Gerhard Fink and Peter Haiss and Hans Christian Mantler

The finance-growth nexus. Market economies vs. transition countries.

Working Paper

EUROPAINSTITUT
WIRTSCHAFTSUNIVERSITÄT WIEN

EUROPAINSTITUT
UNIVERSITY OF ECONOMICS AND
BUSINESS ADMINISTRATION VIENNA

Working Papers

EI Working Paper Nr. 64

GERHARD FINK, PETER HAISS,
HANS CHRISTIAN MANTLER

The Finance-Growth Nexus:
Market Economies vs. Transition Countries

February 2005

Download: http://fgr.wu-wien.ac.at/institut/ef/publicat.html

Althanstraße 39 - 45, A - 1090 Wien / Vienna
Österreich / Austria
Tel.: ++43 / 1 / 31336 / 4135, 4134, 4133
Fax.: ++43 / 1 / 31336 / 758, 756
e-mail: europafragen2@wu-wien.ac.at
http://fgr.wu-wien.ac.at/institut/ef/home01en.html

Impressum:

Die EI Working Papers sind Diskussionspapiere von MitarbeiterInnen und Gästen des Europainstitutes an der Wirtschaftsuniversität Wien, die dazu dienen sollen, neue Forschungsergebnisse im Fachkreis zur Diskussion zu stellen. Die Working Papers geben nicht notwendigerweise die offizielle Meinung des Instituts wieder. Sie sind gegen einen Unkostenbeitrag von € 7,20 am Institut erhältlich. Kommentare sind an die jeweiligen AutorInnen zu richten.

Medieninhaber, Eigentümer Herausgeber und Verleger: Europainstitut der Wirtschaftsuniversität Wien, Althanstraße 39—45, A—1090 Wien; Für den Inhalt verantwortlich: Univ.-Prof. Dr. Stefan Griller, Althanstraße 39—45, A—1090 Wien.

The Finance-Growth Nexus: Market Economies vs. Transition Countries

Gerhard Fink, Peter Haiss, Hans Christian Mantler[1]

Abstract

Applying a growth accounting framework and a wide range of static and dynamic panel data estimators on a panel covering 22 market economies and 11 transition countries over 1990-2001, we find a weak and fragile finance–growth link in market economies, but strong financial sector-induced short-run growth effects in transition countries. The main growth effect hereby runs via the productivity channel. Parametric heterogeneity and financial structure seem to play a more important role than hitherto assumed: The financial sector and its different segments trigger different growth effects in different countries.

Keywords: financial sector, economic growth, transition economies, market economies
JEL classification: G-10, G-21, O-11, O-16

Finance-growth nexus homepage: http://fgr.wu-wien.ac.at/institut/ef/nexus.html

[1] Gerhard Fink is Jean-Monet Professor at the Europainstitut, Vienna University of Economics and Business Administration; Peter Haiss lectures at the Europainstitut, Vienna University of Economics and Business Administration and is with Bank Austria Creditanstalt; Hans Christian Mantler is research fellow at the Europainstitut, Vienna University of Economics and Business Administration. The authors gratefully acknowledge the support granted by the Jubiläumsfonds of the Oesterreichische Nationalbank (project no. 8868). The opinions expressed are the authors' personal views and not necessarily those of the institutions the authors are affiliated with.

1. Introduction

The role of the financial sector for economic growth became a major topic of empirical research in the last decade (Fink et al. 2004a). An impressive number of studies comes to the conclusion that there is a positive link running from the financial sector to economic growth (e.g. Beck and Levine 2002a and 2001, Benhabib and Spiegel 2000, Beck et al. 2000b, Levine and Zervos 1998). Deidda and Fattouh (2001) and Ram (1999) criticise that there may be huge parametric heterogeneity across countries in the large cross-country panels used in most of these studies. "Thus due to country aggregation we cannot answer interesting questions such as: how do the effects of banking development in a country such as the United States differ from those in Zimbabwe, say?" (Ahmed 1998).

Taking up this critique, the main contribution of this paper is to comprehensively assess the finance-growth nexus in and the difference of the finance-growth nexus between market economies and transition countries. Hereby this paper focuses on four questions: (1) Is the nexus between overall financial sector development and growth the same across market economies and transition countries? (2) How strong is the nexus in market economies and transition countries and what transmission channel does it work through? (3) Does the financial sector induce long run or short run growth effects? (4) Does financial structure matter, i.e. do different financial segments as the bank sector, stock markets or bond markets affect growth differently?

