany	447	33	Brazil	6.9
Hong Kong, China	155	59	United States	8.5
Indonesia	111	26	Turkey	11.0
Ireland	79	48	Philippines	13.2
Italy	429	27	France	13.9
Japan	322	5	Canada	14.9
Korea, Rep.	66	3	Indonesia	17.9
Malaysia	95	14	Denmark	18.5
Mexico	68	14	Malaysia	18.6
Norway	65	9	Finland	19.0
Peru	29	9	Colombia	20.7
Philippines	51	12	Argentina	20.7
Portugal	61	17	Norway	23.9
Spain	192	25	Ireland	28.0
Sweden	50	5	Venezuela	29.8
Taiwan, China	66	2	Portugal	30.7
Thailand	49	9	Chile	30.9
Turkey	75	11	United Kingdom	33.9
United Kingdom	357	143	Peru	53.1
United States	451	54	Mexico	54.2
Venezuela	85	8	Hong Kong, China	61.6

Source: Authors' calculations using data from BANKSCOPE.

Table 2
Regression Results: Direct Link between Economic Growth and Foreign Bank Share, 1994-2003
GMM-IV System Estimator

DEPENDENT VARIABLE: GROWTH RATE OF GDP PER CAPITA	Only foreign bank asset share		Net interest margin		Cost		Profit before tax	
Foreign bank asset share (in 1+ logs)	0.171	*	0.057		0.091	*	0.130	**
	(0.084)		(0.158)		(0.061)		(0.013)	
Control variables								
Initial GDP per capita (in logs)	-0.018	***	-0.020	***	-0.020	***	-0.016	***
	(0.003)		(0.001)		(0.004)		(0.002)	
Composite risk index (in logs) [a)]	0.155	***	0.186	***	0.185	***	0.169	***
	(0.000)		(0.000)		(0.004)		(0.004)	
Main telephone lines (in logs)	0.001		0.001		0.002		0.002	**
	(0.551)		(0.615)		(0.405)		(0.035)	
Inflation rate (deviation of the rate from 1, in logs)	-0.111	**	-0.060		-0.126	**	-0.107	**
	(0.033)		(0.280)		(0.011)		(0.032)	
Banking sector indicators								
Net interest margin in % of total assets (deviation of the rate from 1, in logs)			-0.237					
			(0.179)					
Cost in % of total assets (deviation of the rate from 1, in logs)					-0.252			
					(0.275)			
Profit before tax in % of total assets (deviation of the rate from 1, in logs)							0.444	***
							(0.000)	
Number of countries	28		28		28		28	
Observations	223		223		223		223	
Specification tests (p-values)								
Sargan Test	1.000		1.000		1.000		1.000	
Second order correlation	0.684		0.674		0.741		0.270	

The numbers given in paranthesis are p-vales of the estimated coefficients. The standard errors are robust. * (**,***) denotes statistical significance at 10% (5%, 1%) level. The null hypothesis of Sargan test is that the instruments are not correlated with the residuals. The null hypothesis of the second order correlation test is that the errors in the first-difference regression exhibit no second-order serial correlation.
a) A higher risk index indicates a lower risk.

Table 3
Regression Results: Link between Foreign Bank Share and Efficiency of Banking Sector, 1994-2003
GMM-IV System Estimator

	DEPENDENT VARIABLES		
	(1)	**(2)**	**(3)**
	Net interest margin	Cost	Profit before tax
Bank-level variables			
Foreign bank asset share (in 1+ logs)	-0.038 **	-0.036	-0.042
	(0.017)	(0.311)	(0.109)
Equity in % of total assets (deviation of the rate from 1, in logs)	0.148 ***	0.052	0.199 ***
	(0.000)	(0.541)	(0.010)
Non earning assets in % of total assets (deviation of the rate from 1, in logs)	-0.520 ***	0.417 ***	0.131
	(0.005)	(0.001)	(0.587)
Customer and ST funds in % of total assets (deviation of the rate from 1, in logs)	0.067	0.146	0.135
	(0.145)	(0.300)	(0.121)
Tax in % of pre-tax profit (deviation of the rate from 1, in logs)	0.011	0.021	-0.005
	(0.116)	(0.301)	(0.759)
Cost in % of total assets (deviation of the rate from 1, in logs)	0.558 ***	0.271	-0.583 *
	(0.000)	(0.139)	(0.064)
Macroeconomic variables			
Growth rate of GDP per capita	-0.031	-0.045	0.223 **
	(0.338)	(0.232)	(0.021)
Inflation rate (deviation of the rate from 1, in logs)	0.076 ***	0.071 *	-0.063
	(0.003)	(0.093)	(0.193)
Real interest rate (deviation of the rate from 1, in logs)	0.037 **	0.060 ***	-0.054
	(0.048)	(0.007)	(0.133)
Domestic credit by banking sector in % of GDP, in logs	-0.012 ***	-0.016 **	-0.027 ***
	(0.0013)	(0.017)	(0.004)
Initial GDP per capita (in logs)	0.002	0.004	0.002
	(0.255)	(0.373)	(0.537)
Number of countries	28	28	28
Observations	223	223	223
Specification tests (p-values)			
Sargan Test	n.a.	1.000	n.a.
Second order correlation	0.926	0.840	0.134

The numbers given in paranthesis are p-vales of the estimated coefficients. The standard errors are robust. * (**,***) denotes statistical significance at 10% (5%, 1%) level. The null hypothesis of Sargan test is that the instruments are not correlated with the residuals. The null hypothesis of the second order correlation test is that the errors in the first-difference regression exhibit no second-order serial correlation.

