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NEW EVIDENCE FROM OECD COUNTRIES

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Abstract

Recently, two OECD studies provided new empirical evidence confirming that financial development is closely linked to economic growth in OECD countries. Using new dynamic panel regression techniques, these studies show that within the group of high income countries financial development contributes to economic activity primarily through the fixed investment channel. Applying the same techniques, this paper is aimed at re-examining the findings of the OECD studies by exploring financial variables that are less plagued by the forward-looking nature of the stock market than the financial indicators used in the OECD analyses. We will show that price effects are likely to be driving the empirical relationship between stock market liquidity 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

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1. Introduction

There is a growing body of empirical and theoretical evidence 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. By performing these services financial markets work as a very important catalyst of economic growth[1]).

In this context it is natural to conjecture that the finance-growth nexus, if there is any at all, 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 obtained when the data sample reached beyond the OECD world. Recently, however, two OECD studies provided new empirical evidence confirming that financial development is closely linked to economic growth in OECD countries basically through its relationship with fixed investment. Using new dynamic panel regression techniques, *Bassanini – Scarpetta – Hemmings* (2001) show that within the group of high income countries fixed investment plays an important role in the process of economic growth. In addition, their findings indicate that financial development contributes to economic activity primarily through the fixed investment channel. 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 and private credit of deposit money banks.

The focus of this paper is to re-examine the findings of *Leahy et al.* (2001) by exploring financial indicators that are less plagued by the so-called anticipative price bias than the stock market measure used in *Leahy et al.* (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 market liquidity. First, Turnover measures the value of the trades of domestic shares on domestic exchanges 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

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[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*, 2001B.

applies to Turnover. Since stock prices affect both, the numerator and denominator, Turnover will not be influenced by price effects.

The paper is divided as follows: Section 2 provides a simple rationale for the finance-growth nexus by using the AK approach to endogenous growth. Section 3 motivates the proposed extension to the estimation approach used by *Leahy et al.* (2001). Section 4 discusses the results. Section 5 concludes.

2. Rationalizing the Finance-Growth Nexus

Pagano (1993) introduces a nice extension to the AK-model to capture the idea of the potential effects of financial development on growth. At the center of the AK-model is the linear relationship between aggregate output *Y* and aggregate capital stock *K*

$$Y_t = A K_t \tag{1}$$

where *A* is a parameter (productivity of capital). For a rationale of (1), the reader is referred to *Aghion – Howitt* (1998) or any other textbook on modern growth economics.

Under standard assumptions (i. e., stationary population, single good, closed economy, no government) and the introduction of capital market inefficiency

$$\psi S_t = I_t \tag{2}$$

with $0 \le \psi < 1$, representing the efficiency level of financial intermediation (thus, $1-\psi$ measures the losses through inefficient intermediation), the following steady-state growth rate equation is obtained

$$g = A\psi s - \delta \tag{3}$$

where *g* is the steady-state growth rate of *Y*, *s* denotes the gross saving rate *S/Y* and δ is the depreciation rate of aggregate capital per period.

Simple algebra translates equilibrium condition (2) into a reduced-form investment function

$$I = \psi s Y \tag{4}$$

Equations (3) and (4) reveal the channels through which financial development may affect long-run growth: a direct channel via ψ, the portion of savings funneled to investment (i. e., level of financial market efficiency), and two indirect channels through *A*, the productivity of capital, and the gross saving rate *s*, respectively. The working of the direct channel is straightforward: the more efficient the capital markets, that is, ψ converges to one, the smaller the losses of intermediation. As for the indirect channels, financial markets may improve the allocation of capital by funneling funds to projects with the highest marginal product of capital, thereby raising (indirectly) the steady-state growth rate *g* through elevating *A*, the level of aggregate capital productivity. Financial development may also influence growth indirectly through altering the saving ratio. In this case, however, the impact on long-run growth remains ambiguous (for a good discussion of this point see *Pagano*, 1993). The empirical investigation to come focuses solely on the evaluation of the direct channel, as represented by the parameter ψ in (3) and (4). With this restriction in mind equations (3) and (4) may be taken as theoretical base models of the equations to be estimated in Section 3.