Up to now the vast majority of empirical research (e.g. Beck and Levine 2002a and 2001, Kahn and Senhadji 2000, Levine and Zervos 1998, King and Levine 1993a and 1993b) relied on so-called 'Barro regressions' following Barro (1991). Typically, national growth rates are regressed on a wide range of variables. Such regressions are not derived explicitly from a production function, but instead include a more or less ad hoc list of plausible explanatory variables.

Our paper uses as theoretical framework a growth accounting approach based on the Cobb-Douglas production function.[2] This enables us to compare the contributions of different inputs to the growth process and to analyse the channel through which the financial sector triggers economic growth (productivity channel vs. factor accumulation channel).

Empirical estimation is based on a panel including 33 countries (22 market economies, 11 transition countries) and up to 12 annual observations (1990-2001 period). Applying a wide range of static and dynamic estimation methods, we find that financial sector development exerts a positive and

[2] Up to now growth accounting was hardly used in our field of research. To our knowledge the only exemptions are Evans et al. (2002), Benhabib and Spiegel (2000) and Fink et al. (2004b).

exogenous impact on economic growth. The strength of this impact, however, differs between and within market economies and transition countries. Whereas the finance-growth link seems to be weaker in market economies, the financial sector induces strong growth effects in the majority of transition countries. The main growth impact runs via the productivity channel. Short run growth effects are triggered. Financial structure seems to play a more important role than hitherto assumed.

The remainder of the paper is organised as follows: Section two reviews empirical literature on the link between the financial sector and economic growth. Subsequently, in section three, data for the own empirical estimation are presented and section four presents the theoretical framework. Sections five to eight are devoted to the empirical examination of the research questions. A concluding section summarises findings.

2. Review of empirical evidence on the finance-growth nexus[3]

This section discusses findings of previous empirical literature. First, we present evidence on the link between financial sector development and growth. Subsequently we dwell on evidence on the link between financial sector structure and growth.[4]

2.1. Financial sector development and growth

Empirical studies relying on *large country samples*[5] mainly extend on the seminal and inspiring articles of King and Levine (1993a, 1993b). Using cross-section methodology, Levine and Zervos (1998) find that bank sector development and stock market development is positively correlated with contemporaneous and future rates of economic growth, productivity growth and capital accumulation. As those results from pure cross-section studies may be subject to endogeneity problems, Beck et al. (2000b) re-examine these findings using panel data techniques. Results confirm the positive effect of bank sector development on economic growth and productivity growth, but show ambiguous effects on capital accumulation. Evidence found by Benhabib and Spiegel (2000) points into the same direction. Evans et al. (2002) estimate a translog production function augmented with human capital and bank sector variables. They find human capital and the bank sector to be complements suggesting that the productivity enhancing potential of human capital can just be exploited in the presence of a developed bank system. Beck and Levine (2001, 2002a) complement findings by estimating the effect of both, bank sector and stock market development using panel data techniques. The bank sector and stock market have an independent, significant and positive effect on economic growth. Kahn and Senhadji (2000) construct a comprehensive financial sector development indicator comprising the bank sector, stock markets and also bond markets. Again the positive finance-growth link is confirmed.

As we see, an impressive number of empirical studies relying on large country samples show that financial sector development has an economically important impact on growth. The main effect runs via the productivity channel. Results for the capital accumulation channel are mixed. Table 1 gives an overview of studies relying on large country samples.

Deidda and Fattouh (2001) as well as Ram (1999) point out that in the large cross-country panels used in most studies, there may be huge parametric heterogeneity across countries. Results on the

[3] This section strongly profits from Fink et al. (2004a)

[4] For the sake of brevity this section can just discuss selected empirical results with respect to our article. For comprehensive literature reviews see also Fink et al. (2004a, c and d), Berrer et al (2004), Mooslechner (2003), Stockhammer (2003), Blum et al. (2002), Thiel (2001) La Porta et al. (1998) or Levine (1997).

[5] As large country samples we denote broad samples including countries of all development levels.

basis of full-sample estimates do not necessarily hold for subgroups of countries. Therefore a growing number of researchers focus their analysis on more homogenous country groups, for example by distinguishing between market economies and transition countries. We discuss these studies subsequently.

