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Author(s):
Graff, Michael

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ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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KOF

Dr. habil. M. Graff
ETH Zentrum WEH
CH-8092 Zürich
Tel. +41 1 632 42 19
Fax +41 1 632 12 18
graff@kof.gess.ethz.ch
www.kof.ethz.ch

Socio-Economic Factors and the Finance-Growth Nexus

Michael Graff

The finance-growth nexus is discussed with respect to possible conclusions from economic history, contributions from economic theory as well as recent empirical cross-country studies. Then, a new proxy for financial development is introduced, which refers to the input of real resources into the financial system. Based on this proxy, an empirical framework is elaborated to clarify the importance of financial activity for economic growth. Interaction effects between financial development and catching-up, education as well as physical capital accumulation are considered. The numerical analyses, covering a panel of 93 countries from 1970–90, imply that financial activity generally had a positive impact on economic growth. To clarify whether socio-economic characteristics modify this general finance-growth nexus, the countries in our sample are classified according to measures of concepts like 'democracy', 'rule of law' and 'corporatism'. These rankings are used to split the total of 93 countries into distinctive subgroups. It is shown that the generally positive partial correlation between (lagged) proxies for financial development (as well as its interaction terms) and growth are significantly higher in the more law enforcing and the more corporatist subgroups. It is therefore concluded that it is crucial to consider the embeddedness of the financial sector as an economic institution into its broader social, cultural and historical context.

1 Introduction: Outline of the paper

The paper screens hypotheses from theoretical models and stylised facts from empirical research (quantitative research as well as economic history) concerning the significance of financial development as a possible determinant of economic growth. It goes on arguing that a major setback of recent empirical cross country studies is the poor validity of the indicators used to proxy financial development. Moreover, since a country's financial system is embedded into the wider array of cultural, historical, political and organisational traditions, conventions and rules of a given society, it is crucial to consider possible interactions between the financial system and other socio-economic or -political subsystems. Specifically, while a given level of financial activity may be highly beneficial to improve overall allocation of resources in a given societal setting, under other circumstances a higher (lower) level of financial activity might be more adequate. Considering the transformation and restructuring taking place in many parts of the world, a country's financial system should be designed to address its major tasks of channelling savings into investments and improving overall allocation of scarce resources with specific regard to the surrounding in which is supposed to function. It is therefore essential to know more about the interaction of the socio-political subsystem and the finance-growth nexus, which figures so prominently in the recent literature on the ultimate determinants of economic growth and development.

To address these problems and questions, firstly, a resource based measurement of financial development is suggested. This new proxy refers to the input of real resources into the financial system based on three indicators, quality weighted labour employed in the financial sector, the financial sector's share in GDP, and bank density, which are reduced into a principal component, covering a panel data set of 93 countries and quinquennial observations from 1970–90. Secondly, proxy variables are calculated for variables that are a priori likely to be important for growth or to interact with finance: physical capital, human capital, and the level of technical sophistication. Thirdly, classifications of the 93 countries are suggested according to some key concepts referring to the socio-economic set-up of today's market economies.

Based on this data, cross country 'conditional convergence' growth regressions (linear regressions with fixed effects) are conducted, and special attention is devoted to the possibilities of interaction effects and structural shifts or breaks.

The empirical results imply that, from an overall perspective, the hypothesis of a leading nature of financial development in periods of rapid growth is an appropriate characterisation of the finance-growth nexus for the period 1970–90. Moreover, concepts like the 'corporatism–liberal market' dichotomy indeed have significant impact. Specifically, during the analysed period, other things equal, financial development was more beneficial to growth in the more rule enforcing and in the more corporatist subgroups of our 93 countries.

In the light of these results, it is suggested that some of the current perceptions of the finance-growth nexus might be premature.

1.1 The finance-growth nexus

The possibility of a causal relationship between financial development (FD) – broadly defined as an increase in the volume of financial services of banks and other financial intermediaries as well as of financial transactions on capital markets – and economic growth has for a long time attracted the attention of researchers and policy makers.

Generally, economic theory postulates three distinguishable, but not mutually exclusive, partly unintended (external), effects of financial activity and development on overall economic performance: Firstly, the provision of an inexpensive and reliable means of payment – coins, later banking money –, which historically came as a by-product of fractional reserve banking (Kindleberger 1993), secondly,[1] a *volume effect*, where financial activity increases savings and thereby resources that can be channelled into investment, schematically:

FD → Capital Accumulation → Economic Growth

and, thirdly, an *allocation effect*, according to which FD improves the allocation of resources devoted to investment, schematically:

Capital Accumulation → Economic Growth
↑
FD

In earlier periods, the first effect of financial development – monetisation – was obviously of major importance (Einzig 1949). Today, however, its importance is certainly marginal. Moreover, the volume effect is theoretically ambiguous, since sounder financial institutions may guarantee higher interest rates and reduce the incentives for precautionary savings; besides the empirically evidence is at best very weak (Fry 1995).

Hence, if financial development is supposed to play a decisive role in growth and development in our time, the major line of causation should be through improvements in the process of capital accumulation. The next section will look at this in some depth.

1.2 Some tentative generalisations

A Number of scholarly contributions from a historical perspective like Sombart (1916, 1927), Schumpeter (1911), Gerschenkron (1962), Patrick (1966), and Cameron et al. (1967) argue that financial development, though originally initiated by the imperatives of agrarian econo-

1 For the second and third effect, the seminal contribution is Gurley/Shaw (1960).

mies and – some thousand years later – accelerated by the demands of merchants during the Commercial Revolution of the Middle Ages, at some point turned into a determinant of economic growth and development. According to this view, financial development is thus no longer merely accompanying economic development; well functioning monetary and banking systems as well as capital markets are a crucial *precondition* for growth.

Some prominent recent contributions would even go further and regard sophisticated financial systems as *actively* promoting development economic growth. The arguments vary, but Schumpeterian authors as well as some Neo-Keynesians usually stress the banking system's ability to create money and channel it into productive and innovative uses. Others claim that it is the information gathering and processing, which is accomplished by professional actors on credit and capital markets, that helps to improve the efficiency of capital allocation.[2]

Specifically, descriptive theories of the 'stages of financial development'[3] identify a sequence of roughly three major stages: (1) A rudimentary deposit banking system, in which commercial banks act merely as intermediaries between savers and investors, followed by (2) a more advanced money creating banking system, in which some type of bank's liabilities are widely accepted as a means of payment, to (3) the present time, in which the financial sector is characterised by a progressive securitization of former bank credit relationships.

A decisive change in the *macro-economic* function of a financial sector obviously took place between stage one and two. Deposit banking – widespread during the Commercial Revolution – certainly contributed to a reduction of transaction costs, thereby stimulating trade and manufacturing. Fractional reserve banking, however, which came into being when bank's deposits established themselves as means of payment, allowed new investment through bank credit *without prior saving*. Hence, as has been observed by many economists, most notably by Schumpeter (1911), the banker together with the 'Schumpeterian' entrepreneur can induce phases of a rapid industrial growth and development.

Syntheses of theories of financial stages and the Schumpeterian credit-induced growth hypothesis are given by Gerschenkron (1962) and Patrick (1966). Gerschenkron points to the latecomer's (notably France's and Germany's) situation which, in order to catch up with then far advanced Britain, had to mobilise massive amounts of capital for real investment which gave room for an active development policy through a state co-ordinated expansion of the national financial systems.

Patrick (1966), inferring from Japanese industrialisation, introduced the now common termini 'supply-leading' and 'demand-following' finance. He suspected demand-following finance to be the rule and supply-leading finance an exception, an exception, however, of major importance, since it concerns the shift from stage one to stage two, which – according

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2 The arguments are elaborated in detail by Fry (1995). For an extensive survey on the literature cf. Levine (1997).

3 Cf. – among many others – Hildebrand (1864) or Chick (1993).

to Patrick – not only in Japan, but universally, coincides with the period of most rapid development of industrialising economies.

Last but not least, economic historians have claimed that during the last part of the 19th century high literacy rates in Scandinavia have led to a general ”sophistication towards financial matters” (Sandberg 1978: 668). Thus, compared with less literate countries (e.g. France, Southern and South-eastern Europe) where during the 19th century financial development was at times far ahead, the Nordic countries may have gained more from financial development (Cameron 1993: 315). This hypothesis about a positive interaction between literacy and financial development with respect to economic growth – a new application of the so-called ‘impoverished sophisticate’ hypothesis – could be important for an assessment of the macroeconomic returns to financial development in LDCs.