3. The Panel Error Correction Approach

The econometric model used in the empirical analysis is an autoregressive distributed lag (ARDL) model. Given data on time periods $t = 1, 2, 3, ..., T$, and groups, $i = 1, 2, 3, ..., N$, the ARDL(p, q, q, ... q) has the following general structure:

$$y_{i,t} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} x_{i,t-j} + \mu_i + \varepsilon_{i,t} \quad , \tag{1'}$$

where $x_{i,t}$ is a $(k*1)$-vector of explanatory variables (regressors) for the group *i*, μ_i represent the fixed effects, λ_{ij} are the coefficients of the lagged dependent variables and δ_{ij} are $(k*1)$ coefficient vectors. The disturbances $\varepsilon_{i,t}$, $i = 1, 2, 3, ..., N$, $t = 1, 2, 3, ..., T$, are independently distributed across *i* and *t*, with zero means and variances $\sigma_i^2 > 0$.

Re-parameterization of (1') leads to the following error correction equation:

$$\Delta y_{i,t} = \phi_i y_{i,t-1} + \beta_i' x_{i,t} + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}^{*'} \Delta x_{i,t-j} + \mu_i + \varepsilon_{i,t} \tag{2'}$$

with $\phi_i = -(1 - \sum_{j=1}^{p} \lambda_{ij})$, $\beta_i^{'} = \sum_{j=0}^{q} \delta_{ij}$, $\lambda_{ij}^{*} = -\sum_{m=j+1}^{p} \lambda_{im}$, $j = 1, 2, 3, ..., p-1$,

and $\delta_{ij}^{*} = -\sum_{m=j+1}^{q} \delta_{im}$, $j = 1, 2, 3, ..., q-1$. The symbol Δ represents the first order difference operator.

In *Leahy et al.* (2001) an ARDL(1,1,1,1) of equation (4) with no restrictions is used as a benchmark specification:

$$ibv_{i,t} = \mu_i + \delta_{10i} gdp_{i,t} + \delta_{11i} gdp_{i,t-1} + \delta_{20i} irl_{i,t} + \delta_{21i} irl_{i,t-1} + \delta_{30i} fin_{i,t} + \delta_{i,t-1} fin_{i,t-1} + \lambda_i ibv_{i,t-1} + \varepsilon_{it} \quad (1^*)$$

where ibv, gdp, irl and fin are respectively log-transformations of real business-sector gross investment, real gross domestic product, user cost of capital and a financial development indicator (liquid liabilities, stock market capitalization, bank credit to the private sector). The subscripts $i = 1, 2, 3, ..., N$ stand for 19 OECD-countries, the subscripts $t = 1, 2, 3, ..., T$ for the years 1970 to 1997, μ_i represent the fixed effects, $\delta_{i,j}$ the coefficients of the explanatory variables and λ_i the coefficient of the lagged dependent variable. In equation (1*) the user cost of capital (irl) and the financial development indicators (fin) are proxies for the saving ratio s and the capital market efficiency parameter ψ in equation (4), the long-run solution of equation (1*), respectively.

The error correction equation of the dynamic model (1*) is:

$$\Delta ibv_{i,t} = \mu_i + \phi_i (ibv_{i,t-1} - \theta_{1i} gdp_{i,t} - \theta_{2i} irl_{i,t} - \theta_{3i} fin_{i,t}) - \delta_{11i} \Delta gdp_{i,t} - \delta_{21i} \Delta irl_{i,t} - \delta_{31i} \Delta fin_{i,t} + \varepsilon_{i,t} \quad (2^*)$$

where the error correction term in parenthesis depicts the equilibrium solution (4), $\phi_i = -(1-\lambda_i)$ denote the adjustment coefficients, θ_{ji}, $j = 1, 2, 3$, the long-run coefficients, and δ_{ki}, $k = 11i, 21i, 31i$ the short-run coefficients.

The following restrictions are imposed by theory: the existence of a long-run equilibrium relationship requires $\phi_i \neq 0$, and a constant investment-output ratio in the steady state calls for $\theta_{1i} = 1$.

In *Leahy et al.*, three econometric techniques are used to estimate panel error correction models such as equation (2*): mean group (MG), pooled mean group (PMG) and dynamic fixed effects (DFE). The MG estimator imposes no restrictions at all, the PMG restricts the long-run coefficients to be the same for all groups, and the DFE requires all the slope coefficients and error variances to be identical.

All three methods are quite common in applied dynamic panel analysis with both *T*, the number of time series observations, and *N*, the number of groups, quite large. 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. *Leahy et al.* (2001) argue that given the subject matter (that is, long-run growth in OECD countries) the PMG estimator is 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 rightly be 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. We totally agree with the argumentation that the PMG takes a reasonable middle ground between the other two estimators considered.