Based on a panel of 21 industrialised *market economies* Andres et al. (1999) find no significant evidence that the development of the bank sector and the stock market is positively related to economic growth. In contrast, Bassanini et al. (2001) find evidence that there is a positive link mainly between the stock market and economic growth. To assess the effect on factor accumulation, they estimate investment equations. Again they find a positive and robust link between stock market development and investment. Leahy et al. (2001) confirm the investment-related results of Bassanini et al. (2001) using a broader range of estimation techniques. Hahn (2002a, 2002c) re-examines these results using alternative measures for stock market development that are less sensitive to price movements on stock markets. He finds mainly insignificant results for the relationship between stock market development and economic growth and concludes that the seemingly strong growth effect of stock markets in OECD countries is mainly due to the forward looking nature of stock prices and to a much lesser extent to a causal linkage. Fink and Haiss (1999) extend the analysis of the finance-growth link in market economies to bond markets. Results suggest a positive and significant relationship. Fink et al. (2004b) re-examine the bond-growth link using refined methodology, but fail to find a significant interrelation.

In a first attempt to assess growth implications of financial sector development in 10 Central and Eastern European *transition countries* Fink and Haiss (1999) find evidence on a positive impact of bank sector development. Stock markets and bond markets are not significantly related to growth. Jaffee and Levonian (1999) confirm the impact of the bank sector on economic growth using a broader sample of 23 transition economies. They find evidence that especially bank efficiency is significantly and positively related to economic output. Koivu (2002) further refines the picture by exploiting the time series component of a panel of 25 transition economies. Bank efficiency (measured by the net interest margin) shows a significantly positive and causal impact on growth. The results of Drakos (2002) point in the same direction: High bank market concentration is negatively associated with economic growth. Platek (2002) finds a significant and positive growth effect of stock markets. Fink and Haiss (1999), Kominek (2002) and Fink et al. (2004b) come to different conclusions for stock markets. A positive growth effect is attributed to the transition countries´ bond market by Fink et al (2004b).

Evidence from market economies and transition countries indicates that the finance-growth nexus indeed differs between country groups. Whereas in (mainly industrialised) market economies financial sector development seems to play no role for economic growth, there seems to be a strong link between especially the bank sector and growth in transition countries. Results for the role of stock markets and bond markets in transition countries are mixed. Empirical literature, however, does not explicitly test the difference/similarity in the finance-growth link between country groups at different stages of economic development. Table 2 and Table 3 give an overview of studies focusing on market economies and transition countries.

TABLE 1: EMPIRICAL EVIDENCE ON FINANCIAL SECTOR DEVELOPMENT AND GROWTH – LARGE COUNTRY SAMPLES

	Author (year)	Sample	Theoretical framework	Research method	Financial segments included	Growth effect OE	TC	FAC	Key findings
LARGE COUNTRY SAMPLES	King and Levine (1993a)	80 countries of all development levels	"Barro"-regression	cross-section analysis	bank sector	+	+	+	Bank sector development is strongly assiociated with economic growth, the growth rate of physical capital and technology growth.
	King and Levine (1993b)	80 countries of all development levels	"Barro"-regression	panel analysis	bank sector	+	+	+	Bank sector development is positively and significantly related to economic growth, the growth rate of physical capital and technology growth.
	Levine and Zervos (1998)	47 countries of all development levels	"Barro"-regression	cross-section analysis	bank sector	+	+	+	After controlling for many factors associated with growth, bank sector development and stock market development are both positively and robustly correlated with contemporaneous and future rates of economic growth, capital accumulation and productivity growth.
					stock market	+	+	+	
	Ram (1999)	93 countries of all development levels	"Barro"-regression	cross-section analysis	bank sector	**0**/-			In cross-country data the regression structure is permitted to vary across three subgroups. A huge parametric heterogeneity is observed and the overall indication is that of a negligible or negative association between financial development and growth
	Beck et al. (2000b)	77 countries of all development levels	"Barro"-regression	cross-section analysis and panel analysis	bank sector	+	+	**+/0**	We find significantly positive impact of financial development on real per capita growth and productivity per capita growth. This result is robust to the use of different estimation procedures, conditioning information sets, and indicators of financial development. The picture is more ambigous in regressions with physical capital.
	Benhabib and Spiegel (2000)	no details available	growth accounting regression and factor accumulation regression	panel analysis	bank sector		**+/0**	**+/0**	Results indicate that bank sector development positively influence economic growth. However the relationship is not robust to the use of different bank sector development indicators and and estimation techniques.
	Kahn and Senhadji (2000)	159 countries of all development levels	"Barro"-regression	cross-section analysis and panel analysis	bank sector, stock markt and bond market (aggregate indicator)	+			The results in this paper confirm the strong positive and statistically significant relationship between financial development and growth. This result is robust to different financial development indicators.
	Beck and Levine (2001)	40 countries of all development levels	"Barro"-regression	panel analysis	bank sector	+			Stock market development and bank development jointly enter all of the growth regressions significantly using alterantive conditioning information sets and alternative panel data estimators. Thus, after controlling for country specific effects and potential endogeneity, the data are consistent with theories that emphasize an important positive role for financial development in the process of economic growth.
					stock market	+			
	Deidda and Fattouh (2001)	119 countries of all development levels	"Barro"-regression	cross-section analysis	bank sector	**+/0**			For the whole sample there is a positive relationship between finacial development and economic growth. Examining sub-groups of the sample the positive relationship between the level of financial development and economic holds only for countries with high initial income per capita. In countries with low income per capita, there is no significant relationship between financial development and economic growth.
	Beck and Levine (2002a)	40 countries of all development levels	"Barro"-regression	panel analysis	bank sector	+			Stock markets and banks are important for economic growth. Bank and stock market development always enters jointly significant in a the regressions. These findings suggest that both, banks and stock markets are important for growth
					stock market	+			
	Evans et al. (2002)	80 countries of all development levels	growth accounting regression	panel analysis	bank sector	+			Bank sector development makes a significant contribution to economic growth. Bank sector development and human capital are complements in the growth process suggesting that the productivity enhancing potential of human capital can just be exploited in the presence of a developed bank sector.

