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Finance-Growth Nexus and the P-Bias

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Abstract

Recent empirical OECD studies provide new empirical evidence confirming that financial development is closely linked to economic growth in OECD countries. Using new dynamic panel regression techniques, these appraisals indicate that within the group of high income countries stock market size as a measure of financial advancement contributes significantly to overall economic activity. Applying the same advanced techniques, this paper questions this conclusion by showing that the findings of the OECD studies seem to be not only not robust with respect to adding new observations but also likely to be plagued by a severe price bias which belittles the information content of the used financial indicator (stock market capitalization). We provide evidence that anticipative price effects (i. e., expectations of future growth, reflected in current stock prices) may be driving the empirical relationship between stock market activities and economic growth in high income countries to a much larger extent than recent analyses of the finance-growth link for OECD countries indicate.

JEL classification: E22, G00, G30, O16, O40

Keywords: growth, financial system, stock market, panel analysis.

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1. Introduction

Empirical and theoretical evidence is increasing emphasizing the positive influence of financial markets on the level and the rate of growth of a country's per-capita income. The rationale for the finance-growth nexus is straightforward: in imperfect economies, financial markets provide valuable services such as mobilizing savings, diversifying risks, allocating savings to investments, and monitoring the allocation of managers (see, for example, *Aghion – Howitt*, 1998, and *Levine*, 1997)[1]). By performing these services financial markets work as a very important catalyst of economic growth.

In the light of these well-founded conjectures the proposition has been put forward, most prominently by OECD economists, that the finance-growth nexus is the closer the more advanced the state of the economy and the financial system, respectively. Surprisingly, so far most empirical studies have failed to find convincing evidence in favor of this view. Strong links between financial development and growth have only been detected when the data sample reached beyond the OECD world. But even this finding is highly insecure and has recently come under fire (*Driffill*, 2002). Robustness analyses conducted by *Manning* (2002), for example, indicate that each of the stock market measures used in the influential paper of *Levine - Zervos* (1998) - capitalization, liquidity, and turnover - loses its statistical significance upon the elimination of just one influential observation from the sample, or upon the addition of regional fixed effects to their cross-country growth regression.

Despite these sobering set-backs, a new line of empirical research has been launched by OECD economists aimed at discovering more solid evidence in favor of the view that financial development drives overall economic growth in high income countries. For instance, using new dynamic panel regression techniques *Bassanini – Scarpetta – Hemmings* (2001) show that within the OECD countries financial advancement as measured by stock market size plays an important role in the process of economic growth. Applying the same technique, *Leahy et al.* (2001) establish further significant relationships between investment and financial development, as measured by indicators such as stock market capitalization, stock market liquidity and private credit of deposit money banks.

The focus of this paper is to show that these regressions suffer from similar deficiencies as the regression analyses conducted by *Levine - Zervos* (1998). To be specific, extending the years of observation by two more years leads to the disappearance of the positive impact of stock market activities on economic growth detected in the OECD papers. In addition, we re-examine the findings of these OECD studies by exploring financial indicators that are less plagued by the so-called anticipative price bias (or P-bias) than the stock market measures used by the OECD (i. e., market capitalization). Following the recommendation in *Levine – Zervos* (1998), we control for the forward-looking nature of financial markets by using, in addition to capitalization and bank credit, two related measures of stock market activities. First, turnover measures the value of the trades of domestic shares on domestic exchanges

[1]) For an excellent survey of the recent theoretical and empirical work in this highly active research field we refer the reader to *Rajan – Zingales*, 2001.

divided by the value of listed domestic shares. High turnover is said to indicate low transaction costs. Second, value traded equals the value of the trades of domestic shares on domestic exchanges divided by GDP. Since financial markets are basically expectation-driven stock prices will go up today if markets expect rising corporate profits tomorrow. Thus capitalization, as measured by the value of listed domestic shares on domestic exchanges divided by GDP, and value traded might be affected by stock price movements, with no changes in the number of transactions and/or in transaction costs. Since the price effect influences both indicators, but only value traded is directly related to trading, *Levine – Zervos* (1998) propose that both indicators be included simultaneously in the regression analysis. If value traded and long-run economic growth remain positively related while controlling for market size then the results are not very likely to be biased by price effects. The same reasoning applies to turnover. Since stock prices affect both, the numerator and denominator, turnover will not be influenced by price effects.