Applying the same techniques we now re-examine the findings of *Leahy et al.* (2001) by controlling explicitly for price effects caused by the forward-orientation of financial markets. As already mentioned, we are doing this by introducing two liquidity-oriented indicators, Value Traded and Turnover. Both 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 thing. 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*, 2001A). 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 OECD Countries

This section presents the regression results for the financial development indicators Credit, Capitalization, Value Traded and Turnover. According to the approach chosen by *Leahy et al.* (2001), investment is treated as a function of these financial indicators and two conditioning variables, real gross domestic product (in PPP terms) and user cost of capital (i. e., equation (2*)). The specification of the ARDL used in the estimates is determined on the basis of the Schwarz-Bayesian Criterion, with the maximum lag order set to two. The sample used consists of a balanced panel of data from 1970 to 2000 for 23 OECD countries (for details, see Appendix).

In Table 1 the long-run coefficient estimates are reported, all of which are elasticities (that is, all variables in logarithms). As for Credit and Capitalization, the results here confirm the findings of *Leahy et al.* (2001). This particularly holds with respect to the PMG estimates, with the long-run coefficients to be identical across countries and the short-run elasticities to differ freely. However,

Table 1: Long-run Coefficients from Regressions in the Change of Gross Private Investment in 23 OECD Countries

	Capitalization			*Value Traded*			*Turnover*			*Credit*			*Capitalization and Value Traded* [1])		
	DFE[2])	PMG	MG	DFE[2])	PMG	MG	DFE[2])	PMG	MG	DFE[2])	PMG	MG	DFE[2])	PMG	MG
fin	0.17 ***	0.11 ***	0.09	0.10 ***	0.02 **	0.05	0.08 *	-0.02	-0.18	0.13 *	0.10 ***	0.14	0.11 **	0.12 ***	0.58
	(0.03)	*(0.02)*	*(0.06)*	*(0.03)*	*(0.01)*	*(0.05)*	*(0.04)*	*(0.01)*	*(0.12)*	*(0.07)*	*(0.02)*	*(0.13)*	*(0.05)*	*(0.02)*	*(0.39)*
													0.05	-0.05 ***	-0.02
													(0.04)	*(0.01)*	*(0.10)*
gdp	0.93 ***	1.41 ***	1.31 ***	0.90 ***	1.54 ***	1.39 ***	1.20 ***	1.69 ***	1.99 ***	1.25 ***	1.55 ***	1.44 ***	0.85 ***	1.54 ***	0.60
	(0.14)	*(0.05)*	*(0.22)*	*(0.20)*	*(0.06)*	*(0.23)*	*(0.19)*	*(0.05)*	*(0.30)*	*(0.17)*	*(0.04)*	*(0.13)*	*(0.18)*	*(0.05)*	*(1.19)*
irl	0.11	-0.02	-0.81 *	0.06	-0.11	0.05	0.12	-0.26 **	-2.51	0.17	-0.16	-0.92 **	0.07	-0.14	-0.52
	(0.13)	*(0.11)*	*(0.45)*	*(0.13)*	*(0.12)*	*(0.83)*	*(0.17)*	*(0.11)*	*(1.69)*	*(0.14)*	*(0.09)*	*(0.42)*	*(0.13)*	*(0.12)*	*(1.89)*
Memorandum items:															
Average error correction coefficient ϕ	-0.13 ***	-0.30 ***	-0.45 ***	-0.13 ***	-0.27 ***	-0.40 ***	-0.13 ***	-0.29 ***	-0.42 ***	-0.14 ***	-0.29 ***	-0.42 ***	-0.13 ***	-0.37 ***	-0.50 ***
	(0.03)	*(0.06)*	*(0.05)*	*(0.03)*	*(0.05)*	*(0.05)*	*(0.02)*	*(0.05)*	*(0.49)*	*(0.03)*	*(0.04)*	*(0.05)*	*(0.03)*	*(0.06)*	*(0.06)*
Joint Hausman test[3])		12.05			1.64			2.02			5.50			3.47	
		[0.01]			*[0.65]*			*[0.57]*			*[0.14]*			*[0.48]*	

All modells are variations of the error correction approach (2*). The lag order for the short-run adjustment variables is chosen according to the Schwarz-Bayesian Criterion (with a maximum lag equal to 2). DFE ... dynamic fixed effects estimator, PMG ... pooled mean group estimator, MG ... mean group estimator. Standard errors in parentheses (for DFE heteroskedasticity-consistent). – 1) First coefficient Capitalization, second coefficient Value Traded. – 2) Benchmark specification ARDL(1,1,1,1). –

All variables in logarithms. *fin* ... financial indicators, *gdp* ... real gross domestic product, *irl* ... user cost of capital, *Capitalization* ... value of listed domestic shares on domestic exchanges, divided by gross domestic product, *Value Traded* ... value of trade of domestic shares on domestic exchanges, divided by gross domestic product, *Turnover* ... Value Traded divided by Capitalization.