NOTES: "Barro"- regression = specification following Barro (1991), MRW regression = specification following Mankiw et al. (1992), growth accounting regression = specification following Benhabib and Spiegel (1994), factor accumulation regression = various explaining variables are regressed on a factor accumulation term; OE = overall growth effect , TC = growth effect running via the technology channel, FAC = growth effect running via the factor accumulation channel; + denotes a significant and positive relationship, **0** denotes an ambigous or insignificant relationship, - denotes a significant and negative relationship.

TABLE 2: EMPIRICAL EVIDENCE ON FINANCIAL SECTOR DEVELOPMENT AND GROWTH – MARKET ECONOMIES

	Author (year)	Sample	Theoretical framework	Research method	Financial segments included	Growth effect OE	TC	FAC	Key findings
MARKET ECONOMIES	Fink and Haiss (1999)	17 market economies	production function style regression	cross-section analysis	bank sector	**0**			Significant and positiv link between bond markets and economic growth.
					stock market	**0**			
					bond market	+			
	Andres et al. (1999)	21 OECD countries	MRW regression	panel analysis	bank sector		**0**/-		The link between proxis of financial sector development and growth is found to be weak, vanishing when country-dummies are included and ebdogeneity is accounted for using instrumental variables.
					stock market		+/**0**		
	Bassanini et al. (2001)	21 OECD countries	MRW regression and factor accumulation regression	panel analysis	bank sector		**0**	+/**0**	Results point to a robust long-run link between between stock markets development and growth, while that between bank development and growth proves to be ambigous.
					stock market		+	+	
	Leahy et al. (2001)	19 OECD countries	factor accumulation regression	panel analysis	bank sector			+/**0**	Using dynamic panel regresion techniques, the study finds a significant, positive and robust relationship between stock market development and investment. Results for the bank sector are ambigous.
					stock market			+	
	Hahn (2002a)	23 OECD countries	factor accumulation regression	panel analysis	bank sector			+/**0**	We get results indicating that the seemingly strong relationship between stock market development and long-run growth in OECD countries is mainly due to the forward-looking nature of stock markets and to a much lesser extent due to a causal linkage.
					stock market			**0**	
	Hahn (2002c)	23 OECD countries	"Barro"-regression and factor accumulation regression	panel analysis	bank sector	+/**0**		+/**0**	We get results indicating that the seemingly strong relationship between stock market development and long-run growth in OECD countries is mainly due to the forward-looking nature of stock markets and to a much lesser extent due to a causal linkage.
					stock market	**0**		**0**	
	Fink et al. (2004b)	18 market economies	growth accounting regression	cross-section analysis and panel analysis	bank sector, stock markt and bond market (aggregate indicator)		**0**/-		Results indicate that the development of the financial sector plays a minor role for economic growth in market economies.
					bank sector		**0**/-		
					stock market		**0**		
					bond market		**0**		

NOTES: "Barro"- regression = specification following Barro (1991), MRW regression = specification following Mankiw et al. (1992), growth accounting regression = specification following Benhabib and Spiegel (1994), factor accumulation regression = various explaining variables are regressed on a factor accumulation term, production function style regression of Fink and Haiss (1999) is based on a neoclassical Production function substitution physical capital for financial capital ;OE = overall growth effect , TC = growth effect running via the technology channel, FAC = growth effect running via the factor accumulation channel; + denotes a significant and positive relationship, **0** denotes an ambigous or insignificant relationship, - denotes a significant and negative relationship.