Hence, the empirical material collected by economic historians suggests a number of hypotheses that might likewise apply to economic conditions in present less developed countries and should therefore be considered when investigating the finance-growth nexus.

However, from an analytical perspective, the factors that govern economic growth admittedly include many others besides financial development, and interactions among them are likely to prevail. Moreover, mutual causation may be the rule rather than the exception. Last, but not least, what might be an appropriate level of financial activity at one time or in one social, institutional and economic environment may be inadequate at another time or in other environments. Section 3 will address these questions.

2 Empirical analysis

In the last few years, economists have repeatedly reported positive partial correlations between different indicators of ‘financial development’ (FD) and growth rates of per capita income or investment in subsequent years for cross samples of countries.[4]

From simple OLS-regressions of the growth rate of per capita income over some decades on M2/GDP at $t = 0$ and some arbitrarily chosen control variables, this literature has by now reached a high standard of theoretical foundation as well as econometric sophistication, where the simple cross-country approach is now generally replaced by panel designs with a number of stacked growth periods of (in most cases) five years. To cope with the ever present problem of endogeniety, explanatory variables are generally lagged. Moreover, some recent studies address the statistical properties of dynamic panels which might bias the estimates.

However, data on financial systems are scarce and plagued by poor reliability as well as dubious validity. Hence, a major problem with the body of existing studies taken as a whole is

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4 The standard reference as the seminal contribution is King/Levine (1993), though this line of research can be traced back at least to Adelman/Morris (1968). In the 1990s Ross Levine has probably been the most active researcher in this field; for an authoritative survey of many of his widely cited results, cf. Levine (1997). This line of research has been followed by, among others, De Gregorio/Guidotti (1995), Berthélemy/Varoudakis (1996) and Rajan/Zingales (1998). For a recent study cf. Benhabib/Spiegel (2001).

the dubious validity of the common FD-indicators, which suffer from ambiguity, and the thin base of their common original data.

The standard variable is M2/GDP, frequently referred to as 'LLY' ('liquid liabilities to GDP') from the seminal King/Levine (1993) paper. However, due to definitional instability and difficulties in international comparability, the selection of a suitable monetary aggregate creates a first serious problem.[5] Moreover, as Lynch (1996: 6) has noted, monetary aggregates may be highly misleading, since they indicate monetisation rather than financial sophistication. Thus, for example, M2/GDP (monetisation) for the People's Republic of China around 1990 is 98%, whereas Australia scores only 61% – which would not convince many economists of the idea that China's financial development was ahead of Auatralia's. Nevertheless, LLY continues as a right hand growth regressor ever since.

Other standard proxies for FD are aggregates of outstanding credit over GDP. 'PRIVY' – credit within the *private* sector/GDP which also came into widespread use through King/ Levine (1993) – is especially popular, since it abstracts from government loans, credit by 'development banks' and other state-run financial institutions as well as, most notably, central bank credit, which are nowadays mostly considered to be allocationally inefficient and detrimental to the achievement of sustainable growth, or at least inferior to private credit. PRIVY, which is probably closer to what the theoretical literature associates with financial development than LLY, likewise poses conceptual difficulties. While King/Levine (1993) are right to claim that this private intermediation measure captures the essence of the Schumpeterian vision of credit fuelled growth accomplished by innovative entrepreneurs, the actual numbers suffer from the fact that highly beneficial credits are lumped together with non-performing loans. In addition, this variable refers to bank-based finance rather than total intermediation – a fact that might give a misleading picture of FD in countries where a substantial part of investment is raised through the primary capital market.[6] Moreover, as Kaminsky et al. (1998) have shown, inflated credit aggregates are in many instances leading indicators of financial instability and crash.

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5 For an illustration of this problem, cf. Siklos/Barton (2001). Referring to Canadian quarterly data from 1971–99, they present evidence that nominal money supply affects inflation rates as well as real income. However, their analyses are hampered by the fact that no single monetary aggregate shows a stable relationship to their left hand variables. Specifically, while M1 fares well in early years, they end up with M3 for later years, while M2++ (effective M2 modelled in detail according to the Canadian monetary system) is the aggregate which suits best over the whole period. Obviously, monetary aggregates already need careful adaptations to institutional details regarding one country only. Certainly, similar shifts over time are surely no less pronounced between different countries at any given point in time. Thus, the search for a carefully defined monetary aggregate with comparable economic properties and functions across a large sample of countries and spanning some decades is likely to fail, so that this approach usually ends up with M2, which can be identified and found in international statistics for a reasonable number of economies. This, however, amounts to trading data quality for quantity up to a point that deprives the monetary aggregate of all its subtleties which otherwise is the standard in analyses of money.

6 Though the critique is conceptually valid, this particular defect is probably not too harmful from a cross country perspective, since very few countries have deep primary capital markets (Mayer 1990). Moreover, some measures of market capitalisation can be – and have been (e.g. Rajan/Zingales 1998) – added to PRIVY in order to obtain a composite intermediation proxy, without making too much difference.

An innovative approach, which has brought about a specific branch within the empirical finance-growth literature, is to refer to variables concerning the origin of a country's legal system as well as other bureaucratic and political characteristics as instrumental variables for the traditional FD variables LLY and PRIVY (cf. among others: LaPorta et al., 1998), thereby reducing the suspicion of endogeniety bias. Since the instruments themselves, however, are mostly very crude categorical variables (such as a classification of 'legal origin') which refer to the fundamental and persistent socio-economic and political constitution of a country, the possibility to evaluate the financial sector's contribution to growth over – at best – a few decades is severely limited.

A third branch of this literature tries to identify structural characteristics of the financial system. Earlier contributions (Goldsmith 1969, 1987; Bhattarcharyay 1988; Clague et al. 1997) calculated ratios of different money or credit aggregates (e.g. M2/M1 or central bank credit over private credit), while researchers like Beck, Demirguç-Kunt and Levine[7] are currently collecting large cross-country data bases of institutional characteristics and performance indicators referring to different financial institutions, which may ultimately help to classify financial systems across theoretically fundamental – but empirically fuzzy – dimensions like e.g. 'bank-based' versus 'market-based' or 'creditor rights-oriented' versus 'debtor rights-oriented'. While this approach is – at least in our view – the most promising with respect to the possibility of gaining insight into the very nature of the finance-growth nexus, this research programme is mostly still in the process consolidating the data and the resulting classifications. (An attempt to draw on these data within the framework of the present study will be reported below.)

Though most of the recent empirical work of either branch supports the assumption of causality running from finance to growth, many case studies as well as some cross country analyses report lack of causation, reverse and switching causation or even – at least for certain time periods – a negative impact of financial activity on subsequent real growth rates (cf. Graff 2002). In addition, most previous studies draw *on the same stock of original data* (money and credit aggregates as published by the IMF), which amounts to replications of the very same correlation rather than to independent confrontations of economic hypothesis with empirical data.

Hence, we are not quite ready to follow Levine's conclusion (1997: 688 f.) that a positive contribution of financial activity to economic growth is today a proven fact.[8]

The main objective of the following empirical cross-country analysis is thus to draw on *new data* to gain independent evidence on the asserted causal relationship from financial development to economic growth. In the first step, a new proxy for financial development will

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7 Cf. Beck et al. (2000), Demirguç-Kunt/Levine (1999).

8 "A growing body of work would push even most sceptics toward the belief that the development of financial markets and institutions is a critical and inextricable part of the growth process and away from the view that the financial system is an inconsequential side show, responding passively to economic growth and industrialisation."

be constructed, which captures *the share of resources a society devotes to run its financial system* at any given time for a large sample of countries and various years (section 2.1). In contrast to the usual indicators, the FD-proxy suggested here relies on real inputs and, hence, stands for a macro-economic concept in the tradition of growth accounting. Therefore, it is conceptually more adequate for investigations into the sources of economic growth, where the ultimate goal is to get an idea of the relative benefits of investing scarce resources into competing activities – be it education, physical infrastructure, or – for that matter – the task to develop and/or to sustain a financial sector. Moreover, while monetary indicators like M2/GDP are very hard to compare across time and space due to institutional diversity and change, our resource based FD-proxy is likely to be less sensitive to minor changes in institutional regulations, domestic and international shocks, but to capture rather stable characteristics of a given economy's structure. Moreover, it is well known that monetary indicators are leading indicators of business cycles.[9] Consequently, the FD-variable suggested here is probably less endogenous to current economic activity than the traditional FD-variables.