*** ... significant at the 1% level, ** ... significant at the 5% level, * ... significant at the 10% level; standard errors in parentheses.

Table 2: Test for Robustness of Pooled Mean Group Estimates

Model	(1)	(2)	(3)	(4)	(5)	(6)
gdp	1.64 ***	1.56 ***	1.48 ***	1.75 ***	1.86 ***	1.59 ***
	(0.05)	*(0.06)*	*(0.05)*	*(0.07)*	*(0.07)*	*(0.06)*
irl	-0.21 *	-0.19 *	-0.00	-0.25 *	-0.38 ***	-0.27 *
	(0.12)	*(0.11)*	*(0.13)*	*(0.13)*	*(0.13)*	*(0.14)*
Capitalization			0.11 ***	0.15 ***		
			(0.02)	*(0.02)*		
Value Traded			-0.04 ***	-0.09 ***		
			(0.01)	*(0.01)*		
Turnover	-0.00	-0.01			-0.04 ***	-0.01
	(0.01)	*(0.01)*			*(0.01)*	*(0.08)*
Credit		0.14 ***				0.10 ***
		(0.02)				*(0.02)*
Memorandum items:						
Average error correction coefficient ϕ	-0.26 ***	-0.31 ***	-0.36 ***	-0.36 ***	-0.28 ***	-0.35 ***
	(0.05)	*(0.06)*	*(0.08)*	*(0.07)*	*(0.06)*	*(0.07)*
Joint Hausman test[1])	2.33	1.97	3.28	4.69	3.77	7.73
	[0.51]	*[0.74]*	*[0.51]*	*[0.32]*	*[0.29]*	*[0.05]*

All models are based on a Schwarz-Bayesian Criterion with a maximum lag equal to 2 and an ARDL specification. (1), (2), (3) ... excluding countries with REV-Value Traded (United Kingdom, Netherlands, Sweden, Spain). (4), (5) ... excluding countries with soft stock market data (Japan, Switzerland). (6) ... excluding countries with soft stock market data from 1970 to 1995 (Ireland, Portugal, Greece, Switzerland, Turkey). – 1) Test for long-run slope homogeneity, with p-values in square brackets.

All variables in logarithms. *gdp* ... real gross domestic product, *irl* ... user cost of capital, *Capitalization* ... value of listed domestic shares on domestic exchanges, divided by gross domestic product, *Value Traded* ... value of trade of domestic shares on domestic exchanges, divided by gross domestic product, *Turnover* ... Value Traded divided by Capitalization, *Credit* ... Stock of credit by commercial and deposit-taking banks to the private sector, divided by gross domestic product.

*** ... significant at the 1% level, * ... significant at the 10% level; standard errors in parentheses.

Source: WIFO-OECD data set.

controlling for price effects changes the results significantly. Measuring financial development by considering both indicators Capitalization and Value Traded simultaneously or by Turnover only, indicate very clearly that the seemingly strong relationship between financial development and gross investment in OECD countries appears to be mainly due to the forward-looking nature of stock markets (i. e., expectations of future growth, reflected in current stock prices) and to a much lesser extent due to a causal linkage, as suggested by *Leahy et al.* (2001). This can be deduced from the following estimation results: Turnover is either negatively or insignificantly related to gross investment, and Capitalization and Value Traded considered together in the same regression fail to remain both positively associated with fixed investment. That is to say, Value Traded cease to remain significantly positively correlated with gross investment when we control for market size. These results survive various robustness tests as reported in Table 2. The validity of imposing long-run homogeneity is almost ever confirmed by the joint Hausman test statistic.

With respect to the conditioning variables, *gdp* and *irl*, we basically get the same findings as *Leahy et al.* (2001). This applies particularly to the coefficient estimates for output which are positive and strongly significant, but mostly significantly greater one. For a discussion of this robust result, see *Leahy et al.* (2001). The coefficient estimate for the user cost of capital is almost ever insignificant, the error correction coefficient is always negative and significant indicating that there is a long-run equilibrium relationship between the variables considered.