TABLE 3: EMPIRICAL EVIDENCE ON FINANCIAL SECTOR DEVELOPMENT AND GROWTH – TRANSITION COUNTRIES

	Author (year)	Sample	Theoretical framework	Research method	Financial segments included	Growth effect OE	TC	FAC	Key findings
TRANSITION ECONOMIES	Fink and Haiss (1999)	10 transition countries	production function style regression	cross-section analysis	bank sector	+			Positive link between bank sector development and economic growth.
					stock market	**0**			
					bond market	**0**			
	Jaffee and Levonian (2001)	23 transition economies	"Barro"-regression	cross-section analysis	bank sector	+			Significant positive relationship between bank sector development, bank sector reforms and economic growth.
	Koivu (2002)	25 transition economies	"Barro"-regression	panel analysis	bank sector	+			Results indicate that the interest rate margin is significantly and negatively related to economic growth. On the other hand a rise in the amount of credit does not seem to accelerate economic growth.
	Drakos (2002)	21 transition economies	"Barro"-regression	cross-section analysis and panel analysis	bank sector	+			A positive effect of banking sector competition on economic growth is documented. The lower the imperfections in market structure the higher is real GDP growth.
	Platek (2002)	26 transition economies	"Barro"-regression	cross-section analysis	bank sector	+			Bank sector development and stock market development is significantly and positively correlated with economic growth
					stock market	+			
	Fink et al. (2004b)	9 transition economies	growth accounting regression	cross-section analysis and panel analysis	bank sector, stock markt and bond market (aggregate indicator)		+		Bank sector development and bond markets stimulate growth in transition countries. Up to now stock markets seem not to have played an important role.
					bank sector		+/**0**		
					stock market		**0**		
					bond market		+		

NOTES: "Barro"- regression = specification following Barro (1991), MRW regression = specification following Mankiw et al. (1992), growth accounting regression = specification following Benhabib and Spiegel (1994), production function style regression of Fink and Haiss (1999) is based on a neoclassical Production function substitution physical capital for financial capital ;OE = overall growth effect , TC = growth effect running via the technology channel, FAC = growth effect running via the factor accumulation channel; + denotes a significant and positive relationship, **0** denotes an ambigous or insignificant relationship, - denotes a significant and negative relationship.

2.2. Bank- vs. securities-based financial structure and economic growth

In a first attempt to test the hypothesis that financial structure matters for growth Beck et al. (2000a) and Levine (2002) apply cross-country methodology to *large country samples*. They apply a variety of aggregate indicators that reflect overall financial sector development and structure indicators that compare the development of the bank sector and stock markets. Both studies find that the degree to which financial structure is bank-based or securities-based is not associated with economic growth, while overall financial development is clearly associated with economic growth. Platek (2002) re-examines results focusing exclusively on *transition countries*. Again empirical results suggest that financial structure does not affect economic growth.

Altogether evidence from studies focusing on the growth impact of financial structure indicate that financial structure is not interrelated with economic growth.

TABLE 4: EMPIRICAL EVIDENCE ON FINANCIAL SECTOR STRUCTURE AND GROWTH

	Author (year)	Sample	Theoretical framework	Research method	Financial segments included	Growth effect OE	TC	FAC	Key findings
LARGE COUNTRY SAMPLES	Beck et al. (2000a)	38 countries of development levels	"Barro"-regression	cross-section analysis	bank sector vs. stock market	**0**			Financial structure, i.e. the extent to which the financial sector is bank-based or market-based does not offer an explaination for growth differences across countries.
	Levine (2002)	48 countries of development levels	"Barro"-regression	cross-section analysis	bank sector vs. stock market	**0**			While overall financial development is closely associated with economic growth, the degree to which financial structure is bank-basd or market-based is not associated with economic growth.
TRANSITION ECONOMIES	Platek (2002)	26 transition economies	"Barro"-regression	cross-section analysis	bank sector vs. stock market	**0**			Empirical results for transition countries suggest that their financial structure, i.e. the relative development of banks versus stock markets, does not affect economic growth. What is essential for the economy as a whole is the overall financial development.