Table 4
Regression Results: Link between Economic Growth and Efficiency of Banking Sector, 1994-2003
GMM-IV System Estimator

DEPENDENT VARIABLE: GROWTH RATE OF GDP PER CAPITA	Net interest margin		Cost		Profit before tax	
Control variables						
Initial GDP per capita (in logs)	-0.020	***	-0.013	***	-0.019	***
	(0.000)		(0.004)		(0.000)	
Composite risk index (in logs) [a)]	0.160	***	0.090	**	0.187	***
	(0.000)		(0.016)		(0.001)	
Main telephone lines (in logs)	0.002		0.002		0.003	***
	(0.253)		(0.177)		(0.000)	
Inflation rate (deviation of the rate from 1, in logs)	-0.078	*	-0.096	**	-0.091	***
	(0.068)		(0.018)		(0.001)	
Banking sector indicators						
Net interest margin in % of total assets (deviation of the rate from 1, in logs)	-0.115					
	(0.503)					
Cost in % of total assets (deviation of the rate from 1, in logs)			-0.398	**		
			(0.026)			
Profit before tax in % of total assets (deviation of the rate from 1, in logs)					0.622	***
					(0.000)	
Number of countries	28		28		28	
Observations	223		223		223	
Specification tests (p-values)						
Sargan Test	1.000		1.000		1.000	
Second order correlation	0.692		0.658		0.188	

The numbers given in paranthesis are p-vales of the estimated coefficients. The standard errors are robust. * (**,***) denotes statistical significance at 10% (5%, 1%) level. The null hypothesis of Sargan test is that the instruments are not correlated with the residuals. The null hypothesis of the second order correlation test is that the errors in the first-difference regression exhibit no second-order serial correlation.
a) A higher risk index indicates a lower risk.

Table A.1
Descriptive Statistics

	Mean	Standard deviation	Min	Max
Log diffrence of GDP per capita	0.020	0.016	-0.028	0.067
Net interest margin in % of total assets (deviation of the rate from 1, in logs)	0.039	0.028	0.015	0.123
Foreign bank asset share (in 1+ logs)	0.161	0.114	0.016	0.469
Profit before tax in % of total assets (deviation of the rate from 1, in logs)	0.009	0.018	-0.059	0.038
Cost in % of total assets (deviation of the rate from 1, in logs)	0.041	0.024	0.014	0.100
Inflation rate (deviation of the rate from 1, in logs)	0.082	0.128	0.000	0.515
Main telephone lines (in logs)	5.545	0.930	3.263	6.491
Composite risk index (in logs)	-0.278	0.124	-0.552	-0.117
GDP per capita (in logs)	9.211	1.162	6.951	10.692
Initial GDP per capita (in logs)	9.113	1.140	6.889	10.637
Non earning assets in % of total assets (deviation of the rate from 1, in logs)	0.021	0.013	0.003	0.053
Equity in % of total assets (deviation of the rate from 1, in logs)	0.137	0.053	0.046	0.282
Customer and ST funds in % of total assets (deviation of the rate from 1, in logs)	0.542	0.042	0.443	0.614
Tax in % of pre-tax profit (deviation of the rate from 1, in logs)	0.187	0.078	0.044	0.412
Domestic credit by banking sector in % of GDP, in logs	-0.245	0.655	-1.704	1.105
Real interest rate (deviation of the rate from 1, in logs)	0.033	0.098	-0.165	0.473

Table A.2
Simple Correlation Coefficient

	Log diffrence of GDP per capita	Net interest margin in % of total assets	Foreign bank asset share (in 1+ logs)	Profit before tax in % of total assets	Cost in % of total assets (deviation of the rate	Inflation rate (deviation of the rate from 1, in	Main telephone lines (in logs)	Composite risk index (in logs)	GDP per capita (in logs)	Initial GDP per capita (in logs)
Log diffrence of GDP per capita	1	-0.598363	-0.069111	0.242757	-0.679937	-0.44736	0.258432	0.494909	0.299923	0.246216
Net interest margin in % of total assets (deviation of the rate from 1, in logs)		1	0.131227	0.166134	0.829464	0.817646	-0.415584	-0.675992	-0.505272	-0.486196
Foreign bank asset share (in 1+ logs)			1	0.053726	0.27941	-0.005055	-0.170363	-0.115685	-0.173895	-0.172556
Profit before tax in % of total assets (deviation of the rate from 1, in logs)				1	-0.165905	0.166166	0.127661	0.209636	0.1097	0.093751
Cost in % of total assets (deviation of the rate from 1, in logs)					1	0.672384	-0.445197	-0.732551	-0.540152	-0.512572
Inflation rate (deviation of the rate from 1, in logs)						1	-0.344767	-0.733978	-0.509223	-0.498945
Main telephone lines (in logs)							1	0.778471	0.935217	0.931876
Composite risk index (in logs)								1	0.887306	0.873492
GDP per capita (in logs)									1	0.998172
Initial GDP per capita (in logs)										1