Thus, a fair and cautious reading of our findings is that strong price effects are very likely to be driving the empirical relationship between stock market liquidity and economic growth in high income countries to a much larger extent than recent analyses of the finance-growth link for OECD countries suggest.

Interestingly, when using standard cross-country regression analysis we get a further piece of evidence in favor of this view. In following *Levine – Zervos* (1998), we ran various initial value standard growth regressions where we used, as regressors, the values of the four financial development indicators in 1970. Contrary to *Levin – Zervos* (1998), cross-section analyses of our sample of high income countries provide no evidence confirming that stock market liquidity facilitates long-run growth. The respective regression results are given in the Appendix.

5. Conclusion

The paper is re-examining the findings of recent OECD studies (*Bassanini – Scarpetta – Hemmings*, 2001; *Leahy et al.*, 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 approach by including financial development indicators which are better qualified to capture stock market liquidity than market size measures used in the respective OECD studies. By applying dynamic panel regression techniques (mean group, pooled mean group, and dynamic fixed effects) we get results indicating that the seemingly strong relationship between financial development and long-run growth in OECD countries is mainly due to the forward-looking nature of stock markets (i. e., expectations of future growth, reflected in current stock prices) and to a much lesser extent due to causal linkages, as suggested by the OECD studies. Thus, strong price effects may be driving the empirical relationship between stock market liquidity and economic growth in high income countries to a much larger extent than recent analyses of the finance-growth link for OECD countries indicate.

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Annex: List of Variables and Definitions

Variable	Definition	Dimension
GDP	Gross domestic product	Purchasing power parities of 1995
PROD	Gross domestic product per employee	Purchasing power parities of 1995
PROD_I	Initial gross domestic product per employee, 1970	Purchasing power parities of 1995
PROD_C	Gross domestic product per capita	Purchasing power parities of 1995
PO_I	Initial potential output per employee, 1970	Purchasing power parities of 1995
IBV	Business-sector gross investment	Purchasing power parities of 1995
GOV	Government consumption expenditures	Divided by gross domestic product
OPEN	Openness	Exports plus imports divided by gross domestic product
Credit	Stock of credit by commercial and deposit-taking banks to the private sector	Divided by gross domestic product
Capitalization	Value of listed domestic shares on domestic	Divided by gross domestic product
Value Traded	Value of trade of domestic shares on domestic exchanges	Divided by gross domestic product
Turnover	Value Traded divided by Capitalization	
IRL	User cost of capital	$1+(R10-\Delta PGDP_{-1})*(PIBV/PGDP)$
R10	Government bond yield	%
PIBV	Deflator, business sector gross investment	Index
PGDP	Deflator, gross domestic product	Index
Time Period	1970 to 2000	
Countries	OECD members dated 1993 excluding Iceland	

Sources: WIFO, OECD, IFS, Eurostat, FIBV.

Summary Statistics WIFO versus Levine – Zervos *Annex/continued*

	Mean		Maximum		Minimum		Standard deviation		Number of observations	
	WIFO	Levine – Zervos	WIFO	Levine – Zervos	WIFO	Levine – Zervos	WIFO	Levine – Zervos	WIFO	Levine – Zervos
Δ prod_c	0.023	0.021	0.043	0.097	0.012	-0.025	0.007	0.022	22	47
Capitalization	0.38	0.32	1.49	2.45	0.08	0.01	0.31	0.43	22	46
Value Traded	0.14	0.11	0.32	1.16	0.02	0.00	0.09	0.19	22	47
Turnover	0.31	0.30	0.72	2.05	0.01	0.01	0.16	0.33	22	46
Credit	0.69	0.80	1.46	2.27	0.19	0.12	0.26	0.50	22	47

Sample period: WIFO 1970 through 2000; Levine – Zervos 1976 through 1993 (p. 544).

Δprod_c ... real gross domestic product growth per *capita*, *Capitalization* ... value of listed domestic shares on domestic exchanges, divided by gross domestic product, *Value Traded* ... value of trade of domestic shares on domestic exchanges, divided by gross domestic product, *Turnover* ... Value Traded divided by Capitalization, *Credit* ... Stock of credit by commercial and deposit-taking banks to the private sector, divided by gross domestic product.