The empirical findings presented in this paper show that the positive linkage between stock market activities and long-run growth in the OECD countries breaks down when stock price effects are appropriately controlled for. However, the empirical analysis also indicates that there is a positive relationship between long-run growth and private credit which appears to be quite robust. The work is divided as follows: Section 2 outlines the analytical approach used in the OECD studies. Section 3 motivates the estimation approach. Section 4 discusses the results. Section 5 concludes.

2. The Augmented Neoclassical Growth Equation

The growth equation to be estimated in this paper is drawn from the human-capital-augmented neoclassical growth model propagated through the seminal paper of *Mankiw – Romer - Weil* (1992). This model has now become the standard approach in neoclassical growth empirics and, hence, also provides the analytical setting for the respective OECD studies.

Since observed growth rates are very likely to include out-of-the steady-state dynamics it has become generally accepted that the standard growth equation used in empirical work explicitly accounts for transitional dynamics. This is usually done by way of linear approximation.

Assuming that the transitional dynamics can be sufficiently modelled in a linearized form the simplest version of the model can then be written as an autoregressive distributed lag (ARDL) model of order one (see, for example, *Mankiw et al.* (1992), *Bassanini - Scarpetta* (2001)):

$$\begin{aligned}\Delta \ln y_{i,t} = {} & a_{0,i} + \phi_i \ln y_{i,t-1} + a_{1,i} \ln s_{i,t}^K + a_{2,i} \ln h_{i,t} - a_{3,i} n_{i,t} + \sum_{j=4}^{m} a_{j,i} \ln V_{i,t}^j + a_{m+1,i} t \\ & + b_{1,i} \Delta \ln s_{i,t}^K + b_{2,i} \Delta \ln h_{i,t} + b_{3,i} \Delta n_{i,t} + \sum_{j=4}^{m} b_{j,i} \Delta \ln V_{i,t}^j + \varepsilon_{i,t}\end{aligned} \tag{1}$$

where, in the respective OECD studies, $\Delta \ln y$ denotes the annual growth rate of real GDP per head of population aged 15-64, $\ln s^K$ the ratio of real private non-residential fixed capital formation to real private GDP, $\ln h$ the human capital stock represented by the average number of years of schooling of the population from 25 to 64 years of age, each in log-transformation. The letter n stands for the annual growth rate of population aged 15-64 years, V is a vector of policy and institutional variables affecting economic efficiency (i. e., the indicators of financial development as mentioned above), and t stands for a time trend. The usual random term is denoted by ε. The symbol Δ represents the first order difference operator.

The $a-regressors$ determine the long-run solution whereas the $b-regressors$ capture the short-run dynamics. The coefficient ϕ captures the speed of adjustment or convergence, respectively. For a long-run relationship to exist this coefficient needs to be negative. The subscripts t and i indicate the year of observation and the country covered, respectively.

3. Data and Estimation Method

With the exception of the indicators of financial development and the length of the observation period it holds that we use the same data set drawn from the same sources as the respective OECD studies (see, for example, *Bassanini - Scarpetta*, 2001). Thus the sample used in this paper consists of an unbalanced panel of data from 1971 to 2000 (*OECD*, 1971 to 1998) for 21 OECD countries. For further details concerning data and coverage, see also the Appendix.

The availability of high-quality data over a time span of thirty years for 21 OECD countries allows us to estimate the augmented growth equation (1) on an annual basis thereby being enabled to extract the full information content of the data. However, using pooled annual cross-country time with both T, the number of time series observations, and N, the number of groups (countries) quite large, at this stage only three econometric techniques appear to be appropriate to estimate the growth equation (1): mean group (MG), pooled mean group (PMG) and dynamic fixed effects (DFE)[2]).

All three methods produce consistent estimates of the coefficients in dynamic models though these estimates will be inefficient (and biased) when specific homogeneity assumptions hold. The MG estimator imposes no restrictions at all, the PMG restricts the long-run coefficients to be the same for all groups (i. e, countries), and the DFE requires all the slope coefficients and error variances to be identical. Though the MG estimator is consistent, it can easily be affected adversely by outliers in the finite sample case. The PMG, as suggested by *Pesaran – Shin – Smith* (1999), has an advantage over the traditional DFE model in that in the former the short-run dynamics (and the error variances) are allowed to differ freely across groups.

