Journal of Empirical Studies
2014 Vol. 1, No. 2, pp. 62-84
ISSN(e): 2312-6248
ISSN(p): 2312-623X

RELATIONSHIPS BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: A NEW APPROACH BY INPUTS

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ABSTRACT

This paper will discuss a new approach to studying finance-growth nexus, based on the production inputs. We analyze, from a panel of 93 countries (developed countries and least developed countries) over the period 1972-2012, the standard regress of economic growth as well as a new proxy for financial activity and interaction effects of the latter with catching up, education, and physical capital accumulation. The results of the Least Squares Dummy Variable estimator show that, from a global perspective, financial activity was beneficial for growth and development. The interaction between financial development and the standard explanation of growth is an appropriate characterization of the relationship finance-growth. Secondly, there are signs of a positive relationship between financial development of countries and its potential for catching up. Third, financial activity has led to additional benefits in countries with higher levels of adult literacy. Fourth, regardless of a possible volume effect of financial development on saving and investment, there is a positive relationship between financial activity and the rate of capital accumulation, with respect to growth.

Keywords: Financial development, Economic growth, Inputs approach, Developed countries, Least developed countries, Least squares dummy variable.

Contribution/ Originality

This study contributes to the existing literature in two dimensions. First, employing a new proxy variable for financial development constructed by principal components analysis to establish finance-growth relationship. Second, the empirical validation, based on the model of augmented production function, explores a possible channel by which financial development can make its contribution to economic growth.

1. INTRODUCTION

The relationship between financial development and economic growth has generated an enormous amount of publications in recent years and a long and meticulous data collection. The stakes are high because it involves identifying the direction of the correlation between financial system and growth, it's fair to advise countries to assist them and which are really the factors that

favor them. Despite the importance of financial intermediaries in the mobilization saving field, these publications have not said, in a definitive way, this causal relation. The various theoretical and empirical investigations revolve around past four possibilities regarding the growth-finance relationship:

1. Financial development does not matter for economic growth. The correlation observed between them is a simple historical relation: the economies are developed, and thus made their financial sectors, but both followed their own logic.(Meier and Seers, 1984; Stiglitz, 1985; Mayer, 1987; Lucas, 1988).

2. The second possibility, the financial activity is considered as the result of economic activity. Economic growth causes financial institutions to change and develop and financial as well as credit markets to grow. Financial development is thus demand driven. As the growing scale of economic activities requires more and more capital (liquid and fixed), institutional raising and pooling of founds for industry are substituted for individual fortunes to start up enterprises, and for retained profits for economic expansion.

3. As to the third direction, the financial development is a determinant of economic growth, and to clarify this hypothesis, we must distinguish between the factors necessary and sufficient for economic growth. This distinction leads to another logical distinction between two separate formulations of the third orientation that can be found in recent economic literature:

(3.1) Financial development is a precondition for achieving higher economic growth. For reasons theoretical and historical facts, inefficient financial systems are a primary impediment to economic growth.

(3.2) Financial development actively promotes economic growth: if there is no major impediment of economic development, sophisticated financial systems can support high rates and sustained economic growth.

4. Finally, in the fourth direction, financial development may be beneficial, at least in the short-run, and then becomes a liability in the long-run economic growth, because of financial instability that causes crisis. This view is advocated by many economists in extending the theory of Keynes (1936) such as Diamond and Dybvig (1983), Krugman (1995) and Singh (1997).

The remainder of this paper is organized as follows: Section 2 presents the critical review of the empirical research on the finance and growth nexus. Section 3 provides the details of the empirical methodology and describes the new proxy for financial activity, real sector, and economic growth. The empirical results of the paper are discussed in section 4. Finally, Section 5 provides conclusions and some policy implications.

2. LITERATURE REVIEW

This section undertakes a critical review of the research on the multi-significant issue of the correlation and causality between financial development and economic growth.

The empirical relationship between financial development and economic growth is robust. There is now a whole literature that justifies this relationship using a variety of data[1]. Recent empirical studies, however, offer contradictory evidence (Kaminsky and Reinhart, 1999; Deidda and Fattouh, 2002; Favara, 2003; Wachtel, 2003; Rousseau and Wachtel, 2011; Mhadhbi, 2014). Consequently, the relationship between financial development and economic growth has always been a matter of great controversy. However, the discussion focuses on measures of financial development, which must move literature because most authors only analyze an approach that from the outputs and the same database published by the International Monetary Fund (IMF) and the World Bank. Accordingly, it is logical to find almost the same results. In addition to the diversity of financial systems attached to a mutation of the national systems under the effects of deregulation and financial innovation. It is also complex since it does not leave apprehend, by any indicator summarizing the essential features. "The extent of financial intermediation is a problem of interpretation related to the variable nature and its ability to capture the financial activity of a given economy." (Trabelsi, 2003). We must look more deeply, which makes the consistency of these basic models and their resulting difference. We can illustrate, however, the differences between these models by a few indicators which show that the sizes of the banking sector are very different[2].In 1991, for example, total assets represent 62% of Gross National Product (GNP) in the United States, against 145% in Germany and 167% in Japan. However, Germany still shares ownership of companies concentrating. Participants will reach a majority 65% of the total stock of shares, against only 5% in Japan and the United States. The influence of banks in Japan does not pass through the property control.

In addition, the measures of financial development in studies of their impact on economic performance have different powers. Benhabib and Spiegel (2001) examine the relationship between all indicators of financial development and economic growth, investment and *total factor productivity growth*. These two economists using a panel data estimator, not the system described above by Levine *et al.* (2000). This estimator takes into account the endogeneity of all the regressions and the routine use of lagged dependent variables. They concluded that indicators of financial development are correlated with the growth of total factor productivity and *human and physical capital accumulation*. Their work raises, however, an important limitation. Different indicators of financial development are associated with different components of growth (total factor productivity, *human and physical capital accumulation*). The main results obtained taking into account that the main limitation is the difficulty of measuring financial development and to link the empirical constructs with theoretical concepts.

In addition, previous studies have used indicators that sometimes do not reflect the development of financial system. For instance, in some studies, financial development means an increase in the stock of financial assets, whatever their degree of liquidity and is measured using

[1]See Levine (1997; 2004). and Khan(2000).