Correlations WIFO versus Levine – Zervos *Annex/continued*

	Capitalization		*Value Traded*		*Turnover*		*Credit*	
	WIFO	Levine – Zervos	WIFO	Levine – Zervos	WIFO	Levine – Zervos	WIFO	Levine – Zervos
Δ prod	0.123	0.222	-0.308	0.417	-0.020	0.444	0.130	0.372
Capitalization	–	–	0.241	0.331	-0.266	0.050	0.399	0.647
Value Traded	–	–	–	–	0.612 ***	0.831	0.440 **	0.449
Turnover	–	–	–	–	–	–	0.191	0.328

WIFO: average over 1970 through 2000; Levine – Zervos: average over 1976 through 1993 (p. 545).

Δ prod ... real gross domestic product growth per employee (Levine – Zervos: Output growth per capita minus 0.3*Capital stock growth per capita), *Capitalization* ... value of listed domestic shares on domestic exchanges, divided by gross domestic product, *Value Traded* ... value of trade of domestic shares on domestic exchanges, divided by gross domestic product, *Turnover* ... Value Traded divided by Capitalization, *Credit* ... Stock of credit by commercial and deposit-taking banks to the private sector, divided by gross domestic product.

*** ... significant at the 1% level, ** ... significant at the 5% level.

Cross-section Regressions WIFO versus Levine – Zervos

Dependent variable: Real gross domestic product growth per employee

Model	(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)
	WIFO	Levine – Zervos[1])	WIFO	Levine – Zervos[2])	WIFO	WIFO	WIFO	WIFO	WIFO	WIFO
Independent variables										
Capitalization	0.0157 * (0.0078)	0.0070 (0.0056)	0.0111 (0.0099)	0.0135 (0.0055)		0.0167 (0.0125)				0.0049 (0.0141)
Value Traded	-0.0212 (0.0255)	0.0592 (0.0227)					0.0151 (0.0188)			-0.0166 (0.0355)
Turnover					-0.0033 (0.0041)			-0.0018 (0.0078)		
Credit	0.0116 (0.0077)	0.0086 (0.0046)	0.0101 * (0.0058)	0.0094 (0.0050)	0.0129 * (0.0068)				0.0118 ** (0.0055)	0.0075 * (0.0043)
Control variables	*prod_i, OPEN*	[3])	*prod_i, OPEN*	[3])	*prod_i, OPEN*	*prod_i, OPEN*	*prod_i, OPEN*	*prod_i, OPEN*	*prod_i, OPEN*	*prod_i, OPEN*
R^2	0.6839	0.4083	0.6635	0.3423	0.6609	0.5586	0.4876	0.4817	0.6284	0.5813
Number of observations	22	41	22	44	22	22	22	22	22	22
Regressors	1970	1976	1970	1976	1970	1970	1970	1970	1970	Ø 1970 through 2000, prod_i 1970

1) See Table 5, p. 549. - 2) See Table 6, p. 550. -3) Initial Output, Enrollment, Revolutions and Coups, Government, Inflation, Black Market Premium.

Capitalization ... value of listed domestic shares on domestic exchanges, divided by gross domestic product, *Value Traded* ... value of trade of domestic shares on domestic exchanges, divided by gross domestic product, *Turnover* ... Value Traded divided by Capitalization, *Credit* ... Stock of credit by commercial and deposit-taking banks to the private sector, divided by gross domestic product, *prod_i* ... initial real gross domestic product growth per employee 1970, logarithm, *OPEN* ... openness.

** ... significant at the 5% level, * ... significant at the 10% level; heteroskedasticity-consistent standard errors in parentheses.

Cross-section Regressions: Output Growth Fluctuations in 22 OECD Countries [1])