NOTES: "Barro"- regression = specification following Barro (1991), MRW regression = specification following Mankiw et al. (1992), growth accounting regression = specification following Benhabib and Spiegel (1994); OE = overall growth effect , TC = growth effect running via the technology channel, FAC = growth effect running via the factor accumulation channel; + denotes a significant and positive relationship, **0** denotes an ambigous or insignificant relationship, - denotes a significant and negative relationship.

3. Measurement of financial sector development and sample coverage

To assess the finance-growth nexus in and the difference of the finance-growth nexus between market economies and transition countries we first need a comprehensive empirical indicator for the development of the financial sector. In contrast to most empirical studies our indicator not only considers the banking sector and stock markets, but also bond markets. Up to now only Kahn and Senhadji (2000), Fink and Haiss (1999) and Fink et al (2004b) used such a comprehensive measure when analysing the finance-growth nexus.[6]

Our comprehensive indicator of financial sector development (*Total Financial Assets*) is formed by adding up the following individual measures of bank sector, stock market and bond market development:[7]

(1) *Bank Credit (BNK)* – Following King and Levine (1993a), Levine et al. (2000) and others we use the value of domestic claims of banking institutions divided by GDP as an indicator for the development of the bank sector. In transition economies one has to consider the share of non-performing loans that inflate *Bank Credit* for some countries and – once removed from the banks into governmental consolidation agencies – distort time series every time such a consolidation occurs, as was the case in Slovakia (1999, 2000), Romania (2000) and the Czech Republic (2001). This fact is taken into account by deducting the amount of bad loans from *Bank Credit*.

(2) *Stock Market Capitalisation (STK)* – This measure equals the value of listed domestic stocks on domestic exchanges divided by GDP. Although large markets do not necessarily function effectively many researchers use *Stock Market Capitalisation* as an indicator of stock market development (e.g. Demirgüc-Kunt and Maksimovic 1998, Levine and Zervos 1998). The use of *Stock Market Capitalisation* may be criticised as it contains a quantity as well as a price component. These two components, however, are closely linked as Thiel (2001) states: "[...] nominal stock market capitalisation is closely related to the issuance of new capital on the stock markets in most economies [...] thereby suggesting that the former could be a useful proxy despite the impact of changes on the prices of shares".

[6] The few other research considering bond markets in the analysis of economic growth dealt with financial crisis situations rather than the whole business cycle (Herring and Chatusripitak 2000, Batten and Kim 2000) or linked GDP growth to the term structure on interest rates in order to forecast recessions (Harvey 1989 and 1991, Gamber 1996, Gerlach and Smeths 1997, Ahrens 2002). Eichengreen and Luengnaruemitchai (2004) analyze the impact of various real and financial sector variables on bond markets.

[7] More detailed definition and sources of data can be found in the appendix.

(3) *Bonds Outstanding (BND)* – As an indicator for the development of bond markets we use the value of outstanding debt securities divided by GDP.

Our sample includes 33 countries (22 market economies[8] and 11 transition countries) and annual observations from 1990 up to 2001. Available time series are considerably shorter for most transition countries as the data situation is rather unsatisfactory for the early 90ies. Countries and sample periods covered by the panel are listed in Table 5.

TABLE 5: COUNTRY COVERAGE AND SAMPLE PERIODS

	Country	Observation period	Country	Observation period
MARKET ECONOMIES			TRANSITION ECONOMIES	
European Union 15	Austria	1990 - 2001	Bulgaria	1996 - 2001
	Belgium	1990 - 2001	Croatia	1998 - 2001
	Denmark	1990 - 2001	Czech Republic	1995 - 2001
	Finland	1990 - 2001	Estonia	1996 - 2001
	France	1990 - 2001	Hungary	1995 - 2001
	Germany	1990 - 2001	Latvia	1995 - 2001
	Greece	1990 - 2001	Lithuania	1995 - 2001
	Ireland	1990 - 2001	Poland	1993 - 2001
	Italy	1990 - 2001	Romania	1995 - 2001
	Luxembourg	1990 - 2001	Slovak Republic	1995 - 2001
	Netherlands	1990 - 2001	Slovenia	1994 - 2001
	Portugal	1990 - 2001		
	Spain	1990 - 2001		
	Sweden	1990 - 2000		
	United Kingdom	1990 - 2001		
Others	Cyprus	1995 - 2001		
	Japan	1990 - 2001		
	Malta	1993 - 2001		
	Norway	1990 - 2001		
	Switzerland	1990 - 2001		
	Turkey	1990 - 2001		
	United States of America	1990 - 2001		

NOTES: Countries are divided into market economies (EU member countries plus seven other countries) and transition economies

Summary statistics for financial sector variables are presented in the appendix.