[2]These indicators are drawn from Aglietta (1995). p.43.

monetary aggregates. An extensively used measure of financial development is given by the broad and/or very broad monetary aggregates M_2/PIB. Although, the evolution of this ratio more accurately reflects the financial system's ability to provide liquidity, its ability is to finance productive investment. Instead, at a low level M_2/PIB report may be associated with a significant *financial sector development*. Consequently, the choice of appropriate monetary aggregate creates a first serious problem because of the instability, the diversity of institutional change and the difficulties of definition for international comparability.Moreover, as Lynch (1996) has noted, monetary aggregates may be highly misleading, since they may indicate the monetization rather than financial development. For example, (M2/GDP) to the People's Republic of China is around 98%, while Australia only 61%. The idea that China's financial system was more developed than Australia does not convince some economists. If we now look carefully indicators of domestic credit, which are probably more close to the theoretical literature that monetary ratio. They ask the same conceptual difficulties, since the credit boom before the banking crisis and the relationship between these measures of financial intermediation and growth is negative in years of banking crises.In fact, domestic credit to private sector (as% of GDP) rises rapidly before the crisis, and then it falls strictly, once the crisis is triggered. He recovered partially, the decline in subsequent years. On the other hand, GDP per capita fall in previous years the banking crisis, he reached the bottom at the beginning of the crisis and later, he recovered gradually. In this line of research, Kaminsky *et al.* (1998) showed that the credit aggregates are swollen important causes of financial instability. The correlation between measures of financial development and economic growth is negative for the period analyzed. The question that arises is whether negative relationship in the short-run can be explained by the occurrence of systemic banking crises. Loayza and Ranciere (2002) show that long-run positive relationship between financial intermediation and growth coexists with a negative relationship in the short-run. This contradictory effect of financial depth on economic activity, may explain the apparent contradiction between the literature of crises and the endogenous growth literature. Loayza and Ranciere (2002) extend this line of empirical research by distinguishing between long-run and short-run. They note that increased short-run credit in the bank may actually signal the beginning of financial crises and stagnation. They must submit to a constraint, it is, therefore, crucial to consider simultaneously short and long-run development finance. For instance, finance spurs economic growth for many countries. This link does not in Latin America, which was subject to a severe banking crisis and repeated. Using a panel, Loayza and Ranciere (2002) estimated a model that tests the effects of long and short-run. Using the Levine *et al.* (2000) measure of financial development (Private Credit), they find a positive long-run relationship between financial development and growth, but in the short-run, it is generally negative[3].

As a result of these ambiguity indicators of financial development, causality analysis continues to be a problem not defined in this work. Typically, it detects only the empirical correlation with no indication on the cause and the consequence. Subsequently, the direction of

[3]To distinguish the more short-run and long-run financial development, see Fisman and Love (2004).

causality has not been a consensus in economic literature. To test this causality, a necessary condition must be present: the reliability of indicators. Authors who have studied the causal relationship may have shown a reverse causality. Robinson (1952)[4] and Friedman and Schwartz (1963) think that causality should be growth towards the financial development through the request of the currency. Then, Patrick (1966)reconciled two-way of causality between finance and growth. The author explained this idea by the fact that one must distinguish between: (i) exogenous financial development, initiated by offering ' supply Leading ', where the causality of financial development on growth and (ii) development financial endogenous, demand-driven 'demand followings', implying causality from growth to finance. As Patrick (1966), Greenwood and Jovanovic (1990) show, using an endogenous growth model, the existence of a two-way causality between financial development and growth. Lawrence (2006) and Zang and Kim (2007) showed that economic growth precedes financial development, using the causality tests Sims-Geweke applied on a large data sample, prepared by Levine *et al.* (2000).

By studying the effect of financial development on economic growth in Turkey during the period 1968-2005, Halicioglu (2007) found that while there is a positive long-run relationship between financial development and economic growth, this relationship can be a negative in the short-run. For the same country, this result is in disagreement with those found by Acaravci *et al.* (2007). These authors found that in the long-run, there is no relationship between financial development and economic growth, so that in the short-run, the first variable has a positive impact on the second. Conversely to the traditional analysis of the finance-growth relationship, Graff (2001; 2002; 2005) proposed an alternative approach to the traditional work, to assess the level of financial development, for the financial sector inputs and its impact on economic performance. This new approach is based on Graff resources available for development of the financial system and can be summarized in three indicators: the share of manpower employed in the financial system, the financial system's share in GDP and the number of banks and branches per capita.

3. EMPIRICAL ANALYSIS

Before starting our study, it is important to remember that the finance is certainly only a minor factor in economic growth. The basic determinants are the accumulation of factors of production and technical progress. Therefore, to avoid misspecification, attention has to be devoted to an economically sound specification of the growth equation to be estimated. Therefore, unlike many other studies[5], we will employ a considerable number of theoretically derived right-hand variables, including a new proxy for the level of technical progress and three interaction effects to capture fundamental hypotheses on the finance-growth nexus from economic theory and history. Contrary to all the work that set a limited number of right-hand variables and testing for

[4]Where enterprise leads finance flow.

[5]For an overview of the literature see Levine (1997; 2004).

'robustness' by adding combinations of variables from an arbitrary vector of 'controls'. The current modeling includes all theoretically important variables and thus is less restrictive.

The data gathered for this study are pooled into a panel of 93 countries and five points in time (eight 5-year growth periods, respectively) covering the period from 1972–2012. Apart from a substantial gain in degrees of freedom, this set-up enables to allow for a priori unknown country ('fixed') effects, which further reduces the ever present omitted variable bias, thereby giving more confidence to the interpretation of the estimates for the coefficients of interest. Since all country specific influences on the endogenous variable are captured by the 'fixed effects', this amount to the estimation of 'within country estimators'. Thus, the estimation ultimately builds on a cross-section analysis of within-country variation, where the time series dimension consists of eight observations only. Hence, this panel approach allows one to draw generalizations from very short time series.

3.1. Model Specification

In the new literature, empirical work on economic growth usually starts from an aggregated production function with the traditional neo-classical inputs. To incorporate the main idea of this new theory in recent years, knowledge-related right-hand variables are added[6]. Some variables are introduced as parts, as in the case of human capital or entirely public goods,such as technical knowledge or organizational features, which are promoting economic activity.

The standard procedure is to refer to a theoretical core. We adopt the augmented Cobb-Douglas aggregate production function, which connects the GDP of country **i** at time **t** and the factors of production. The list of compulsory right-hand variables and other specification issues are, however, be universally agreed upon by the applicants or the observers. To do this, we will follow the approach of Mankiw *et al.* (1992). Consider the Cobb-Douglas which relates to GDP in country **i** at time **t** and the factors of production:

$$Y_{i,t} = A_{i,t} K_{i,t}^{\alpha} L_{i,t}^{\beta} H_{i,t}^{\gamma} \qquad (1)$$

Y is GDP, **K** is physical capital, **H** is human capital, **L** labor and **A** is a factor which reflects the technical level and the economic efficiency.Assuming constant returns to scale in K, L and H, the production inputs traded on factor markets, dividing by **L** and taking logarithms and time derivatives yields

$$g_{(Y/L)} = g_A + \alpha g_{(K/L)} + \gamma g_{(H/L)} \qquad (2)$$

Where g_X is the continuous growth rate of a variable Xand redundant subscripts are suppressed.