The second step (section 2.2.) is to plug this new FD-proxy into the now well established cross-country growth regression approach from the new empirical growth literature. Before proceeding, however, it is important to recall the fact that finance is certainly only a minor factor in economic growth – the fundamental determinants being the accumulation of the factors of production and technical progress. Consequently, to avoid serious mis-specification, attention has to be devoted to an economically sound specification of the growth equation to be estimated. Therefore, in contrast to many other studies,[10] we shall use a considerable number of theoretically derived right-hand variables, including an innovative proxy for the level of technological sophistication and three interaction effects to capture fundamental hypotheses on the finance-growth nexus from economic theory and history. Hence, contrary to the prevailing approach of fixing a small number of right-hand variables and testing for 'robustness' by adding combinations of variables from an arbitrary vector of 'controls', the present econometric model includes all theoretically important variables at once and is thus is less restricted and prone to omitted variable bias from the very beginning.

The data gathered for this study are pooled into a panel of 93 countries and five points in time (four 5-year growth periods, respectively) covering the period from 1970–90. Apart from a substantial gain in degrees of freedom, this set-up enables to allow for a priori unknown country ('fixed') effects using LSDV-regression,[11] 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

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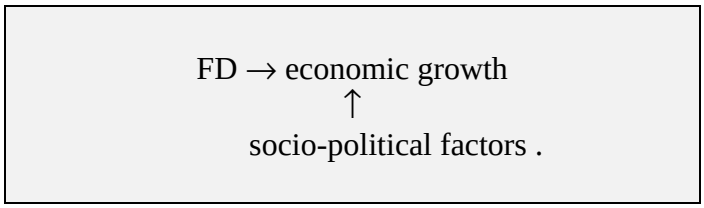
9 See, for example, Tichy 1994: 164 ff.

10 For an outline of the common procedure cf. Sala-I-Martin (1997).

11 'LSDV' is semantically derived from *L*east-*S*quares-*D*ummy-*V*ariables, referring to the common way of implementation, namely to include *i*–1 dummy variables for *i* observations. Since our analysis comprises all countries for which data are available, this (deterministic) 'fixed effects' model is more adequate than the 'random effects' model, where the data are by assumption a random draw from a larger population.

are captured by the 'fixed effects', this amounts 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 four observations only. Hence, this panel approach allows to draw generalisations from very short time series. The resulting benchmark regressions are then repeated with some of the traditional FD-proxies. Tests for non-nested models imply, that – at least in this set-up – the new FD-proxy is more adequate than the traditional variables.

The last step of analysis (section 2.3.) explores whether the results obtained in section 2.2. can be specified further, if some socio-political dimensions are taken into account. To this end, the 93 countries in this study are ranked according to proxies for the degree of 'corporatism', 'democracy', 'bureaucratic efficiency', and 'market-based financial system'. The sample is then split accordingly into subgroups of 46 and 47 countries. Finally, the regression parameters for the FD-proxy and its three interaction terms are set free and compared. Schematically, this final analysis can be represented by the following box:



2.1 A new proxy for financial development

The new variable FD for financial development suggested here is designed to accomplish a reasonably reliable and comparable quantification of *the share of resources a society devotes to run its financial system*.

While this intention bears some resemblance to the core argument of *transactions cost* and *institutionalist* Economics (NORTH 1990, WILLIAMSON 1985), namely that aggregate transaction costs are very far from negligible and that financial institution are a major response to this problem, we depart from the closely connected evolutionist argument that prevailing institutions – having survived the selection mechanism of the market – are the 'adequate' solution. Instead, we regard the amount of resources devoted to run these institutions as an indicator of the effort to keep transaction costs (as well as frictions and market failures due to informational asymmetry that are mitigated by the financial system) low. This notion of financial development is thus very different from the common notion of financial depth; it signifies a *real* rather than a *monetary* phenomenon.[12]

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12 It is not claimed that the notion of financial depth is not useful, but the degree of monetisation or the aggregate credit volume channelled through the financial system – the traditional variables – and the amount of resources needed to run a financial system stand for different economic functions: While the former inform about the prevailing channels of finance, the latter measure the intensity of financial services.

The idea to measure the operating costs of a given financial system seems plain enough – why has this not been tried by other researchers?[13] Presumably, part of the answer lies in the fact that no international statistics supply valid, reliable and readily comparable data. The three indicators which obviously suggest themselves for consideration, (1) the number of banks and branches per capita, (2) the share of manpower employed in the financial system, (2) the share of the financial system in GDP, are plagued by a host of problems. Though distributed by distinguished institutions, none of the considered indicators seems highly reliable. Numerous footnotes indicate that the reported numbers are not readily comparable across countries nor through time. In addition, conceptual changes as well as retrospective recalculations sometimes appear in subsequent volumes *without any notice*. Moreover, missing values add to the trouble.

Regarding their validity to approximate a quantitative, resource-based concept of financial development, the financial system's share in GDP (i.e. the factor income generated in this sector) is probably the best indicator to think of. Specifically, if most of the financial system's share in GDP consists of wages, and labour markets clear at wages equal to marginal productivity, the sector's share is evaluated at conditions that come very close to what most economists would 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 number of banks and branches per capita is giving an idea about the degree to which a country's population has access to financial services. Obviously, the validity of this indicator is impaired 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, though this measure would indicate a decline of financial development for most developed countries in recent years, this is the result of innovations in banking and therefore probably a sign for progress rather than decay.

Indeed, as shown below in table 1, there appear first signs of a levelling or even decline in the number of banks and branches per labour force member, which might indicate a structural break – but only after 1990. Considering these arguments as well as the numbers, we would restrain from using this indicator for very recent years in highly developed countries. However, since our analysis refers to years until 1990 only and covers a wide sample of countries including many LDCs, the validity of this indicator can be seen with more confidence.

Since the number of Banks and branches are 'manually' counted from the BANKERS' ALMANAC AND YEARBOOK (see appendix), the reliability, of course, remains questionable. We therefore undertook a second counting by a different individual, resulting in bivariate correlations of 0.98, 0.97, 0.95, 0.96, and 0.94 for 1970, 1975, 1980, 1985, and 1990, respectively, which seems close enough to reassure confidence in the reliability of the counting procedure.

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13 To the best of our knowledge, apart from Graff (2000 and 2002), there are no such studies.

Table 1: Banks and branches per 100,000 labour force, by level of development

	1970	1975	1980	1985	1990	1995
All 93 countries	14.6	15.9	16.5	19.3	21.6	21.7
31 least developed[a]	1.7	1.7	2.1	2.0	2.2	2.2
31 intermediate[a]	9.8	10.1	10.9	11.8	12.9	13.8
31 most developed[a]	32.5	35.8	36.5	44.4	49.7	49.0

[a] Split by real gross domestic product per worker in 1980

Last, but not least, the share of manpower employed in the financial system is open to dispute, because it ignores the productivity levels of those working in the financial system.[14] To cope with this problem, we suggest to weight the 'raw' numbers of employees with an 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 of finance and development in a cross-sample of countries which intends to cover some twenty or thirty years, despite all corrections and reservations, due to data quality, the considered indicators are thus far from satisfactory. What follows, therefore, rests on the assumption that these variables can be transformed in a way that turns them into reasonably reliable, valid, and complete measures for the intended notion of 'resources for finance'. The procedure chosen here is to identify the *common variance* of the three indicators using principal component analysis. If the operating costs of the financial system are reasonably well represented by the first principal component[15] the individual scores for this component may serve as a valid proxy for the interesting variable.

Practically, to prepare the raw data, the three normalised indicator-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 incom-

14 As a critical observer has noticed, the Reserve Bank of India employs 17,000 university graduates to shred used banknotes, which certainly is a sign of inefficiency rather than of a high level of financial development.

15 That is, if the correlations between the desired representations are high, but measurement errors and stochastic shocks in the data for the individual indicators have little common variance. To come close to this goal, a 'technical' condition is that the indicator variables have to be measured independently. This condition is satisfied here; our three indicators for the size of the financial system are compiled from data published by ILO, UN and BANKERS' ALMANAC, respectively.

patibilities. Next, the yearly values of the normalised variables were transformed into five-year averages for 1970, 1975, 1980, 1985 and 1990. Finally, operational rules had to be formulated how to treat missing values.[16] The remaining data for 93 countries and five points in time were pooled and standardised. Then, principal component analysis was applied to the resulting 465×3 matrix. The principal component extraction results are given in table 2.