[8] With regard to the assignment of Turkey to the group of market economies in this study and with regard to the finance-growth nexus in Turkey see Ünalmis (2002).

4. Theoretical framework

The growth accounting model that provides the overall theoretical framework and estimating equation for this paper is derived from a Cobb-Douglas production function with constant returns to scale $Y = A \cdot K^{\beta} \cdot L^{1-\beta}$, which can be written in logarithmic intensive form as:

$$\ln(y_{it}) = A_{it} + \beta \cdot \ln(k_{it}) + \varepsilon_{it} \qquad (E\ 1)$$

where $y = Y / L =$ GDP per employee,[9] A represents the level of technology and $k = K / L =$ physical capital per employee. Capital stock data are obtained by using the perpetual inventory method. In calculating initial capital stocks we follow Easterly and Levine (2001). ε stands for the stochastic error term, *i* for the cross section index and t for the time index.

We assume that the technology level (A_{it}) is a function of the overall development of the financial sector (TFA_{it}) and some other country characteristics that are constant over time (μ_i):

$$A_{it} = \alpha_i \cdot TFA_{it} + \mu_i \qquad (E\ 2)$$

By substituting *E 2* in *E 1* we get the base specification of our empirical model:

$$\ln(y_{it}) = \alpha_i \cdot TFA_{it} + \beta \cdot \ln(k_{it}) + \mu_i + \varepsilon_{it} \qquad (E\ 3)$$

As this specification comprises factor accumulation, it is especially suited to estimate the growth effects of financial sector development that run via the productivity channel. As we are – at least in the initial step of our analysis – interested in the overall growth effect of the financial sector, we follow the recommendation of Temple (1999) and omit the factor accumulation term. Hence, the assessment of our first research question relies on a specification without factor accumulation.

5. Is the overall finance-growth nexus the same across countries?

The assumption that the overall finance-growth nexus is different across countries is reflected in the unrestricted model *E. 4*. It implies that α may vary freely across countries:

$$\ln(y_{it}) = \alpha_i \cdot TFA_{it} + \mu_i + \varepsilon_{it} \qquad (E\ 4)$$

Hereby *t* denotes the time index and *i* the country index.

[9] Other studies based on "Barro"-regressions (e.g. Beck and Levine 2002a and 2001, Kahn and Senhadji 2000, Levine and Zervos 1998, King and Levine 1993a and 1993b) typically use GDP per capita as independent variable. Within the growth accounting framework the use GDP per employee is justified theoretically. Additionally, GDP per capita would prove as unsatisfactory proxy for GDP per employee as labour participation rates and the age structure of a country's population vary substantially (Temple 1999, Heston and Summers 1996)

The assumption that the finance-growth nexus is the same across countries implies that $\alpha_i = \alpha$. The unrestricted model *E. 4* can be rewritten to the restricted model:

$$\ln(y_{it}) = \alpha \cdot TFA_{it} + \mu_i + \varepsilon_{it} \qquad (E\ 5)$$

Whether this restriction is valid can easily be tested using an extended version of the Chow-test (Chow 1960)[10]. It is tested whether the mean sum of squared residuals of the restricted model is significantly higher than the one of the unrestricted model. As indicated by previous empirical literature, the hypothesis of a uniform finance-growth nexus across countries is rejected at all significance levels (Table 6 line *b*).

TABLE 6: TESTS OF PARAMETER HOMOGENEITY ACROSS COUNTRIES

Model		Residual Sum of Squares	Chow test (F-Stats)	Probability	Result
Unrestricted model					
(a)	Heterogenous intercept and slope (*E 4*)	264	--	--	--
Restricted models					
(b)	Heterogenous intercept and homogenous slope (*E 5*)	1,440	36.76	0.0000 ***	REJECT EQUALITY
(c)	Heterogenous intercept and homogenous slope for market and transition economies (*E 6*)	919	21.12	0.0000 ***	REJECT EQUALITY

NOTES: Significance codes: *** = 0.01; ** = 0.05; *=0.1. F-statistics test the null hypothesis of equivalence of the unrestricted model and the restricted models. In order to avoid cross section heteroskedasticity bias of F-statistics WLS is employed. Cross section weights are based on single equation standard errors of the unrestricted model ; 33 cross sections and 330 observations included.