[6]It is fair to say that while the process of selecting variables is certainly guided by economic theory, the final specifications of the models to be estimated are generally reliable and motivated by theoretical arguments, rather than formally derived from a set of equations Hoover and Perez (2000).

In this context, we suggest to think of g_A (*i.e.*, (dA/dt) (1/A)) as, at least in part includes an indicator of financial development FD and its interactions with the other growth factors. Demetriades and Law (2006) show that technological progress maybe relevant to empirical studies on the relationship between financial development, institutions and economic development. Thus, technological improvements may be the result of a developed financial system and a sound institutional framework (North, 1990). These two fields of analysis have a tendency to increase the efficiency of the productive sector and improve the productivity investment (Landesmann and Ugo, 1994).

In a context of growth, enabling remediation, through the international technology diffusion, for a given country **i**, human capital is probably one aggregates production may be regarded not only as factors of production, but also as a variable that can exert its influence through changes in the technology level and the overall efficiency. This effect is explained by the fact that human capital is a determinant of a country's ability to assimilate technological and organizational knowledge from abroad and improve the overall efficiency of a Nation (Leibenstein, 1989; Benhabib and Spiegel, 1994). This second effect of human capital is represented in this modeling total factor productivity (TFP) A_{it}. Certainly, a similar magnitude can be accepted for many other socio-political and institutional factors (Barro, 1991). Therefore, the rate growth of the overall efficiency level A is best understood as a function of a set of variables. Like most studies of the new empirical literature on growth, modeling of dA/dt can be represented as follows:

$$g_{A_{i,t}} = F\left(t, T_{i,t-1}, \left(H/L\right)_{i,t-1}, \left(Y/L\right)_{f,t-1} - \left(Y/L\right)_{i,t-1}, X_{i,t-1}\right) \qquad (3)$$

Where t is the time, T is the level of technological competence, (H/L)is human capital per worker, $(Y/L)_f$ - $(Y/L)_i$is the development gap to the most advanced 'frontier' country fand $X_{i,t-1}$ is a vector of other determinants of g_A, which, of course, remains questionable. Specifically, since X undoubtedly consists of a very large number of elements certainly more than any quantitative empirical analysis can handle, a choice has to be made in order to highlight some aspects, while deliberately neglecting others.In addition, the functional form of F raises other difficulties. Given the current state of theoretical knowledge, however, a linear additive formulation does not appear to be accessible starting point for an empirical application.

Regarding the arguments of F, we shall consider a linear time trend, a proxy for the level of technology T, and as a measure for human capital, the logarithm of adult literacy rate LIT. Note that $(Y/L)_f$is constant across countries, therefore, it affects only the intersection and may be dismissed without bias parameter estimates. As before, the variable 'catching-up'is the logarithm of income per capita in country i and the expected sign of the coefficient is negative. X is our proxy for financial development FD and, referring to arguments proposed in the literature, the three interaction effects $[FD \times \ln(Y/L)]_{t-1}$, $[FD \times \ln LIT]_{t-1}$and $FD_{t-1} \times g(K/L)_t$, which stand for the Gerschenkron 'latecomer advantage' hypothesis, the Scandinavian 'impoverished sophisticate' hypothesis, and the allocational improvement of overall capital accumulation due to the activity in the financial sector. This amounts to the following specification of TFP growth:.

$$g_{Ai,t} = a_1 t + a_2 T_{i,t-1} + a_3 \ln LIT_{i,t-1} + a_4 \ln\left(Y/L\right)_{i,t-1} + a_5 FD_{i,t-1} + a_6\left[FD \times \ln\left(Y/L\right)\right]_{i,t-1} + a_7\left[FD \times \ln LIT\right]_{i,t-1} + a_8 FD_{i,t-1} \times g\left(K/L\right)_{i,t} \quad (4)$$

In this way, we have built a reasonable cross-country to study the general framework of growth, where factor accumulation is modeled on a traditional 'augmented' aggregate production function, while the spirit of the new 'endogenous' growth literature enters via TFP growth. The latter is modelled as a function of well-known and empirically largely 'robust' arguments and, last but not least, of the financial development (FD) as well as three interaction terms($\lceil$FD x $\ln(Y/L)\rceil_{t-1}$,$\lceil$FD x $\ln LIT\rceil_{t-1}$and FD_{t-1} x $g(K/L)_t$).

The reduced form that will be used for estimates in this study is derived by substituting equation (4) into equation (2), which results in

$$g\left(Y/L\right)_t = \alpha_0 + \alpha_1 t + \alpha_2 T_{t-1} + \alpha_3 \ln LIT_{t-1} + \alpha_4 \ln\left(Y/L\right)_{t-1} + \alpha_5 FD_{t-1} + \alpha_6\left[FD \times \ln\left(Y/L\right)\right]_{t-1} + \alpha_7\left[FD \times \ln LIT\right]_{t-1} + \alpha_8 FD_{t-1} \times g\left(K/L\right)_t + \alpha_9 g\left(K/L\right)_t + \alpha_{10} g\left(H/L\right)_t \quad (5)$$

3.2. Sample and Data

The variables used in this papier are from the database[7] developed by Graff and updated until 2012.

This study examines a panel of 93 countries, excluding countries that are very small (less than one million), countries with centrally planned economies[8] during the period 1972-2012, countries where oil exports constituted over 20% of GDP in 1985, and countries with civil wars claiming a death toll exceeding 2.5% of total population during 1972-2012. The exclusion of these countries in the sample is justified by the fact that it is unreasonable to run regressions across countries that are fundamentally different from the usual conditions (Harberger, 1998).

Variable outputs of the traditional financial development, namely: Depth liquid liabilities reflects the financial system. However, due to instability and differences in definition, the choice of an appropriate monetary aggregate raises a serious problem. Private shows the effectiveness of the financial system towards the private sector. Bank shows the importance of assets of deposit banks, compared to those of the central bank. Nowadays, credit to the private sector is seen as an inefficient allocation and detrimental to the sustainable growth achievement. To solve problems related to these measures that reflect the monetization and the allocation of credit, an innovative approach has a specific branch within the empirical literature (La Porta *et al.*, 1998; 2008). This

[7]For more details on the database, refer to Appendix.

[8]Centrally planned economies were characterized by the dominance of large enterprises, while SMEs hardly existed.

approach refers to variables concerning the origin of a country's legal system and, more bureaucratic and political characteristics as the instrumental variables to the traditional variables of financial development. The problems of bias and convergence of the estimators are therefore corrected. However, these instruments are usually very rough qualitative variables. A classification by legal origin, which refers to the socio-economic and political constitution of a country, makes the possibility of evaluating the financial sector's contribution to growth during recent decades very limited.