Table 2: A financial development proxy from principal component analysis

FD indicator	**description**
BANK	number of banks and branches / 100,000 labour force
FIN/GDP	financial system's share (factor income) in GDP
FINPER	share of labour employed in the financial system (adjusted by educational attainment)

Principal component analysis, 3 FD indicators, n = 5 × 93 = 465

Principal component	explained variance	cumulated explained variance
1	75.7 %	75.7 %
2	17.5 %	93.2 %
3	6.8 %	100.0 %

FD indicator[a]	loading principal component No. 1	communality
BANK	0.87	0.75
FINPER	0.93	0.87
FIN/GDP	0.81	0.65

a standardised variables.

Table 2 reveals that the suggested procedure reduces the data fairly well and delivers a first principal component that accounts for 76% of overall variance. Moreover, the variance explained by the second and third principal components are only 17.5% and 6.8%, respectively; all loadings are high (0.87 for banks per inhabitant, 0.93 for the share of manpower in financial sector and 0.81 for the share of finance in GDP), indicating that the expected one-dimensional structure of the three variables is indeed very well represented by the first principal component only.

Accordingly, in what follows, the individual scores for this component are taken as our FD-proxy for further analysis. We can thus proceed with a new and well-defined variable that

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

assigns a specific value for 'financial development' as defined here to all 93 countries in our sample through five points in time (n = 465 μ = 0 and σ = 1). Some descriptive statistics of this FD-proxy across time and subgroups are summarised in table 3.[17]

Table 3: FD-proxy (factor scores) by year and country group (World Bank classification)

	1970	1975	1980	1985	1990	N
All 93 countries	–0.22	–0.16	–0.03	0.13	0.28	93
OECD members	0.77	0.92	1.15	1.57	1.99	22
MiddleEast / North Africa	–0.34	–0.27	–0.17	–0.08	–0.01	8
Latin America	–0.32	–0.28	–0.11	–0.03	0.08	20
East Asia/Pacific	–0.47	–0.40	–0.22	0.08	0.26	9
South Asia	–0.68	–0.71	–0.63	–0.54	–0.49	5
Sub–Saharan Africa	–0.71	–0.70	–0.68	–0.66	–0.65	29

2.2 A general cross-country growth regression set-up

The new FD-proxy from the previous section shall now be used as a right-hand variable in the standard cross-country growth regression approach.

Explicitly or implicitly, most of previous empirical work is based on what Stiroh (2001: 41 f.) summarises as the 'general approach' of endogenous growth models referring to a firm specific production function

$$Y_{i,t} = A_t(R)\, f(K_{i,t}, L_{i,t}, R_{i,t}) , \tag{1}$$

where t denotes time, i firm specific inputs and R stands for "the aggregate stock of knowledge".

In this formalisation, endogenous growth comes about through the differential equation $dA/dt = (dA/dR)(dR/dt)$ which, of course, in order to have substantial meaning needs further specification. The list of compulsory right-hand variables and other specification issues are, however, far form universally being agreed upon amongst applicants or observers. Yet, It seems fair to summarise that the standard procedure in the 'new growth' literature is to refer to an 'augmented' aggregate production function as in Mankiw/Romer/Weil (1992) that relates GDP in country i at time t to the factors of production

17 The complete 5×93 matrix of FD-values can be obtained from the author upon request.

$$Y_{i,t} = A_{i,t}\, K^{\alpha}_{i,t}\, L^{ß}_{i,t}\, H^{\gamma}_{i,t}\,, \tag{2}$$

where Y is GDP, A a constant, K physical capital, L labour and H human capital. Assuming constant returns to scale in K, L and H ($\alpha + ß + \gamma = 1$),[18] i.e. the production inputs traded on factor markets, dividing by L, and taking logarithms and time derivatives yields

$$g_{(Y/L)} = g_A + \alpha\, g_{(K/L)} + \gamma g_{(H/L)}\,, \tag{3}$$

where g_X stands for the continuous growth rate of a variable X and redundant subscripts are suppressed.

In this context, we suggest to think of g_A (i.e. $(dA/dt)(1/A)$) as – at least in part – a function of 'financial development' FD and its interactions with other growth inducing factors.

Now, consider that in a growth context which allows for catching-up through international diffusion of technology, for a given country i, human capital most likely enters the aggregate production function not only as a factor of production, but also as a variable that may exert its influence through changes in the level of technology and overall efficiency, since it is a determinant of a country's capacity to absorb technological and organisational knowledge from abroad and to improve overall efficiency ('TFP', represented here by A_{it}) at home (Benhabib/Spiegel 1994; Leibenstein 1989). Certainly, a similar importance can be assumed for many other socio-political and institutional variables (Barro 1991).

Hence, the growth rate of the overall efficiency level A is best understood as a function of a set of variables. Following most of the new empirical growth literature, modelling of dA/dt can start from

$$g_{Ai,t} = F(t,\, T_{i,t-1},\, (H/L)_{i,t\text{-}1},\, (Y/L)_{f,t-1} - (Y/L)_{i,t-1},\, X_{i,t-1})\,, \tag{4}$$

where t is 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 f, and $X_{i,t\text{-}1}$ is the vector of other determinants of g_A, which, of course, remain open to questions. 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.

Moreover, the functional form of F poses further difficulties. Given the current state of (or rather: lack of) theoretical knowledge, however, a linear additive formulation does not seem to be an impossible starting point for an empirical implementation.

Regarding the arguments of F, we shall consider a linear time trend, a proxy for the level of technology T, and, as a proxy for human capital, the log of the adult literacy rate LIT. Note that $(Y/L)_f$ is constant across countries, hence it influences only the intercept and will there-

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18 A pre-test for economies of scale in $Y = A\, K^{\alpha} L^{ß} H^{\gamma}$ using the data to be employed in what follows shows that rejection of the null hypothesis $\alpha + ß + \gamma = 1$ yields a t-statistics of merely –0.05. Hence, the assumption of constant returns to scale does obviously not stand in contradiction to our data.

fore be dropped without biasing the parameter estimates. The usual 'catching-up' variable is therefore the (log of) per capita income in country *i*, and the expected sign of the coefficient is negative. Last, but not least, for the purpose of this study let *X* be represented by our proxy for financial development FD and – referring the arguments put forward in the literature – the following 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:

$$(5) \qquad g_{Ai,t} = a_1\, t + a_2\, T_{i,t-1} + a_3 \ln LIT_{i,t-1} + a_4 \ln (Y/L)_{i,t-1} + a_5\, FD_{i,t-1} + a_6\, [FD \times \ln (Y/L)]_{i,t-1} + a_7\, [FD \times \ln LIT]_{i,t-1} + a_8\, FD_{i,t-1} \times g_{(K/L)i,t}\,.$$

In this way, we are equipped with a reasonably general cross-country growth framework, where factor accumulation is modelled according to 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 FD as well as three FD-interaction terms.

The reduced form which will serve as starting for the estimations in this study is derived simply by substituting equation (5) into equation (3), which results in

$$(6) \qquad g_{(Y/L)t} = ß_0 + ß_1\, t + ß_2\, T_{t-1} + ß_3 \ln LIT_{t-1} + ß_4 \ln (Y/L)_{t-1} + ß_5\, FD_{t-1} + ß_6\, [FD \times \ln (Y/L)]_{t-1} + ß_7\, [FD \times \ln LIT]_{t-1} + ß_8\, FD_{t-1} \times g_{(K/L)t} + ß_9\, g_{(K/L)t} + ß_{10}\, g_{(H/L)t}\,.$$

2.3 Sample and data

The sample consists of 93 countries for which the necessary data could be collected, with the exception of countries that are very small (population less than one million), of countries with centrally planned economies through most of the period 1970–90, countries in which oil exports accounted for more than 20% of GDP in 1985, and countries with war or civil war claiming a death toll exceeding 2.5% of total population during 1970–88. The exclusion of these countries is to acknowledge that it may make very little sense to run regressions across countries which are fundamentally different from usual conditions (cf. Harberger 1998).