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[2]) The application of standard pooled and aggregate estimators is inappropriate because these estimators cannot be expected to be consistent in dynamic models, even for very large N and T (see, for example, *Pesaran - Smith*, 1995). The same applies to the standard dynamic panel estimators such as the Arellano-Bond's instrument variable estimator which are suited for dealing with dynamic models when N is large and T relatively small.

Given the subject matter (that is, long-run growth in OECD countries) the PMG estimator appears to be superior to the other two estimators mentioned for a good reason: due to similar levels of economic and technological development, but profound differences in institutional infrastructure and design, it can be rightly assumed that the long-run equilibrium relationships between fundamental growth variables be similar across OECD countries, with the speed of adjustment to the long-run equilibrium values differing freely country by country. This has been the line of argumentation in the OECD studies under scrutiny. We agree with the view that the PMG takes a reasonable middle ground between the other two estimators considered.

As a result, we estimate the growth equation (1) by imposing the following long-run homogeneity restrictions:

$$\begin{aligned}\Delta \ln y_{i,t} = a_{0,i} - \phi_i \left\{ \ln y_{i,t-1} - \theta_1 \ln s_{i,t}^K - \theta_2 \ln h_{i,t} + \theta_3 \ln \Delta p_{i,t} - \sum_{j=4}^{m} \theta_j \ln V_{i,t-1}^j \right\} + a_{m+1,i} t \\ + b_{1,i} \Delta \ln s_{i,t}^K + b_{2,i} \Delta \ln h_{i,t} + b_{3,i} \Delta^2 p_{i,t} + \varepsilon_{i,t}\end{aligned} \qquad (2)$$

where p stands for working age population and $V_{i,t-1}^j$ represents either stock market capitalization (cap), stock market liquidity (liq), stock market turnover $(turn)$ or private credit $(credit)$, each lagged by one. This restriction is suggested by the high degree of forward-orientation of the used financial markets indicators.

Additionally, in accordance with the respective OECD studies we model the time trend t as a non-linear process proxied by a sequence of time dummies (reflecting a non-constant change of technical progress). The four multiple-year dummies introduced encompass the years $(1974-78)$, $(1979-83)$, $(1989-93)$, $(1994-98)$, respectively. These time dummies are identical with those applied in the OECD studies (see, for example, *Bassanini – Scarpetta*, 2001). Contrary to the OECD studies, however, we only found evidence for the view that these dummies reflect country-specific rather than common shocks.

Finally, the long-run homogeneity restrictions $\theta_s = \dfrac{a_{s,i}}{\phi_i}$ are checked by applying a Hausman test, introduced by *Pesaran – Smith - Im* (1996).

As mentioned above, we are re-examining the OECD estimates not only by extending the period of observation by two more years (1999 and 2000) but also by controlling explicitly for price effects caused by the forward-orientation of financial markets. As already said, we are doing this by introducing, besides market capitalization and private credit, two more financial indicators, value traded and turnover. These measures, however, are only as good as the way volume traded is recorded. Unfortunately, data collection on volume of securities traded is a highly controversial undertaking. According to the Federation Internationale Bourses Valeurs (FIBV) data on volume traded must be divided into two groups: trading system view (TSV) and regulated environment view (REV). In the TSV system only transactions which take place on the exchange's trading floor are counted, whereas the REV system covers all transactions subject to supervision by the market authority, with no distinctions between on- and off-market transactions (*Rajan – Zingales*, 2001). In bearing this caveat in mind we constructed these indicators with particular care (as for data definitions and sources, see Appendix).

4. Estimation Results for 21 OECD Countries

This section presents the regression results for the financial development indicators credit, capitalization, value traded and turnover. As in the OECD studies, the computations are carried out with the help of a GAUSS program made available by M. H. Pesaran.

Based on model specification checks (Schwarz-Bayesian Criterion with the maximum lag order set to two), we specified the lags uniformly across countries with two lags for the dependent variable and $\ln s^K$, respectively, and one lag for each of the other input factors. As mentioned, the financial development indicators enter the equation as $(t-1)$-variable with no further lags (or leads) considered. This lag structure has not been rejected by sensitivity tests indicating that the estimates are not strongly affected by the choice of the lag structure and, hence, not seriously flawed by picking up (too much short run) business cycle effects[3]). In addition, standard diagnostics have also been sufficiently supportive for this specification (Table 1). The regressions based on the baseline model specification as an ARDL (2,2,1,1) explain about 50 percent of the change in the logarithm of per capita output on average. This is in line with the findings in the respective OECD papers.