Finally, some researchers attempt to identify the structural features of the financial system. These contributions (Goldsmith, 1969; 1987; Bhattarcharyay, 1988; Clague *et al.*, 1997; Ergungor, 2008) refer to different ratios of currency or credit aggregates (eg, M_2/M_1 or credit of the central bank in the private credit), while researchers such as Beck, Demirguç-Kuntand Levine[9] have constructed a large database of national characteristics and institutional performance indicators, referring to the various financial institutions. These features may eventually help classify financial systems from the fundamental theory but empirically unclear. While this distinction of countries according to a financial system based on banks versus market-based or oriented versus the rights of creditors facing the debtor's rights, is encouraging as regards the possibility to specify the nature of link between finance and growth. This research is still at the consolidation of data and resulting classifications.

We leave the boundaries of those measures in the empirical literature and the work of Graff (2001; 2002; 2005) on the growth-finance relationship, proposing a new proxy measure for financial development, inputs from the financial system. The construction of the new variable for financial development is motivated by the interest in obtaining a reasonably reliable and comparable quantification of the proportion of societal resources devoted to the financial system. Even if the intention has a certain resemblance to the basic argument of transaction costs and institutional economics (Williamson, 1985; North, 1990) namely, that the overall transaction costs are far from negligible and that financial institutions are a major response to this problem. Instead, we consider that the amount of resources devoted to the functioning of these institutions as a reliable indicator of the effort to control transaction costs (and, frictions and market failures due to asymmetric information that is tempered by the financial system).

This measurement is the first principal component of a set of different indicators for financial activity. While monetary indicators, such as Depth, are very difficult to compare over time and space because of the diversity and institutional change. Our proxy is likely to be less sensitive to changes in the institutional regulations and national and international shocks, but to capture rather stable characteristics of a given economy's structure. In addition, it is well known that monetary indicators are leading indicators of business cycles. Therefore, these variables are less endogenous inputs to current economic activity that traditional variables of financial development.

[9]See Demirgüç-Kunt and Levine (1999). and Beck *et al.* (2000).

In terms of their approximate validity in quantitative conception of financial activity, the financial system's share in GDP, that is to say, the factor incomes generated in the financial sector, is probably the best indicator. More specifically, the share of the financial system in GDP consists of wages and the labor markets are characterized by the optimality of wages fixed by the market. This is based on equality between wages and marginal productivity of labor. The sector's share is valued at conditions that are very close to what most economists consider appropriate. Following this line of reasoning, the only flaw is to point to the observation that in the real world factor markets are frequently far from resulting in market clearing prices, so that some reservation is called for.

The second indicator is the number of banks and branches per capita, which gives an idea about the degree to which a country's population has access to financial services. Obviously, the validity of this indicator is weakened by differences in the dispersion of a country's population over its territory. In addition to this, technical progress and financial innovations, such as, telephone and Internet banking have made the accessibility of a bank office obsolete for many financial interactions and services. Thus, although this measure indicates a decline in financial development in most developed countries in recent years is the result of innovations in the banking sector and thus a sign of progress rather than a decline. Indeed, Table 1 shows the first signs of stabilization or even a fall in the number of banks and branches by one of the active population, which could indicate a structural break, but only after 1990. Considering these arguments, the use of this indicator for recent years in highly developed countries may cause a problem. However, since our analysis refers to the period 1972-2012 and covers a wide sample of countries including many least developed countries (LDCs), the validity of this indicator can be seen with confidence.

Table-1. Banks and branches per 100,000 labor forces, by level of development

	1970	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2009**	**2012**
All 93 countries	14,6	15,9	16,5	19,3	21,6	21,7	21,9	21,9	22	22,2
31 Least Developed Countries *	1,7	1,7	2,1	2,0	2,2	2,2	2,3	2,3	2,4	2,4
31 Intermediate countries *	9,8	10,1	10,9	11,8	12,9	13,8	14,1	14,2	14,2	14.3
31 More developed countries *	32,5	35,8	36,5	44,4	49,7	49,0	49,2	49,1	49,2	49,2

*Split by real gross domestic product per worker in 1990.

Finally, we refer to the share of manpower employed in the financial system. This measure is questionable because it ignores the productivity levels of those working in the financial system. To address this problem, we suggest a weighting of raw numbers of employees withan internationally comparable labour productivity proxy, mean years of schooling of the population aged 25–65 years (Barro and Lee, 1996) which results in an indicator for 'effective' rather than

'raw' labour. For a first picture, this correction, albeit imperfect, should, at least to some degree, improve the validity of our manpower indicator.

For a study on the relationship finance-growth in a cross-sample of countries covering thirty or forty years, despite all the adjustments and reservations, due to data quality indicators are considered far from satisfactory. Thus, these variables can be transformed in a way to make these measures reasonably reliable, valid and complete, to reflect the concept of 'resources for finance'. The procedure is currently chosen to determine the common variance of the three indicators, using principal component analysis (PCA). If the operating costs of the financial system are reasonably well represented by the first principal component this component can serve as a valid proxy variable for financial development.

The PCA is based on the variance of specific variables and can extract a minimum of factors that explain the largest number of specific variance. To approach this goal, a technical requirement must be satisfied: the dummy variables must be measured independently. This condition is satisfied, because our three variables for the size of the financial system are derived from different databases.

The PCA is a technique that aims to identify groups of quantitative variables strongly linked. This group is called 'component'. Variables (in our case, the three new inputs of financial activity) belonging to the same component are strongly linked represent a single concept 'financial development'. Instead, variables not linked they do not measure the same concept and are not part of the same component.

Practically, to prepare raw series, the three variables (number of banks and branches per capita, weighted share of manpower employed in the financial system, share of the financial system in GDP) were carefully screened for obvious errors and incompatibilities. Next, the yearly values of the normalized variables were transformed into five-year averages for 1972, 1977, 1982, 1987, 1992, 1997, 2002, 2001 and 2012. Finally, operational rules had to be formulated how to treat missing values[10]. The remaining data for 93 countries and eight points in time were pooled and standardized. Subsequently, PCA was applied to a set of observations arising from a matrix of 744×3. We conducted a PCA using SPSS. The PCA results are shown in Table 2.

Table 2 reveals that the principal component extraction is quite well done. It reduces the data and gives us a first principal component representing 77% of the overall variance (a total of 70% of variance explained is generally considered acceptable). In addition, the variance is explained for the second and third principal component accounts for only 18.1% and 5.1% respectively. All loadings are high (0.88 for banks per capita, 0.94 for the share of manpower in financial sector and 0.83 for the share of finance in GDP), indicating that the expected three-dimensional structure of the three variables is in fact well represented only by the first principal component.