Regarding the variables to be used, we depart from the main body of the literature in the following respects:[19]

The usual proxy for labour (*L*) in studies similar to ours is the size of the population. While this may be adequate as long as the focus is on standard of living aspects of economic

19 For sources and details on all variables used in this study, see appendix.

development, for this productivity oriented study we rather refer to the size of the labour force proper.

Capital accumulation is frequently proxied 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, having computed capital stock estimates allows us to compute individual time series for $v = K/Y$, a result that will later help to calculate estimates for capacity utilisation (see below).

Human capital accumulation $g_{(H/L)}$ is frequently proxied be enrolment rates. Instead, we compute the rate of change of educational attainment using data on mean years of schooling. In this way, we get a variable which is more reliable as well as closer to the model specification, thereby adding reliability and validity to our estimation as a whole. Apart from $g_{(H/L)}$, in our model there are two other human capital-related regressors: 'initial human capital' as well as the interaction term 'initial human capital' × FD. To stick as closely as possible to the literacy/financial development interaction-hypothesis, the variable for the *level* of human capital is represented by the literacy rate LIT.

The level of technological sophistication T is generally acknowledged to be one of the major determinants of economic growth. Yet, due to difficulties to find suitable proxies, it is very rarely explicitly modelled 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 will almost certainly bias the estimates, thereby casting serious doubt on the adequateness of the model. To avoid this kind of mis-specification, we again use a principal component approach: Since no single variable from published statistics is likely to give a valid estimate of technical progress, the procedure followed here is to consider a wide array of information from international statistics on R&D, patenting activity, scientific publications, and direct acquisition of technical knowledge from abroad, and then to take the first principle component of these variables as a proxy for T.[20]

Finally, since this study is concerned with long-run characteristics, it is desirable to eliminate business cycle and shock-related influences from our variables.[21] To this end we correct our production input variables K, L and H for capacity utilisation, drawing on a method fre-

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20 For this proxy, we refer to six technology-related indicators with observations covering the whole panel. For further details, see appendix.

21 In accordance with the main body of empirical work, growth rates are calculated as differences of natural logarithms of the values in t and t–1. Since the basic time span of our panel is five years, which might be highly correlated with business cycles, cyclical properties of the underlying data have to be taken into account. Note also, that due to the periodical subdivision of our data, the usual alternative to our elimination of cycles, namely the fitting of a long run growth rate through all observations during some decades ('world bank method'), is not feasible here.

quently used to determine capital utilisation in policy-oriented business cycle research. The basic idea is that the empirical short-run fluctuations of the capital output ratio v are mainly due to cyclical changes in capital utilisation. Accepting this line of reasoning, the individual long-run trend estimate $\text{pred}(v_t) = e^{\text{pred}(\ln v_t)}$ from 93 regressions following

$$\ln v_t = ß_0 + ß_1\, t + ß_2\, t^2 + ß_3\, t^3 + \varepsilon_t \tag{7}$$

for each country i can be used to identify the actual deviation of any respective v_t from its minimum level (i.e. the country's maximum capacity utilisation), which in turn allows to quantify actual capital utilisation. Labour utilisation would, of course, be adequately measured by the unemployment rate. However, it is hopeless to find reliable and comparable figures for unemployment for more than very few countries, so that for a large sample as ours, one has to resort to less direct methods. Here, 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-utilisation is computed as 50% of capital's deviation from its full utilisation. A similar procedure is applied to compute the capacity utilisation of human capital. In this case, it is assumed, that human capital is 'hired and fired' even less than 'raw' labour, assigning a value of 50% of labour's fluctuations in utilisation to human capital's.

2.4 Benchmark regressions

Since we draw on a panel data set of $I = 93$ countries and $T = 4$ growth periods, we estimate the fixed effects LSDV-model which allows for individual constants for all i countries and t periods and is therefore a priori less likely to suffer from mis-specification due to omitted variable biases than OLS-models. Consequently, the final equation to be estimated is

$$\begin{aligned} g_{(Y/L)t} = {} & ß_i + ß_1\, t + ß_2\, T_{t-1} + ß_3 \ln \text{LIT}_{t-1} + ß_4 \ln (Y/L)_{t-1} + \\ & ß_5\, \text{FD}_{t-1} + ß_6\, [\text{FD}\times\ln (Y/L)]_{t-1} + ß_7\, [\text{FD}\times\ln \text{LIT}]_{t-1} + ß_8\, \text{FD}_{t-1}\times g_{(K/L)t} + \\ & ß_9\, g_{(K/L)t} + ß_{10}\, g_{(H/L)t} + \varepsilon_{it}\,, \end{aligned} \tag{8}$$

Another implementation of the benchmark model is to refer to the factors of production before adjustment for capacity utilisation (K', L', and H'). Though these 'raw' values are not corrected for their degree of utilisation due 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 to be obtained with the 'raw' values are easier to compare with those from previous studies. Moreover, these results are useful to demonstrate the effects of our adjustment procedure. Hence, we run a second benchmark regression as specified above, but with K, L and H substituted for by K', L' and H':

$$(9) \qquad g_{(Y/L')t} = ß_i + ß_1\, t + ß_2\, T_{t-1} + ß_3 \ln \mathrm{LIT}_{t-1} + ß_4 \ln (Y/L')_{t-1} + ß_5\, \mathrm{FD}_{t-1} + ß_6\, [\mathrm{FD}\times\ln (Y/L')]_{t-1} + ß_7\, [\mathrm{FD}\times\ln \mathrm{LIT}]_{t-1} + ß_8\, \mathrm{FD}_{t-1}\times g_{(K'/L')t} + ß_9\, g_{(K'/L')t} + ß_{10}\, g_{(H'/L')t} + \varepsilon_{it}\,,$$

With the variables defined and computed as described above, the fixed effects model is estimated by regressing $g_{(Y/L)i.t}$ on its presumed determinants (with growth rates computed as continuous yearly rates for every 5-year period, and level variables taken from the beginning of the corresponding periods). The results are presented in table 4.

As a first comment, it is obviously justified to say that our benchmark model fares extraordinary well. It explains 86% of the variance of $g_{(Y/L)}$, which is very high compared to the usual 70% in similar exercises, and *all* coefficients are significantly ($p \leq 5\%$) different from zero with their expected signs. The good overall fit is, of course, partly due to the inclusion of the country dummy variables for the 'fixed' effects (coefficients not reproduced here). Yet, highly significant F-tests for the joint significance of the dummy variables period dummies indeed certify the appropriateness of their presence. Consequently, the more restricted, albeit simpler, 'constant effects' OLS-model would suffer from mis-specification.

Apart from that, the fact that all growth accounting variables as well as the determinants of overall efficiency are significantly partially correlated with economic growth adds further confidence to our overall specification. Moreover, the point estimate of $ß_1$, which is representing the rate of 'exogenous' growth unaccounted for by the other regressors, is merely 0.13 per cent per year, so that most of the roughly 2% of growth is captured by the core of our model.

Consequently, we interpret the positive and significant ($t = 2.56$) estimate for the coefficient for the lagged FD-variable as a strong indication that financial activity does indeed matter for economic growth and development.

Moreover, the negative ($t = -2.56$) coefficient for the interaction term FD×ln (Y/L) suggests that relatively backward countries may indeed gain more from financial development than the more advanced countries, thereby giving new empirical support to the Gerschenkron-hypothesis. Finally, the positive coefficients for the interaction terms FD×ln LIT ($t = 2.64$) and FD×$g_{(K/L)}$ ($t = 1.79$) support the literacy-financial development interaction and the allocational efficiency hypotheses.

The overall fit is considerably reduced when the factors of production are taken as 'raw' numbers, unadjusted for capacity utilisation (equation 9). Moreover, human capital accumulation fails to pass conventional significance levels. Obviously, capacity adjustment as proposed here obviously improves precision, but it does not lead to contradictory results if compared to the 'unadjusted' version. Hence, assuming that the reduced form of our growth model is representing real world economic relationships reasonably well, in what follows preference will be given to the capacity adjusted specification.