In Table 2 the long-run coefficient PMG estimates are reported, all of which are elasticities (since all variables are in logarithms). Column A reports the estimates of the baseline model, that is, without considering financial variables. As hoped for, the long-run coefficients are significant and have the right sign. The joint Hausman test statistic of 2.33 indicates that the restriction of long-run homogeneity of the long-run coefficients considered cannot be rejected, that is to say, the difference between the MG and PMG estimates is not significant. The convergence coefficient is negative and significant indicating that there is a long-run equilibrium relationship between the variables considered. This holds for all growth regressions reported.

As to the baseline model, the estimates on the basis of our slightly extended data set corroborate the findings of the OECD studies. However, enlarging the set of regressors by financial development indicators leads to results which deviate substantially from those reported in the OECD studies. The most intriguing result is that stock market capitalization ceases to be significantly linked to long-run economic growth for the 21 OECD countries when the length of the time series is extended by two more observations (Column B). A fair reading of this result is that the positive linkage between stock market capitalization and long-run economic growth as reported in the OECD studies cannot be considered to be

[3]) An additional point in favor of this uniform lag design was that under this specification the joint Hausman test procedure did not run into cumbersome computational difficulties which occurred frequently by more complicated lag structures.

Table 1: Diagnostic Statistics: Test of baseline model specification ARDL(2,2,1,1)
Mean Group Estimators

	χ^{2}_{SC} 1)	χ^{2}_{FF} 2)	χ^{2}_{NO} 3)	χ^{2}_{HE} 4)	$\overline{R^{2}}$ 5)
US	0.58	1.71	0.10	3.46	0.54
CA	0.76	0.47	0.63	2.22	0.29
JA	0.72	0.04	8.55	0.01	0.42
AU	0.03	3.43	1.46	0.31	0.43
NZ	1.99	4.48	0.11	2.35	0.63
AT	2.15	0.42	1.03	1.39	0.55
BE	0.41	0.00	4.30	0.43	0.48
DE	1.45	1.00	0.18	0.73	0.83
FR	0.26	0.21	1.01	0.70	0.61
IT	2.89	0.36	7.92	0.05	0.64
GB	0.05	3.06	0.07	0.02	0.25
NE	4.58	0.01	0.80	3.64	0.45
NO	2.17	2.07	0.94	0.00	0.19
SE	1.38	5.25	0.93	0.45	0.75
FI	0.05	5.35	1.22	1.67	0.65
DK	3.65	0.34	0.83	0.08	0.45
IE	3.41	0.18	0.27	0.01	0.42
ES	0.06	1.51	0.72	2.10	0.78
PT	7.53	0.09	1.62	0.02	0.72
GR	0.52	2.42	0.97	1.06	0.54
CH	2.56	3.79	0.62	4.74	0.51

[1]) Godfrey's test of residual serial correlation. - [2]) Ramsey's RESET test of functional form. - [3]) Jarque-bera test of normality of regression residuals. - [4]) Langrange multiplier test of homoscedasticity. - [5]) Adjusted R².

robust. More importantly, the same holds true when stock market capitalization is replaced by stock market turnover. This financial indicator is supposed to be as free from misleading stock price effects as possible and, hence, well suited for detecting a causal relation between real stock market activities and economic growth if there is any. Undoubtedly, our finding suggests that stock market turnover does not affect significantly the long-run output path of the OECD countries under investigation (Column D). This can be taken as a very clear indication that the strong relationship between financial development and output growth in the OECD countries reported in the respective studies is mainly due to the forward-orientation of the stock market (i. e., expectations of future growth, reflected in current stock prices) and to a much lesser extent due to a causal linkage. This can be also deduced from the estimation results based on stock market liquidity which is at least as strongly plagued by stock price effects as stock market capitalization (Column C). The coefficient of this financial measure is positive and significant, but introducing this indicator into the regression analysis leads not only to the rejection of the long-run homogeneity restriction (joint Hausman test statistic equals 24.00) but also, most interestingly, to the loss of significance of human capital. However, when financial development is measured by private credit which is by all

Table 2: Long-run coefficients from regressions in the change of per capita output growth in 21 OECD countries