[10]The general strategy was to estimate missing values in time by interpolation, extrapolation, trend analysis, and, if possible, by regression on exogenous variables, but exclude all observations where the majority of data could result estimation, rather than from the original data.

Table-2. A financial development proxy from principal component analysis

FD indication	**Description**	
Bank	Number of banks and branches / 100,000 labor force	
Fin/PIB	Financial system's share (factor income) in GDP	
Fin per	Share of labor employed in the financial system (adjusted by educational attainment)	
Principal component analysis, 3 FD indicators, n = 8 x 93		
Principal component	Explained variance	Cumulated explained variance
1	76,8%	76,8%
2	18,1%	94,9%
3	5,1%	100%
FD indicator	Loading principal component No. 1	Variance commune
Bank	0,88	0,76
Fin/PIB	0,94	0,88
Finper	0,83	0,68

Therefore, in what follows, the individual scores for this component are taken as proxy of financial development for future analysis. We can therefore proceed to a new variable defined, which assigns a specific value for financial development. This indicator is defined for the 93 countries in our sample, across eight time points ($\mathbf{n}$ = 744, $\boldsymbol{\mu}$ = 0 and $\boldsymbol{\sigma}$ = 1). Some descriptive statistics, this new measure of financial activity over time for sub-groups of countries are summarized in Table 3.

Table-3. FD-proxy (factor scores) by year and country group

	1970	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**N**
All 93 countries	-0,22	-0,16	-0,03	0,13	0,28	0,50	0,62	0,79	0,83	93
OECD	0,77	0,92	1,15	1,57	1,99	2,18	2,73	2,89	2,95	22
Middle East / North Africa	-0,34	-0,27	-0,17	-0,08	-0,01	0,05	0,22	0,43	0,61	8
Latin America	-0,32	-0,28	-0,11	-0,03	0,08	0,15	0,47	0,59	0,69	20
East Asia/Pacific	-0,47	-0,40	-0,22	0,08	0,26	0,46	0,63	0,82	0,87	9
South Asia	-0,68	-0,71	-0,63	-0,54	-0,49	-0,33	-0,14	-0,20	-0,25	5
Sub–Saharan Africa	-0,71	-0,70	-0,68	-0,66	-0,65	-0,62	-0,57	-0,49	-0,47	29

World Bank classification

The usual measure for labor (L) in studies similar to ours, is the size of the population. This measure may be adequate, as long as the focus is on standard of living aspects of economic development, for this productivity oriented study we rather refer to the size of the labor force.

Capital accumulation is often represented by the investment rate. We choose to compute capital stock estimates and growth rates instead. The reason is that we assume the well-known problems of capital stock estimates (most of all the arbitrariness of assumptions regarding depreciation and obsolescence) to be more than outweighed by the provision of a variable that is very much closer to the theoretical derivation of the long-run growth equation.Specifically, investment rates are likely to change more than capital stock growth rates along the business cycle and after macro-economic shocks. Moreover, the calculation of capital stock estimates, we

can calculate the various individual time series for v = K/Y, a result that facilitates the subsequent determination of estimates for capacity utilization.

Human capital accumulation $\mathbf{g}_{(H/L)}$ is represented by the rate of change of educational attainment using data on mean years of schooling. Regardless of $\mathbf{g}_{(H/L)}$ in our model, there are two other variables related to human capital: the initial human capital, and the interaction term of the latter with the variable of financial development. To approach as closely as possible to the literacy/financial development interaction-hypothesis, the variable level of human capital is represented by the literacy rate (Literacy: LIT).

The level of technological sophistication T is generally acknowledged to be one of the main determinants of economic growth. Yet, due to difficulties to find suitable proxies, it is very rarely explicitly modeled in empirical cross-country growth exercises. However, if the exogenous variable of interest can be suspected to be closely related to technical progress, as the financial activity proxies in the present study, ignoring T estimates are certainly biased, thereby casting serious doubt on the adequacy of the model. To avoid this kind of misspecification, we use again the PCA since no single variable statistics published is likely to give a valid estimate of technical progress.

The procedure is to consider a wide array of information from international statistics on R & D, patenting activity, scientific publications and the direct acquisition of technical knowledge from abroad, and then take the first principle component of these variables as a proxy for T[11].
The information used to determine a proxy for technical progress Tare:

- The R & D, plus the cost of patents and licenses from abroad;
- The number of scientists and engineers in R and D;
- Patents granted to residents by the national patent offices;
- Patent applications in the United States;
- Patent applications, which take place in at least two countries;
- The rate of citations weighted by the number of publications in a sample of scientific and technical journals.

After PCA, Table 4 shows that the first principal component explains 86% of the total variance of the six indicators of R & D. We'll use this first principal component as a proxy for technological, $\mathbf{T}_{i,t}$, (t = 1972, 1977, ..., 2012).

Finally, since this study focuses on the characteristics of long-run, it would not be reasonable to eliminate business cycle and macroeconomic shocks influences from our variables[12]. To this

[11]To this extent, we refer to six indicators related to technology with observations on the same panel. For details, see Graff (2000).

[12]Accordance with the main empirical work, the growth rates are calculated as differences of logarithms of the values t and t - 1. Since the length of time based on our panel is five years, making our variables strongly correlated with economic cycles. The cyclical properties of the underlying data must be taken into account. Also note that due to the periodic subdivision of our data, the usual alternative of eliminating cycles, namely the construction of a rate of long-term growth across all observations within a few decades (method World Bank) is not possible.

end, we correct our production inputs variables K, L and H, for capacity utilization (Graff, 2005), based on the method of stimulation of Klein and Kosobud (1961), and frequently used to determine capital utilization in policy-oriented business cycle research.