Table 4: Cross-country LSDV-regressions, dependent variable: $g_{(Y/L)}$

Model	benchmark	benchmark	DC group	LDC group
Capacity utilisation	adjusted	not adjusted	adjusted	adjusted
t	0.0013	0.00054	0.00066	0.0019
	(4.96)*	(1.35)	(1.87)*	(4.42)*
T_{t-1}	0.027	0.037	0.024	0.040
	(3.08)*	(2.83)*	(2.90)*	(1.32)
$\ln LIT_{t-1}$	0.022	0.054	0.044	0.0097
	(1.69)*	(2.68)*	(1.83)*	(0.51)
$\ln (Y/L)_{t-1}$	–0.070	–0.11	–0.062	–0.056
	(–9.90)*	(–11.46)*	(–6.79)*	(–3.28)*
$g_{(K/L)t}$	0.66	0.40	0.63	0.77
	(18.89)*	(8.30)*	(14.17)*	(6.46)*
$g_{(H/L)t}$	0.048	0.024	0.031	0.041
	(1.72)*	(0.54)	(0.61)	(1.16)
FD_{t-1}	0.15	0.28	0.23	–0.12
	(2.56)*	(3.27)*	(2.99)*	(–0.63)
$[FD \times \ln (Y/L)]_{t-1}$	–0.015	–0.026	–0.022	0.017
	(–2.56)*	(–3.11)*	(–2.93)*	(0.76)
$(FD \times \ln LIT)_{t-1}$	0.040	0.073	0.071	0.035
	(2.64)*	(3.18)*	(2.19)*	(1.57)
$FD_{t-1} \times g_{(K/L)t}$	0.081	0.075	0.072	0.21
	(1.79)*	(1.17)*	(1.11)	(1.37)
R^2	0.86	0.70	0.87	0.86
R^2 adjusted	0.80	0.58	0.81	0.80
N	4×93	4×93	4×47	4×46

t-statistics in brackets, one-tailed significance tests for regression parameters, * $p \leq 0.05$.

Columns 3 and 4 show the results of two separate runs of the 'adjusted' version for the developed (DC) and less developed (LDC) subgroups of 47 and 46 countries. The general picture is that the explicit growth factors are identified better with respect to the DC subgroup, so that the 'exogenous'– purely time dependent – component remains more important in the LDC subgroup. Apart from that, it is worth noting that the LDC point estimate for the lagged FD-proxy is *negative* (though not significantly different from zero). The interaction effects, however, do not change their sign, though the Gerschenkron effect fails to be significant.

Accordingly, the finance-growth nexus is somewhat less pronounced in the poorer subgroup of countries. To some extent, however, this might be due to poorer data quality rather than structural difference. The following analyses will therefore seek to avoid this possible data quality effect.

Before proceeding, however, the validity of our approach will be submitted to a test with respect to our FD-proxy. To this end, we re-estimate the benchmark model with the 'traditional' FD-proxies LLY and PRIVY instead of our resource based proxy and apply a standard test for non-nested models, Mizon/Richard's (1986) E-Test, which amounts to an F-test with four numerator degrees of freedom (the FD variable and its three interaction terms) for the joint significance of the rivalling regressors against the full alternative model.

The results are reassuring. Resource based FD against the monetisation proxy LLY yields an F-statistic of 2.31 (p = 5.8%), while LLY against FD results in F = 1.70 (p = 15%). The difference is even more pronounced in the case of credit intermediation PRIVY, where a priori reasoning would expect a higher degree of validity: FD against PRIVY delivers an F-statistic of 2.40 (p = 5.1%), while the complementary test for PRIVY against FD scores only F = 0.59 (p = 67%). Hence, if FD and its interactions are indeed affecting growth in a way which is close to what is specified in our benchmark model, preference should be given to measure it by the resource based proxy rather by the traditional money and credit indicators.

2.5 Socio-economic factors and the finance-growth nexus

Socio-economic factors like 'democracy', and institutional quality have long been considered as crucially important for economic growth and development. As far as financial activity is concerned, the importance of institutional quality ('rule of law') as well as 'trust' is fairly obvious, and – as outlined above – the 'third branch' of research on the finance-growth nexus is currently undertaking highly productive efforts to gain more empirical evidence on this topic in general and the strengths and weaknesses of specific economies in particular.

This study departs from the existing financial development literature in drawing attention to the possible importance to the finance-growth nexus of a specific socio-political feature of market economies – 'corporatism'.

For the purpose of the present analysis, let 'corporatism' denote an economy characterised by deliberate attempts to address undesirable outcomes of market solutions (due to what

is generally addressed as 'market imperfections' in economic theory) by co-ordination.[22] Generally 'corporatism' (or 'neo-corporatism' – to distinguish this socio-political set-up from the infamous models originating in the 1920s and 30s), though far from being well defined in the literature,[23] usually refers to a socio-economic set-up of 'centralised or co-ordinated pay bargaining structures' (Henley/Tsakalatos, 1993: 81) that are designed to ensure a 'durable compromise' of powerful worker's and employer's organisations, where unions commit themselves to moderate wage policy, and employers, on the other hand, refrain from spending profits on excessive (or 'conspicuous', cf. Veblen 1899) consumption, but rather follow a long term strategy of reinvesting – 'ploughing back'– profits into new investment. From this 'negotiated' or 'consensual' capitalism, which is sometimes referred to as the, 'Austrian' or 'Swedish' model, Coates (2000) distinguishes a 'state-led' capitalism (the most typical examples of which are supposed to be met in South and East Asia), where workers' rights are much more limited and co-ordination is accomplished through potent long term developmental economic policy. While until about 1980 either type of 'corporatism' was generally regarded as a success, the economic profession has since then shifted to the liberal market paradigm, and what was once considered virtuous is now frequently regarded as 'labour market inflexibility', 'crony capitalism', 'full insurance mentality' and 'Eurosklerosis'.

In the present context, what makes this seemingly old fashioned notion interesting is the fact that a 'corporatist' set-up is obviously partly identical with – or at least in many respects similar to – a 'bank-based' financial system, where close long-term relationship is preferred to arms' length finance; and shareholders' rights at times have to stand behind those of stakeholders. Specifically, while 'corporatist' as well as 'bank based' set-ups are generally assumed to be statistically less efficient than more market orientated systems, they might – at least occasionally – be superior with respect to dynamic efficiency, be it directly though 'ploughing back' of profits in exchange for wage restraint, or be it though more subtle effects of 'consensus' like long-term commitment and high levels of motivation, where – last but not least – individual economic life risks that inevitable come with a market economy (temporary or permanent loss of income due to unemployment, malady and old age) are largely taken care of by social security systems.

Corporatism, though intuitively appealing, is however very far from being well defined, and there exist no more a than few studies – mostly from political scientists – that try to relate corporatism to economic performance. In addition, these studies are concerned with a handful of developed economies only, and their classifications as 'corporatist' refer to in-depth comparative analyses of the labour market institutions or the political systems of the countries

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22 Note that co-ordination is fundamentally different from planning: While the latter relies on authority, based on better knowledge, perception or any other kind of superiority, co-ordination implies a compromise (real or perceived, cf. Habermas 1973) between otherwise antagonistic interest groups in what is understood by the actors as to be for the best of all. In other words, corporatism in capitalist economies is legitimated by the promise to enlarge the cake by mutual restraint in the interest of all before parting it.

23 For in depth discussions of 'corporatism' cf. Henley/Tsakalatos (1993) and Coates (2000).

concerned. Hence, they do not offer any feasible suggestions how to measure corporatism in a large sample of countries.

What we suggest here is, therefore, to try to get a rough idea of the degree of corporatism in quantitative terms by identifying the common variance of a set of variables which on a priori reasoning should be related to corporatist institutions and policies.

Based on this reasoning, indicators of a high degree of corporatism are – among others – a 'mixed' economic systems, high degrees of government consumption and redistribution, a certain amount of deficit spending to ensure full employment, an egalitarian income distribution and the presence of centralised labour and employer's organisations.

Screening the set of socio-political variables commonly used in Barro-type growth regressions, we select the following three indicators, which can be supposed to reflect different, distinctive aspects of corporatism (institutional restraint on markets, coalition of socio-economic groups and interventionist economic policy rather than budget discipline):

– a dummy variable for a mixed economic system (source: Barro/Wolf 1989),
– the degree of concentration in the private sector (source: Vanhanen, 1997),
– the averaged yearly inflation rate from 1960–1989 (source: Levine/Renelt, 1992).