Pooled mean group estimators

Dependent variable: $\Delta \ln y$	A[1])		B		C		D		E	
		Hausman test		Hausman test		Hausman test		Hausman test		Hausman test
Long-run coefficients										
$\ln s^k$	0.189 ***	0.04	0.275 ***	1.29	0.224 ***	14.13	0.173 ***	0.05	0.248 ***	0.86
	(0.027)	[0.85]	(0.033)	[0.26]	(0.034)	[0.00]	(0.024)	[0.83]	(0.034)	[0.35]
$\ln h$	1.637 ***	0.85	0.310 ***	1.01	0.143	4.75	1.497 ***	0.06	0.702 ***	0.17
	(0.052)	[0.36]	(0.095)	[0.32]	(0.101)	[0.03]	(0.089)	[0.81]	(0.084)	[0.68]
$\Delta \ln p$	-6.054 ***	0.74	-1.379 ***	0.54	-1.323 ***	0.12	-4.718 ***	0.43	-2.776 ***	1.16
	(1.026)	[0.39]	(0.245)	[0.46]	(0.239)	[0.73]	(0.818)	[0.51]	(0.791)	[0.28]
$\ln cap_{t-1}$			0.007	0.97						
			(0.006)	[0.32]						
$\ln liq_{t-1}$					0.029 ***	1.15				
					(0.005)	[0.28]				
$\ln turn_{t-1}$							0.004	0.70		
							(0.005)	[0.40]		
$\ln credit_{t-1}$									0.225 ***	0.39
									(0.028)	[0.53]
Convergence coefficient ϕ										
$\ln y_{t-1}$	-0.136 **		-0.293 ***		-0.424 ***		-0.241 ***		-0.203 ***	
	(0.046)		(0.079)		(0.090)		(0.065)		(0.045)	
Joint Hausman test		2.33		7.20		24.00		1.56		3.68
		[0.51]		[0.13]		[0.00]		[0.82]		[0.45]

All equations include short-term dynamics, a constant country-specific term and four 5-year time dummies (1974-1978), (1979-1983), (1989-1993) and (1994-1998) not constrained to be identical across countries. Standard errors are in brackets. p-values are in square brackets.

* significant at 10% level; ** significant at 5% level; *** significant at 1% level. - [1]) Without time dummies.

accounts the least price-biased standard measure of financial development we also find evidence in favor of the growth-finance nexus as advocated by the OECD analyses (Column E).

Finally, it is worth stressing that the joint Hausman test statistic indicates that the homogeneity assumption is valid for all but one growth equation (that is, except the equation reported in Column C).

Thus, given the findings presented in this paper one has to come to the conclusion that caution is more than due when it comes to reading the available empirical evidence concerning the finance-growth nexus in high income countries. There is a pitfall out there named P-bias reminding us that strong price effects may be driving the statistical relationship between stock market activities and economic growth in high income countries, and they do so to a much greater extent than recent analyses of the finance-growth link for OECD countries suggest[4]).

5. Conclusion

The paper is re-examining the findings of recent OECD studies (*Scarpetta – Bassanini – Pilat – Schreyer,* 2000; *Bassanini – Scarpetta – Hemmings*, 2001) which are highly supportive of the view that stresses positive linkages between financial market development and long-run growth in high income countries. For this reason, we extended the OECD analyses by expanding both, the length of the time series and the set of the financial development indicators. By applying a new dynamic panel regression technique (pooled mean group estimator) we get results indicating that the statistical relationship between financial development and long-run growth in OECD countries, as reported in the respective OECD studies, is not only not robust with respect to adding new observations but also mainly due to the forward-looking nature of stock markets (i. e., expectations of future growth, reflected in current stock prices). Thus, strong price effects may be driving the statistical relationship between stock market activities and economic growth in high income countries to a much larger extent than recent analyses of the finance-growth link for OECD countries indicate. However, there is empirical evidence in favor of the finance-growth nexus when financial development is measured by an indicator which is credit market-based and, hence, less price-bias plagued.

[4]) In a companion paper dealing with the findings reported in *Leahy et al.* (2001) we are able to show that the same holds true with respect to the relation between stock market activities and real private non-residential fixed capital formation in high income countries (*Hahn*, 2002).

References

Aghion, P., Howitt, P., Endogenous Growth Theory, MIT Press, Cambridge, 1998.

Andrés, J., Hernando, I., Lópes-Salido, J. D., "The Role of the Financial System in the Growth-Inflation Link: The OECD Experience", Banco de Espana Working Paper, 1999, (October).