Dependent variable: Standard deviation of real gross domestic product growth

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Independent variable										
Constant	0.072	0.064	0.066	0.061	0.071	0.061	0.062	0.064	0.062	0.060
	(0.023)	*(0.012)*	*(0.011)*	*(0.019)*	*(0.017)*	*(0.017)*	*(0.007)*	*(0.009)*	*(0.012)*	*(0.016)*
Initial Potential Output	-0.009	-0.006	-0.009 **	-0.008	-0.009 *	-0.008	-0.005	-0.006	-0.006	-0.007
	(0.008)	*(0.006)*	*(0.004)*	*(0.007)*	*(0.005)*	*(0.006)*	*(0.004)*	*(0.004)*	*(0.005)*	*(0.006)*
Capitalization	0.011	0.008	0.004	-0.000						
	(0.009)	*(0.021)*	*(0.007)*	*(0.014)*						
Value Traded									-0.012	-0.026
									(0.021)	*(0.038)*
Turnover					-0.010	-0.005				
					(0.016)	*(0.005)*				
Credit	-0.012 *	-0.015 **					-0.009	-0.012 *		
	(0.007)	*(0.007)*					*(0.006)*	*(0.007)*		
OPEN			0.007	0.008	0.006	0.008	0.009	0.006	0.007	0.006
			(0.005)	*(0.009)*	*(0.006)*	*(0.006)*	*(0.007)*	*(0.008)*	*(0.006)*	*(0.007)*
GOV	-0.075 *	-0.091 *	-0.089 *	-0.09 *	-0.099 **	-0.087 *	-0.112 **	-0.102 *	-0.099 *	-0.099 **
	(0.040)	*(0.051)*	*(0.047)*	*(0.051)*	*(0.043)*	*(0.043)*	*(0.054)*	*(0.051)*	*(0.049)*	*(0.045)*
R^2	0.628	0.568	0.539	0.485	0.549	0.530	0.602	0.605	0.535	0.518
Regressors	Ø 1970 through 2000	1970	Ø 1970 through 2000	1970	Ø 1970 through 2000	1970	Ø 1970 through 2000	1970	Ø 1970 through 2000	1970

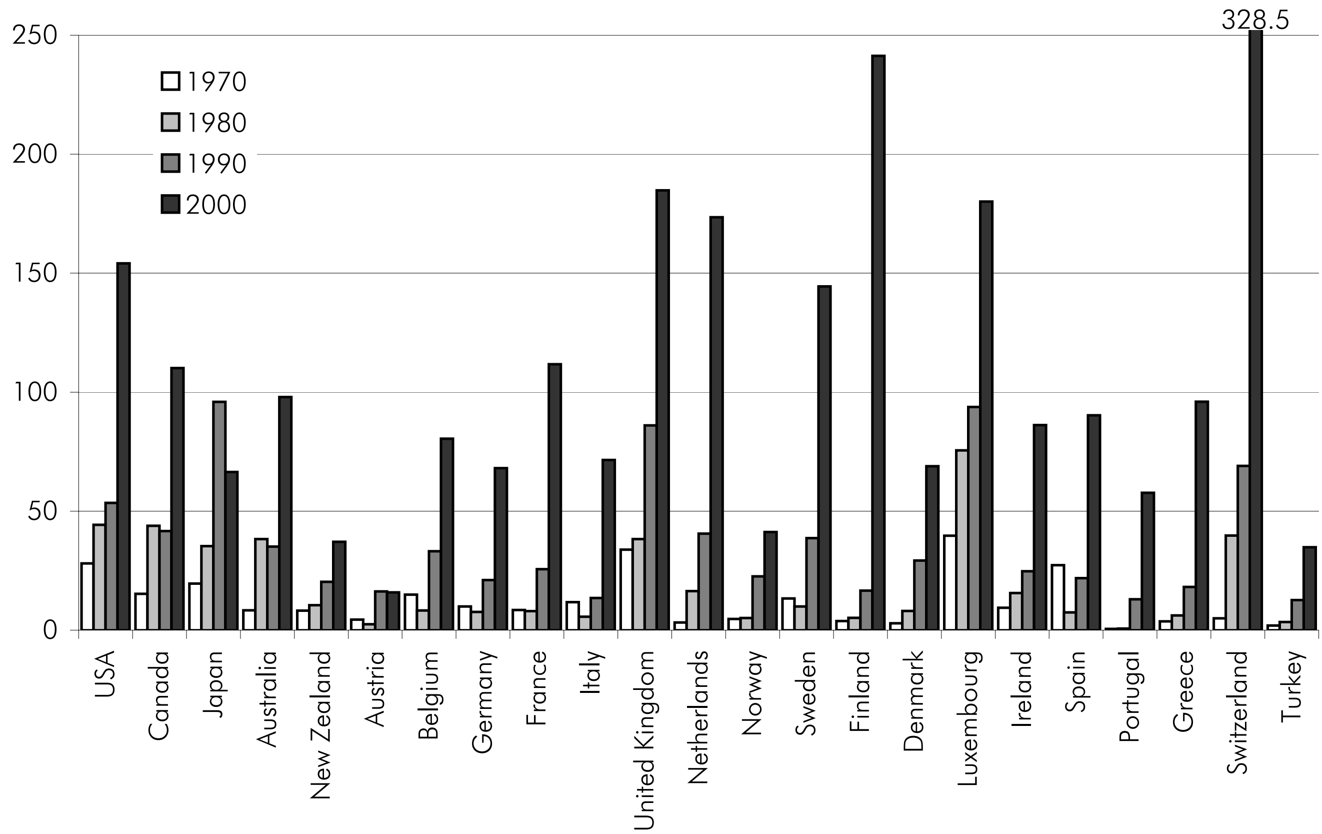
Initial Potential Output ... initial potential output per employee 1970, logarithm, *Capitalization* ... value of listed domestic shares on domestic exchanges, divided by gross domestic product, *Value Traded* ... value of trade of domestic shares on domestic exchanges, divided by gross domestic product, *Turnover* ... Value Traded divided by Capitalization, *Credit* ... Stock of credit by commercial and deposit-taking banks to the private sector, divided by gross domestic product, *OPEN* ... openness, *GOV* ... Government consumption expenditures, divided by gross domestic product.