These indicators correlate high enough to allow the extraction of one first principal component only.[24] Since this proxy, however, is likely to be rather preliminary, we shall refer to it only in order to rank the countries in our sample. We can thus proceed with a subgroup of 'corporatist' market economies with a relatively concentrated private sector, a monetary and fiscal policy that is more permissive toward inflation, and a higher likeliness to be classified as 'mixed' on the one hand, and, on the other hand, a complementary subgroup of 'liberal market economies' (LME), which come closer to atomistic competition and are more committed to what is today generally perceived as sound economic policy. This distinction is certainly not perfect; as a fist and tentative approach to get an empirical idea of the consequences of 'corporatism' versus 'liberal market orientation' in the finance-growth nexus, however, it is – at least in our view – worth a try.

In order to highlight the difference between this classification and the socio-political dimensions, which have so far attracted attention in research on finance and growth, we conduct similar multi-indicator analyses referring to 'democracy' and 'institutional quality'. Moreover, we refer to two direct indicators of market orientation, a general 'market-oriented economy' dummy variable, which builds on Vanhanen's (1997) quantification of non-agricultural activities, as well as a dummy variable for 'market-based financial system' based on the classification from Demirguç-Kunt/Levine (1999).[25] The data and the main results of these procedures are given in table 5. For the resulting classifications of our 93 countries, see table 6.

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24 The second component yields an eigenvalue of less than 1.

25 Note that Demirguç-Kunt/Levine's 'market-based' versus 'bank-based' classification applies for 54 of our 93 countries. Since the missing values can only be labelled as either 'non market-based' or 'non bank-based', a 'market-based' and a 'bank-based' distinction would amount to two different sample splits.

Table 5: Socio-political indicators, first principal component statistics, about 1980

Indicator[a]	Description	Loading
Corporatism, resulting classification: CORP		
First principal component, 3 indicators, n = 93, explained variance: 42.7%		
MIXED	Dummy variable for 'mixed' economic system	0.71
CPS	Degree of centralisation in the private sector	0.40
PI6089	Average yearly inflation rate, 1960–89	0.79
Institutional Quality, resulting classification: RLAW		
First principal component, 4 indicators, n = 93, explained variance: 73.2%		
RULELAW	Rule of law index	0.93
CORRUPT	Corruption index	0.92
ICRGE80	Multi-indicator institutional quality index	0.96
BLACK	1 + log (black market premium)	–0.54
Democracy, resulting classification: DEMO		
First principal component, 4 indicators, n = 93, explained variance: 81.3%		
DEMOC	Gastil's index of democracy	0.73
CIVLIB	Gastil's index of civil liberties	0.89
GADP	Government anti-diversion policy index	0.78
ID	Vanhanen's index of democracy	0.85
Market-oriented economy, resulting classification: MOE		
MOE = 1 if share of economy classified as 'market-oriented, diversified ownership' ≥ 0.3, MOE = 0 otherwise		
Market-based financial system, resulting classification: MB		
MB = 1 if financial system classified as 'market-based', MB = 0 otherwise		

[a] standardised variables.

Table 6: Socio-political classifications

Country	CORP	RLAW	DEMO	MOE	MB
ARG	1	0	0	0	0
AUS	0	1	1	1	0
AUT	1	1	1	1	0
BDI	1	0	0	0	0
BEL	0	1	1	1	0
BEN	0	0	0	0	0
BGD	1	0	1	1	0
BOL	1	0	0	0	0
BRA	1	1	1	0	1
BUR	0	0	0	0	0
BWA	0	1	1	0	0
CAF	1	0	0	0	0
CAN	0	1	1	0	1
CHE	0	1	1	1	1
CHL	1	1	1	0	1
CIV	0	1	0	0	0
CMR	0	1	0	0	0
COL	0	0	1	0	0
CRI	0	1	1	0	0
DEU	0	1	1	0	0
DNK	1	1	1	1	1
DOM	0	1	1	0	0
DZA	0	0	0	0	0
ECU	0	1	0	0	0
EGY	1	0	0	0	1
ESP	0	1	1	1	0
ETH	0	0	0	0	0
FIN	1	1	1	1	0
FRA	1	1	1	1	0
GBR	1	1	1	1	1
GHA	1	0	0	0	0
GIN	0	0	0	0	0
GRC	1	1	1	1	0
GTM	0	0	1	0	0
HKG	0	1	1	1	1
HND	0	0	0	0	0
HTI	0	0	0	0	0
HVO	0	1	1	0	0
IDN	1	0	0	0	0
IND	1	1	1	0	0
IRL	0	1	1	1	0
IRN	0	0	0	0	0
ISR	1	1	1	1	0
ITA	1	1	1	1	0
JAM	1	0	1	0	1
JOR	0	0	0	0	0
JPN	0	1	1	1	0
KEN	0	1	0	0	0
KOR	1	1	1	0	1

(to be continued)

Table 6: Socio-political classifications (continued)

Country	CORP	RLAW	DEMO	MOE	MB
LBR	0	0	0	0	0
LKA	1	0	1	0	0
LSO	0	0	0	0	0
MAR	1	0	0	0	0
MEX	1	1	1	0	1
MLI	0	0	0	0	0
MRT	1	0	0	0	0
MWI	1	0	0	0	0
MYS	0	1	1	0	1
NAM	1	0	0	0	0
NER	0	1	0	0	0
NGA	0	0	0	0	0
NLD	1	1	1	1	1
NOR	1	1	1	1	0
NPL	0	0	0	0	0
NZL	0	1	1	1	0
PAK	1	0	0	0	0
PAN	1	0	0	0	0
PER	1	0	0	0	1
PHL	1	0	0	0	1
PNG	0	1	1	0	0
PRT	1	1	1	0	0
PRY	1	0	0	0	0
RWA	1	0	0	0	0
SGP	1	1	1	0	1
SLE	1	0	0	0	0
SLV	0	0	1	0	0
SOM	0	0	0	0	0
SWE	1	1	1	1	1
SYR	0	0	0	0	0
TCD	0	0	0	0	0
TGO	0	0	0	0	0
THA	0	1	1	0	1
TTO	1	1	1	0	0
TUN	1	1	0	0	0
TUR	1	1	1	0	1
TZA	0	0	0	0	0
URY	1	1	1	0	0
USA	0	1	1	1	1
VEN	1	1	1	0	0
ZAF	1	1	1	0	1
ZAR	1	0	0	0	0
ZMB	0	0	0	0	0
ZWE	1	0	0	0	0

The correlations of the factor scores underlying our classifications are low and non significant (–0.23 between corporatism and institutional quality, –0.12 between corporatism and democracy. Moreover, the corporatism index is not correlated significantly to any other variables in the regression – the endogenous variable (the growth rate of per worker income, which is on average 1.71% for the non corporatist and 1.86% for the corporatist subgroup), the FD-proxy, per capita income, technical progress, literacy and factor accumulation rates – so that what this classification captures is definitely not yet accounted for by the any other variable considered here.

We stress that we do not claim to have solved the problem how to measure corporatism and suggest strongly to keep the conceptual difficulties in mind. With these reservations, let us proceed to the next and final step of analysis. Table 7 displays the results of the estimates of the benchmark model (equation 8) with the FD-variable and its three interaction terms set free (i.e., with 4 additional degrees of freedom) between the low and the high scoring subgroups ($n = 46$ and $n = 47$) with respect to the socio-political classifications considered here, while retaining the other parameters (not reproduced in table 7) equal across the total of 93 countries.

The results from table 7 show that the hypothesis of equality of the five standard regressors (T_{t-1}, ln LIT, ln $(Y/L)_{t-1}$, $g_{(K/L)t}$ and $g_{(H/L)t}$) cannot be rejected across the corporatism versus LME and the general market orientation dimensions, whereas institutional quality, democracy and the prevalence of a market-based financial system do make a difference. On the other hand, the four FD related regressors are significantly different across all subgroups except for the market orientation and the market-based financial system distinctions. Hence, a first result is that out of the socio-political dimensions considered here, only the corporatism versus LME dichotomy makes a difference with respect to finance, but not to the other determinants of growth.

Regarding the different estimates of the finance related coefficients, institutional quality clearly appears to be enforcing the finance-growth nexus identified in the benchmark model, whereas the effects of more democracy are hard to interpret: While FD and the FD-capital accumulation interaction are yielding more precise and higher point estimates, the FD-literacy interaction appears with the ‘wrong’ sign. The results in so far confirm what is shown in other studies: institutional quality is generally beneficial to economic activity, whereas a democracy (at least: what is reflected by the usual indicators supplied by political scientists) does not have a straightforward overall effect on economic performance.