Table-4. A technologyproxy from principal component analysis

indicator	**Description**	
R et D	(R & D + the cost of patents and licenses from abroad)/ GDP	
SI_R et D	The number of scientists and engineers in R and D / employees	
BR	Patents granted to residents by the national patent office's / employees	
B_USA	Patent applications in the United States / employees	
B_2P	Patent applications, which take place in at least 2 countries	
RC	(publications in a sample of scientific and technical journals + citations) / employees	
Principal component analysis, 6T indicators, n = 8 x 93		
Principal component	Loading principal component No. 1	Variance commune
1	86,0 %	86,0 %
2	6,9 %	92,9 %
3	2,7 %	95,6 %
4	2,2 %	97,8 %
5	1,6 %	99,5 %
6	0,5 %	100,0 %
T indicator	Corrélation	Variance commune
ln (1 + B_USA)	0,98	0,95
ln (1 + B_2P)	0,97	0,93
ln (1 + BR)	0,91	0,83
ln (1 + RC)	0,92	0,85
R et D	0,90	0,81
SI_R et D	0,89	0,80

The basic idea is that the empirical short-run fluctuations of capital output ratio, v, are mainly due to cyclical fluctuations in capital utilization. Accept this reasoning, the individual long-run trend is estimated pred $(v_t) = e^{pred(lnvt)}$, from 93 regressions following:

$$\ln v_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \varepsilon_t$$

For each country, we adopt equation (6) to identify the actual deviation of any of any respectivev_t minimum level (*i.e.* the country's maximum capacity utilization), to measure the actual capital utilization. Labour utilization would, of course, properly measured by the unemployment rate. However, it is difficult to find reliable and comparable figuresfor unemployment for more than very few countries, so that for a large sample, we must resort to less direct methods. As Graff (2005) taking into consideration potential firm specific qualifications of labour, the duration of work contracts and other institutional characteristics of labour markets, we assume that labour is laid off to a lesser degree than capital is put idle. To implement this argument, labour's capacity under-utilization is calculated as 50% ofcapital's deviation from its full utilization. A similar procedure is applied to calculate the capacity utilization of human capital. In this case, 'hired and fired' even less than 'raw' labour, assigning a value of 50% of labour's fluctuations in utilization to human capital's.

Since we relied on a set of panel data, with I = 93 countries and T = 8 growth periods, the estimation method is that Least Squares Dummy Variable (LSDV), which takes into account individual fixed effects and time. This method is less likely to suffer from misspecification due to bias estimators, the OLS method. Therefore, the final equation to estimate is:

$$g\left(Y/L\right)_t = \alpha_i + \alpha_1 t + \alpha_2 T_{t-1} + \alpha_3 \ln LIT_{t-1} + \alpha_4 \ln\left(Y/L\right)_{t-1}$$
$$+\alpha_5 FD_{t-1} + \alpha_6\left[FD \times \ln\left(Y/L\right)\right]_{t-1} + \alpha_7\left[FD \times \ln LIT\right]_{t-1} \qquad (7)$$
$$+\alpha_8 FD_{t-1} \times g\left(K/L\right)_t + \alpha_9 g\left(K/L\right)_t + \alpha_{10} g\left(H/L\right)_t + \varepsilon_{it}$$

Another application of the reference model is to refer to the inputs of production before adjustment for capacity utilization (K', L' and H). These initial observations are not corrected on their degree of utilizationdue to cyclical influences or temporary shocks and therefore certainly conceptually less valid to measure the actual production inputs than our 'corrected values. However, the results can be achieved with these initial observations are more comparable with those of previous studies. In addition, these results are useful to demonstrate the effects of our adjustment procedure. Therefore, we run a second regression as specified above, but with K, L and H, substituted for byK', L' and H ':

$$g\left(y/L'\right)_t = \alpha_i + \alpha_1 t + \alpha_2 T_{t-1} + \alpha_3 \ln LIT_{t-1} + \alpha_4 \ln\left(y/L'\right)_{t-1}$$
$$+\alpha_5 FD_{t-1} + \alpha_6\left[FD \times \ln\left(y/L'\right)\right]_{t-1} + \alpha_7\left[FD \times \ln LIT\right]_{t-1} \qquad (8)$$
$$+\alpha_8 FD_{t-1} \times g\left(K'/L'\right)_t + \alpha_9 g\left(K'/L'\right)_t + \alpha_{10} g\left(H'/L'\right)_t + \varepsilon_{it}$$

With the variables defined and calculated as described above, the fixed effects model is estimated by regressing $g(Y/L)_{i,t}$on its presumed determinants (with growth rates calculated as continuousyearly rates for every five year period and level variable taken from the beginning of the corresponding periods).

4. ESTIMATION RESULTS

In an empirical study based on a production function, the first step is to test economies of scale. To do this, we must first estimate the following equation:

$$\ln y_{i,t} = \alpha_0 + \alpha_i + \alpha \ln K_{i,t} + \beta \ln L_{i,t} + \gamma \ln H_{i,t} + \mu_{i,t} \qquad (9)$$

Results relating to the production function are mentioned in Table 5. The estimated equations for the fitted model show that the unadjusted returns are almost unitary. In addition, the rejection of the null hypothesis, $\alpha + \beta + \gamma = 1$, gives a t statistic of only - 0.05. Therefore, the assumption of constant returns to scale is not in contradiction with our data.

Table 6 shows for a total sample and both subgroups of countries (developed countries and LDCs) the estimates of the reference model adjusted and unadjusted for the LSDV method. As a first comment, it is obvious to note that our reference model is adequate. It explains 84% of the

variance of $\mathbf{g}_{(Y/L)}$, which is very high compared to similar studies, is around 60% (King and Levine, 1993a; 1993b; Demirgüç-Kunt and Maksimovic, 1998; Levine and Zervos, 1998; Beck *et al*., 2000; Rioja and Valev, 2004). In addition, all coefficients are significantly ($p \leq 5\%$) different from zero, with the expected signs. Estimates in the specification are better adjusted, that due to the introduction of dummy variables (binary variables) countries, for fixed effects. However, Fisher's test is highly significant for the dummy variables, indeed affirms the relevance of their presence.

Table-5. Estimation results by LSVD, production functions

Dependent variable **lnY**, n = 8 x 93		
Variable	Unadjusted specification	Adjusted Specification
	(K, L, H)	(K', L', H')
ln$K$	0,45* (26,2)	0,50* (31,5)
ln$L$	0,49*(8,44)	0,65*(11,24)
ln$H$	0,06* (2,69)	–0,02 (–0,92)
R^2	0,99	0,99
$\alpha + \beta + \gamma$	0,998	1,126
t-Test	(–0,05)	(3,38)
p(H1)	0,963	0,001*

(1) t -statistics in brackets, one-tailed significance tests for regression parameters,

(2) * $p \leq 0{,}05$

However, the fact that all explanatory variables and the determinants of overall efficiency are significant and partially correlated with economic growth has the credibility to our specification. Therefore, we interpret a positive and significant (t = 2.82) estimated for the coefficient on the lagged financial development $\mathbf{FD}_{t-1}$ as a strong indication that financial activity was not acting directly on economic growth.

In addition, the negative coefficient (t = -2.78) for the interaction term **FD × ln (Y/L)**, suggesting that underdeveloped countries earn more from financial development than developed countries, thus giving a new empirical support for the Gerschenkron hypothesis. Finally, the positive coefficients for the interaction terms **FD × ln LIT** (t = 2.64) and **FD** × $\mathbf{g}_{(K/L)}$ (t = 1.78) support the literacy-financial development interaction and the allocation efficiency hypotheses.