** ... significant at the 5% level, * ... significant at the 10% level; heteroskedasticity-consistent standard errors in parentheses.

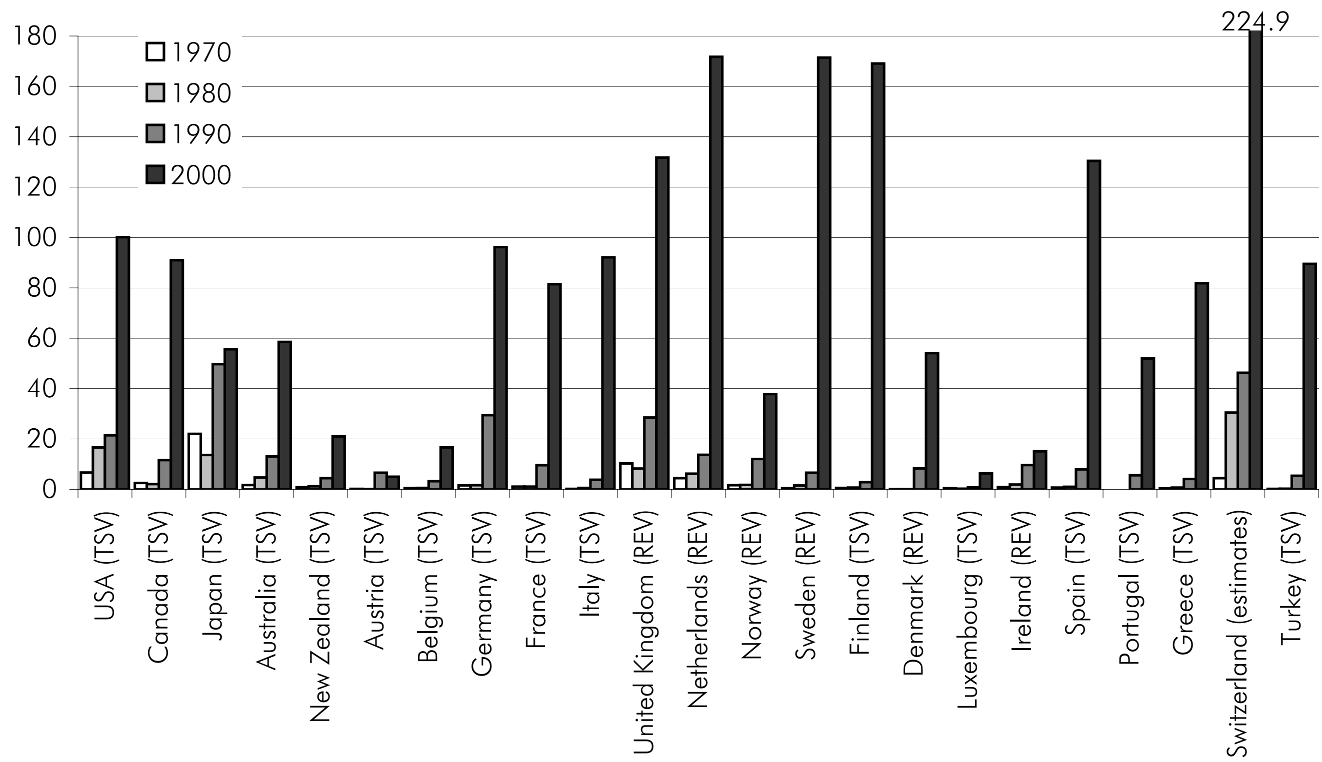
1) Excluding Switzerland.

Source: WIFO-OECD data set.

Capitalization as Percent of Gross Domestic Product



Value Traded as Percent of Gross Domestic Product



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