Table 7: Effects of FD in different socio-political subgroups, dependent variable: $g_{(Y/L)}$

Regressions according to benchmark model (8), but with four additional degrees of freedom: parameters for $FD_{i,t-1}$, $[FD\times\ln(Y/L)]_{t-1}$, $(FD\times\ln LIT)_{t-1}$ and $FD_{t-1}\times g_{(K/L)t}$ set free across subgroups					
Classification	corporatism vs. LME	institutional quality	democracy	market orientation	market-based finan. system
5 standard regressors	F = 0.86	F = 2.81*	F = 8.00*	F = 1.93	F = 2.38*
4 FD related regressors	F = 2.49*	F = 5.40*	F = 7.62*	F = 0.81	F = 0.68
low scoring subgroup, n = 46					
$FD_{i,t-1}$	–0.018 (–0.22)	0.015 (0.16)	0.0030 (0.32)	0.14 (2.07)*	0.11 (1.51)
$[FD\times\ln(Y/L)]_{t-1}$	0.018 (0.22)	–0.0031 (–0.30)	–0.0013 (–0.13)	–0.014 (–2.03)*	–0.011 (–1.52)
$(FD\times\ln LIT)_{t-1}$	0.030 (1.87)*	0.019 (1.25)	0.028 (1.78)*	0.041 (2.61)*	0.032 (2.04)*
$FD_{t-1}\times g_{(K/L)t}$	0.084 (1.46)	0.0006 (0.01)	0.012 (0.20)	0.065 (1.11)	0.055 (0.98)
high scoring subgroup, n = 47					
$FD_{i,t-1}$	0.029 (3.80)*	0.27 (3.46)*	0.22 (2.75)*	0.26 (1.14)	0.26 (2.02)*
$[FD\times\ln(Y/L)]_{t-1}$	–0.029 (–3.76)*	–0.027 (–3.52)*	–0.0053 (–0.30)	–0.025 (–1.15)	–0.026 (–2.05)*
$(FD\times\ln LIT)_{t-1}$	0.053 (3.26)*	0.025 (1.19)	–0.022 (–2.79)*	–0.0012 (–0.02)	0.053 (1.08)
$FD_{t-1}\times g_{(K/L)t}$	0.065 (1.01)	0.14 (2.29)*	0.13 (2.11)*	0.10 (0.95)	0.11 (0.97)

t-statistics in brackets, one-tailed significance tests for regression parameters, * $p \leq 0.05$.

Perhaps more surprisingly, countries classified as market-orientated show less clear effects on growth from the FD related regressors (except for the capital accumulation interaction term, which is weak in both subgroups); and the market based financial system classification from Demirguç-Kunt/Levine (1999) does not seem to make a difference at all, at least as far as the finance-growth nexus is concerned.[26]

Last but not least, our tentative corporatism versus LME distinction does indeed seem to capture a characteristic feature of the finance-growth nexus through the 1970s and 80s: The FD-proxy, the FD-literacy interaction, and the FD-catching-up interaction emerge considerably more pronounced with respect to their point estimates and more significant with respect to their precision in the corporatist than in the LME subgroup, whereas the fourth FD-related regressor, the capital accumulation interaction term, is only slightly – but not significantly – lower.

This amounts to suggest that corporatist environments might have been more beneficial to the growth enhancing potential of financial activity than the LME set-up. Accordingly, as far as the effects of finance are concerned, corporatist institutions, which nowadays are mostly viewed with some suspicion amongst economists, could be the better option to promote prosperity and growth for the economy as a whole.

It should be kept in mind, however, that these results do not imply that corporatism is generally the better option; if anything our results indicate that it does not make much difference with respect to the other determinants of growth considered here.

Finally, in order to get an better idea of the magnitude and stability of socio-political factors influencing the finance-growth nexus and to reveal the causal determinants which are responsible this, there is certainly need for more research.

3. Conclusion

The empirical results presented in this paper suggest that the prominent Schumpeterian hypothesis of the supply-leading nature of financial development may indeed be an appropriate characterisation of the finance-growth nexus in market economies from about 1970–90. Specifically, financial activity obviously mattered for growth. Second, there are signs of a positive interaction of country's financial development and its catching-up potential. Third, financial activity yielded additional benefits in countries with higher adult literacy. Forth, apart from a possible volume effect of financial development on savings and investment, there is a positive interaction between financial activity and the rate of capital accumulation with respect to growth.

However, a number of socio-political characteristics appear to modify the finance-growth nexus. As might be expected, better institutional quality makes financial activity more benefi-

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26 Note that this observation – while clearly in contrast to theoretical implications from the theory of finance as well a widespread popular belief amongst economists – confirms first empirical generalisations by Demirguç-Kunt/Levine (1999).

cial from an overall economic perspective. The results with respects to democracy are mixed. More surprisingly in the light of the prevailing economic paradigm, our results indicate that the benefits of financial activity might be especially pronounced in corporatist rather than liberal market economies.

Hence, further research should be conducted to investigate possible interactions between the functioning of the financial system and regulatory issues as well as the given economic situation from a local as well as from an international perspective. If these indirect benefits of corporatism as opposed to the model of a liberal market economy were confirmed to have empirical relevance, this would imply that financial systems should not prematurely be reshaped or newly designed according to the textbook model of a competitive market with atomistic agents. Rather, one should take into account the possibilities of antagonism or deliberate consent among economically influential groups and organisations as well as state interference and corrections of market outcomes.

Finally, it should be kept in mind that the financial system is certainly not the major source of economic growth; and at best, its services to the rest of the economy as an intermediary and allocator play an auxiliary role in the process of economic growth and development. A failure to fulfil these functions, however, may imply that the rate of economic growth is reduced below the otherwise feasible, which eventually would result in a loss of economic prosperity.

4. Appendix: Data and sources

Physical capital is estimated by the perpetual inventory method as specified for LDCs by Harberger (1978) and refined by Nehru/Dhareshwar (1993), using a depreciation rate of 10%. Data are from the Penn World Tables (Mark 5.6, revised December 1997).

Human capital: 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 *Labour* (*L*) – if not otherwise noticed – are adjusted for capacity utilisation as described in section 2.3.

The *per capita growth rate* $g_{(Y/L)}$ is taken as $[\ln (Y/L)_{1990} - \ln (Y/L)_{1970}]/20$. Data are RGDPW from the Penn World Tables (Mark 5.6), adjusted for labour capacity utilisation. All other growth rates are computed in the same way. The convergence variable is RGDPW70 adjusted for labour capacity utilisation.

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 (1970, 1975,0..., 1990). 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 per cent of all the variables' variance. (For further details cf. Graff 2000: 229–239. The 5×93 matrix of values for *T* can be obtained upon request).

The *number of Banks and branches* are counted from the 1970 to 1990 editions of the Bankers' Almanac and Yearbook, London: Thomas Skinner.

The *share of labour employed in the financial system* is from ILO Yearbook of Labour Statistics, Vols. 1971–1997, 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* is computed from various issues of the UN National Account Statistics, New York, referring to factor income generated in 'finance, insurance and business services'.

The *average of the yearly inflation rate from 1960–1989* is from Levine/Renelt (1992).

The *dummy variable for a 'mixed' economic system* is from Barro/Wolf (1989).

The *degree of concentration in the private sector* is from Vanhanen (1997).

The *rule of law index (Political Risk Services)* RULELAW is taken from Easterly/Levine (1997).

The *corruption index (Political Risk Services)* CORRUPT is taken from Easterly/Levine (1997).

The *multi-indicator institutional quality index (Political Risk Services)* ICRGE80 is taken from Sachs/Warner (1997).

The *black market premium* BLACK is taken from Easterly/Levine (1997).

The *democracy index (Gastil)* DEMOC is taken from Easterly/Levine (1997).

The *civil liberties index (Gastil)* CIVLIB is taken from Barro/Wolf (1989).

The multi-indicator government anti-diversion policy index GADP is from Hall/Jones (1997).

The *political party index of democracy* ID is from Vanhanen (1997).

The data underlying the '*market-oriented with diversified ownership*' classification MOE is from Vanhanen (1997).

The *'market-based financial system' classification* MB is from Demirguç-Kunt/Levine (1999).

M2/GDP (LLY) and *private credit/GDP (PRIVY)* are from the IMF Financial Statistics (M2: line 551, if missing line 34 + 35, for UK line 351; private credit: line 32d; GDP: line 99b).

If not mentioned otherwise, missing values have been replaced by their World Bank regional country group mean.

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