The overall fit is significantly reduced when the factors of production are taken as raw series unadjusted for capacity utilization (Equation 7). In addition, the accumulation of human capital does not pass conventional levels of significance. Therefore, the capacity adjustment, as proposed obviously improves accuracy, but it does not lead to contradictory results, when compared to the unadjusted. Subsequently the reduced form of our growth model reasonably represents the economic relations of the real world.

In what follows, preference will be given to specifying the adjusted capacity.

Columns 3 and 4 show the results of two separate groups of the specification adjusted for developed countries and LDCs, which are composed respectively of 47 and 46 countries. In general, the table shows that growth factors are more explicit with respect to the identified sub-group of developed countries, so that the exogenous components purely time dependent, remain

more important in the sub-group of LDCs. It is interesting to note that the estimate of lagged financial development $\mathbf{FD}_{t-1}$for the LDCs is negative (but not significantly different from zero). The interaction effects, however, do not change sign, although the Gerschenkron effect is not significant. Accordingly, finance-growth relationship is less established in the sub-group of the poorest countries. To some extent this could be due to the quality of data for these countries, rather than to structural differences. The following research should try to avoid this possible effect of data quality.

Table-6. LSVD estimation, dependent variable$g_{(Y/L)}$

Model Capacity Utilization	Unadjusted specification	Adjusted Specification	Developed Countries(Adjusted)	LDCs (Adjusted)
T	0,0013*(4,94)	0,00056 (1,36)	0,00071* (1,89)	0,0021* (4,32)
T_{t-1}	0,025* (2,86)	0,026* (3,07)	0,032 *(3,62)	0,039(1,30)
ln LIT_{t-1}	0,025 *(1,82)	0,026* (1,98)*	0,048* (3,82)	0,009(0,52)
ln $(Y/L)_{t-1}$	−0,068* (−9,23)	−0,070* (−10,2)	−0,066* (−9,40)	−0,055* (−3,27)
g $(K/L)_t$	0,62 * (22,2)	0,58* (22,0)	0,62* (22,8)	0,79* (6,40)
g $(H/L)_t$	0,045 * (2,28)	0,022 (0,54)	0,020 (0,87)	0,043 (1,15)
FD_{t-1}	0,155* (2,82)*	0,160* (2,96)	0,193* (3,51)	−0,11 (−0,60)
$[FD \times \ln (Y/L)]_{t-1}$	−0,015* (−2,78)	−0,015* (−2,89)	−0,018* (−3,26)	0,018 (0,75)
$(FD \times \ln LIT)_{t-1}$	0,036* (2,51)	0,044* (3,04)	0,037* (2,60)	0,032 (1,59)
$FD_{t-1} \times g(K/L)_t$	0,082* (1,78)	0,072* (1,22)	0,073 (1,13)	0,24 (1,37)
R^2	0,86	0,70	0,87	0,86
R^2ajusté	0,80	0,58	0,81	0,80
N	8 x 93	8 x 93	8× 47	8 × 46

Finally, the validity of our approach will be submitted to a test against proxies of financial development. To this end, we estimated the reference modeloutputs with traditional measures of financial development (**Depth**, **Private** and **Bank**). Table 7 presents the estimates results of the basic model adjusted with the traditional variables of financial development for the total sample.

Table-7. LSVD estimation, the outputs of the financial development variables, dependent variable $g_{(Y/L)}$

Model Capacity Utilization	Depth	Private	Bank
T	0,0011* (4,91)	0,0024* (4,37)	0,00071* (1,89)
T_{t-1}	0,021* (2,90)	0,013* (2,17)	0,015* (2,15)
ln LIT_{t-1}	−0,010(−1,59)	0,0003 (0,06)	−0,018 (−2,28)
ln $(Y/L)_{t-1}$	−0,031* (−4,56)	−0,036* (−5,58)	−0,030* (−3,07)
g $(K/L)_t$	0,51*(16,0)	0,51* (15,9)	0,50* (15,9)
g $(H/L)_t$	0,037*(2,03)	0,038* (2,11)	0,038* (2,10)
FD_{t-1}	0,154* (3,19)	0,118* (3,18)	0,153* (2,83)
$[FD \times \ln (Y/L)]_{t-1}$	−0,016 (−1,30)	0,003 (0,25)	−0,014 (−1,27)
$(FD \times \ln LIT)_{t-1}$	0,046(1,57)	−0,018 (−0,66)	0,036* (2,18)
$FD_{t-1} \times g(K/L)t$	0,037*(2,03)	0,038* (2,11)	0,038* (2,10)
R^2	0,65	0,65	0,66
R^2ajusté	0,57	0,58	0,58
N	8x 93	8 x 93	8 x 93

While the consideration of the estimated coefficients for the various traditional variables and, for a new proxy of financial development proposed here can provide guidance on the plausibility of different measurement concepts, a simple comparison of parameter does allow, however no indication of more appropriate models of statistical standpoint. Thus, we apply a standard test of non-nested models and we choose Mizon and Richard (1986) E-test, which amounts to a Fisher test with eight degrees of freedom in the numerator (the variable of financial development and three interaction terms). The joint significance of regressors competes against the full replacement model shows the results reassuring. Our measure of financial development FD inputs against the monetization variable Depth, yields an F-statistic of 2.31 (p = 5.8%), while Depth against the results of our proxy FD gives an F-statistic of 1.70 (p = 15%). The difference is even clearer for the other two measures of credit (Private and Bank). Private, where a priori reasoning would expect a higher degree of validity: The FDagainstPrivate offers an F-statistic of 2.40 (p = 5.1%), while the complementary test for PrivateagainstFD only gives an F-statistic of 0.59 (p = 67%). Finally, FDagainstBank gives F-statistic of 2.51 (p = 4.9), conversely only F-statistic 0.62 (p = 71%). Therefore, if financial development and its interdependencies affect growth in a manner which is close to what is specified in our reference model, preference should be given to the measure by the inputs of the financial system and not by measures traditional, reflecting the monetization (Depth) and the volume of credit (Private and Bank).