Bassanini, A., Scarpetta, S., "Does Human Capital Matter for Growth in OECD Countries? Evidence from Pooled Mean-Group Estimates", OECD Economics Department Working Papers, Paris, 2001, (82).

Bassanini, A., Scarpetta, S., Hemmings, P., "Economic Growth: The Role of Policies and Institutions – Panel Data Evidence from OECD Countries", OECD Economics Department Working Papers, Paris, 2001, (283).

Bassanini, A., Scarpetta, S., Visco, I., "Knowledge, Technology and Economic Growth: Recent Evidence from OECD Countries", OECD Economics Department Working Papers, Paris, 2000, (259).

De la Fuente, A., Doménech, R., "Human Capital in Growth Regressions: How Much Difference Does Data Quality Make?", OECD Economics Department Working Papers, Paris, 2000, (283).

Driffill, J., Growth and Finance, mimeo, 2002.

Hahn, F. R., "The Finance-Growth Nexus Revisited: New Evidence from OECD Countries", WIFO-Working Paper, 2002, (176).

Leahy, M., Schich, S., Wehinger, G., Pelgrin, F., Thorgeirsson, T., "Contributions of Financial Systems to Growth in OECD Countries", OECD Economics Department Working Papers, Paris, 2001, (280).

Levine, R., "Financial Development and Economic Growth: Views and Agenda", Journal of Economic Literature, 1997, 35(2), p. 688–726.

Levine, R., Zervos, S., "Stock Markets, Banks, and Economic Growth", American Economic Review, 1998, 88(3), p. 537–558.

Levine, R., Loayza, N., Beck, T., "Financial Intermediation and Growth: Causality and Causes", Journal of Monetary Economics, 2000, (46), p. 31–77.

Mankiw, G. N., Romer, D., Weil, D. N., "A Contribution to the Empirics of Economic growth", Quarterly Journal of Economics, 1992, (107), p. 407-437.

Manning, M. J., Finance causes Growth: Can We be So Sure?, mimeo, 2002.

OECD, Education at a Glance, Paris, 2000.

Pagano, M., "Financial Markets and Growth: An Overview", European Economic Review, 1993, (37), S. 613–622.

Pesaran, H., Smith, R. P., "Estimating Long-run Relationships from Dynamic Heterogeneous Panels", Journal of Econometrics, 1995, (68), p. 79–113.

Pesaran, H., Shin, Y., Smith, R. P., "Pooled Mean Group Estimation of Dynamic Heterogeneous Panels", Journal of the American Statistical Association, 1999, (94), p. 621–634.

Pesaran, H., Smith, R. P., Im, K. S., "Dynamic Linear Models for Heterogeneous Panels", in Mátyás, L., Sevestre, P., The Econometrics of Panel Data – A Handbook of the Theory with Applications, Kluwer Academic Publishers, Dordrecht – Boston – London, 1996.

Rajan, R. G., Zingales, L., "Financial Systems, Industrial Structure, and Growth", Oxford Review of Economic Policy, 2001, 17(4), S. 467–482.

Scarpetta, S., Bassanini, A., Pilat, D., Schreyer, P., "Economic Growth in the OECD Area: Recent Trends at the Aggregate and Sectoral Level", OECD Economics Department Working Papers, Paris, 2000, (283).

Annex: List of Variables and Definitions

Variable	Definition	Dimension	Source
Y	Real Gross domestic product per person of working age	Purchasing power parities of 1995	OECD
S^k	Ratio of real private non-residental fixed capital formation to real private GDP		OECD
H	Average number of years of schooling of the population from 25 to 64 years of age		De la Fuente-Doménech (2000), OECD Education at a Glance, various issues
P	Working age population		OECD
CREDIT	Stock of credit by commercial and deposit-taking banks to the private sector	Divided by gross domestic product	International Financial Statistics (IFS)
CAP	Value of listed domestic shares on domestic exchanges	Divided by gross domestic product	Federation Internationale Bourses Valeurs (FIBV)
LIQ	Value of trade of domestic shares on domestic exchanges	Divided by gross domestic product	Federation Internationale Bourses Valeurs (FIBV)
TURN	Value Traded divided by Capitalization		
Time Period	1970 to 2000		
Countries	USA, Canada, Japan, Australia, New Zealand, Austria, Belgium, Germany, France, Italy, Great Britain, Netherlands, Norway, Sweden, Finland, Denmark, Ireland, Spain, Portugal, Greece, Switzerland		

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