5. CONCLUSION

This paper presents a new approach to study the relationship finance-growth, which is based on the inputs. To measure financial development, we have chosen the first principal component inputs of the three indicators of financial activity as (Graff, 2005): This is the financial system's share in GDP, the number of banks and branches per capitaand the share of manpower employed in the financial system. We have specified a neoclassical growth model based on an augmented aggregate production function, identically to Mankiw *et al.* (1992) where we reflected on the interactions between this financial development proxy and the determinants growth, namely, the physical and human capital and technological progress. In addition, we adjusted our baseline model taking into account the uses of the determinants of production capacity. Our conclusions focus on two models adjusted and unadjusted. On a sample of 93 countries divided into two subgroups, one of the developed countries and other LDCs in the period 1972-2012. The results of the LSDV estimator show that, from a global perspective, financial activity was beneficial for growth and development. In addition, these results support Schumpeterian hypothesis of the growth. The interaction between financial development and the standard explanation of growth is an appropriate characterization of the relationship finance-growth. Secondly, there are signs of a positive relationship between financial development of countries and its potential for catching up. Third, financial activity has led to additional benefits in countries with higher levels of adult literacy. Fourth, regardless of a possible volume effect of financial development on saving and investment, there is a positive relationship between financial activity and the rate of capital accumulation, with respect to growth. In conclusion, the financial system is certainly not the main

source of economic growth; its role is to provide services to the rest of the economy, as an intermediary and distributor. The financial system plays a supporting role in the process of economic growth and development. However, a lack in the performance of these functions may lead to economic growth rate below the potential rate, would result in a loss of economic prosperity. Therefore, the comparative analysis between the two sub-groups, leads us to conclude that developing countries cash in addition to the financial activity for the developed countries. In addition, the relationship finance growth is less established in the subgroup of the poorest countries. Following this detailed examination, we can say that the link between financial development and economic growth is complex, because of cross interrelationships between the real and the financial sphere. However, we believe that research on the effect of this new proxy of financial development on growth has only just begun. Other more refined research is still needed to confirm the positive effect of this indicator on economic performance. In sum, it should be noted that this work draws its originality in the scope of our empirical methodology. Indeed, if the applications of the approach outputs to test the relationship finance growth are numerous applications by approaching inputs are much lower (Graff, 2001; 2002; 2005). Despite the imperfection of the data, we obtain convincing results and consistent with our expectations.

This job step does not answer all the questions raised by the theme of the interrelations between the development of the real, monetary and financial, but provides a good basis for reflection. Several lines of research can emerge from this analysis. The first priority is to reflect further on the measures of financial activity and the theoretical justifications of these measures and the factors that influence the growth-finance relationship. The second area concerns the causality question of this new proxy, based on the inputs of the financial sector. For the third axis, it is a priority to add to that proxy measures for other components of financial development, namely, indicators of stock market and insurance market indicators. Finally, more research should be conducted to study in an international perspective, possible interactions between the functioning of the financial system and regulatory issues, as well as the national economic situation.

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APPENDIX

Data Sources (1972-2012)

Variable	Description and Source
Physical capital	Estimated by the perpetual inventory method as specified for LDCs by Harberger (1978) and refined by Nehru and Dhareshwar (1993.), using a depreciation rate of 10%. Data are from the Penn World Tables (Mark 5.6, revised December 2006).
Capital humain	Educational attainment (H/L) is taken from Barro and Lee (1996) referring to mean years of schooling in the population aged 25–65. Literacy Rates (LIT) are from various issues of the UNESCO Statistical Yearbook, Paris.
Capital (K), Human Capital (H) and Labor (L)	Adjusted for capacity utilization as described in Section **3.2**

The per capita growth rate g(Y/L)	Taken as ⌊ln(Y/L) 2012 − ln(Y/L) 1972⌋/40. Data are RGDPW from the PennWorld Tables (Mark 5.6), adjusted for labor capacity utilization. All other growth rates are computed in the same way. The convergence variable is RGDPW73 adjusted for labor capacity utilization.
Technology	The proxy T is computed as the fist principal component of six technology related indicators covering the whole panel of 93 countries and five years (1972, …,..., 2012). Indicators are two R&D related ratios (referring to expenditure and professionals engaged, source: UNESCO), patenting activity (domestic and international, source: WIPO, Geneva and ifo- Institute, Munich, scientific publications (scientometric data, source: Scientometrics), and direct acquisition of technical knowledge from abroad (royalties and expenditure for foreign licenses, source: IMF). The first principal component represents 85% of all the variables' variance. (For further details see (Graff, 2000). The 8 × 93 matrix of values for T can be obtained upon request).
The number of Banks and branches	Counted from the 1972 to 2012 editions of the Bankers' Almanac and Yearbook, London: Thomas Skinner.
The share of labour employed in the financial system	ILOYearbook of Labor Statistics, Vols. 1971–2012, Geneva. The corresponding ISIC-2 (international standard industrial classification of all economic activities, 1968) classification is 'major division 8' (financial institutions, insurance, real estate and business services).
The financial system's share of GDP	Computed from various issues of the UN National Account Statistics, New York, referring to factor income generated in 'finance, insurance and business services'.

Sample of Countries

Country Code	Country Name	Country Code	Country Name	Country Code	Country Name
ARG	Argentina	GIN	Guinea	NOR	Norway
AUS	Australia	GRC	Greece	NPL	Nepal
AUT	Austria	GTM	Guatemala	NZL	New Zealand
BDI	Burundi	HKG	Hong Kong	PAK	Pakistan
BEL	Belgium	HND	Honduras	PAN	Panama
BEN	Benin	HTI	Haiti	PER	Peru
BGD	Bangladesh	HVO	Burkina Faso	PHL	Philippines
BOL	Bolivia	IDN	Indonesia	PNG	New Guinea
BRA	Brazil	IND	India	PRT	Portugal
BUR	Burma	IRL	Iceland	PRY	Paraguay
BWA	Botswana	IRN	Iran	RWA	Rwanda
CAF	Central African Republic	ISR	Israel	SGP	Singapore
CAN	Canada	ITA	Italy	SLE	Sierra Leone
CHE	Switzerland	JAM	Jamaica	SLV	El Salvador
CHL	Chile	JOR	Jordan	SOM	Somalia
CIV	Ivory Coast	JPN	Japan	SWE	Sweden
CMR	Cameroon	KEN	Kenya	SYR	Syria
COL	Colombia	KOR	Korea	TCD	Chad
CRI	Costa Rica	LBR	Liberia	TGO	Togo
DEU	Germany	LKA	Sri Lanka	THA	Thailand
DNK	Denmark	LSO	Lesotho	TTO	Trinidad and Tobago
DOM	Dominican Republic	MAR	Morocco	TUN	Tunisia
DZA	Algeria	MEX	Mexico	TUR	Turkey
ECU	Ecuador	MLI	Mali	TZA	Tanzania
EGY	Egypt	MRT	Mauritania	URY	Uruguay
ESP	Spain	MWI	Malawi	USA	United States
ETH	Ethiopia	MYS	Malaysia	VEN	Venezuela
FIN	Finland	NAM	Namibia	ZAF	South Africa
FRA	France	NER	Niger	ZAR	Zaire
GBR	United Kingdom	NGA	Nigeria	ZMB	Zambia
GHA	Ghana	NLD	Netherlands	ZWE	Zimbabwe