Let's therefore turn to a softer restriction. The assumption that the link between the financial sector and economic growth differs between market economies and transition countries is reflected in *E.6*:

$$\ln(y_{it}) = \alpha_1 \cdot \delta_{ME} \cdot TFA_{it} + \alpha_2 \cdot \delta_{TE} \cdot TFA_{it} + \mu_i + \varepsilon_{it} \qquad (E\ 6)$$

Hereby δ_{ME} represents a dummy variable for market economies, δ_{TE} one for transition countries. Although the softer restriction (*E. 6)* drastically reduces the residual sum of squares in comparison to *E.5*, the Chow-test still rejects the equality with the unrestricted model at a high significance level (Table 6 line *c*). This leads us to the conclusion that the financial sector has also different growth implications within the group of market economies and the group of transition countries.

[10] As Baltagi (2001: 53) points out the test results of straight Chow-tests may be biased in the presence of cross-section heteroskedasticity. We therefore applied WLS estimation techniques. Cross-section weights are calculated from the standard errors of single equation estimates of the unrestricted model.

To find out whether there are any groups of market economies or transition countries that exhibit a similar finance-growth nexus and hence can be grouped together we proceed as follows: We use the estimation results of the unrestricted model E. 4[11] and sort market economies and transition countries by the size of the point estimates of α. For each pair of market economies and each pair of transition countries we calculate t-statistics that evaluate whether the point estimates of α differ significantly between those countries.[12] Results for market economies are shown in Table 7. Those for transition countries in Table 8.

[11] Detailed estimation results are shown in the appendix.

[12] It is tested whether the difference between the point estimates of a pair of countries (e.g. $\alpha_2 - \alpha_1 = 0$) equals zero. The standard error of the difference of two coefficients $\sqrt{Var(\alpha_2) - 2 \cdot Cov(\alpha_2, \alpha_1) + Var(\alpha_1)}$.

TABLE 7: MARKET ECONOMIES – SINGLE COUNTRY ESTIMATES, TEST OF EQUALITY OF SINGLE COUNTRY ESTIMATES

	Country	Estimate for Total Financial Assets	T-test of equality of single country estimates																				
			GROUP 1						GROUP 2										GROUP 3				
			Norway	Belgium	Austria	Ireland	Italy	Sweden	Portugal	Turkey	Denmark	United Kingdom	Malta	Germany	France	Finland	Greece	United States	Japan	Spain	Cyprus	Luxem-bourg	Switzer-land	Nether-lands
GROUP 1	Norway	0.369																					
	Belgium	0.252	-1.048																				
	Austria	0.217	-1.529	-0.543																			
	Ireland	0.213	-1.6280	-0.670	-0.165																		
	Italy	0.201	-1.743 *	-0.858	-0.538	-0.627																	
	Sweden	0.192	-1.804 *	-0.965	-0.713	-0.777	-0.349																
GROUP 2	Portugal	0.136	-2.406 **	-1.923 *	-2.511 **	-3.508 ***	-2.923 ***	-1.877 *															
	Turkey	0.133	-2.332 **	-1.775 *	-1.940 *	-2.195 **	-1.867 *	-1.414	-0.066														
	Denmark	0.125	-2.503 **	-2.069 **	-2.692 ***	-3.565 ***	-3.050 ***	-2.101 **	-0.393	-0.211													
	United Kingdom	0.111	-2.691 ***	-2.400 **	-3.658 ***	-6.238 ***	-5.314 ***	-3.099 ***	-1.164	-0.617	-0.566												
	Malta	0.106	-2.706 ***	-2.399 **	-3.368 ***	-4.709 ***	-4.116 ***	-2.815 ***	-1.119	-0.689	-0.642	-0.221											
	Germany	0.099	-2.827 ***	-2.628 ***	-4.214 ***	-7.830 ***	-6.690 ***	-3.716 ***	-1.857 *	-0.979	-1.128	-0.918	-0.358										
	France	0.096	-2.849 ***	-2.662 ***	-4.240 ***	-7.587 ***	-6.532 ***	-3.747 ***	-1.927 *	-1.041	-1.212	-1.040	-0.468	-0.210									
	Finland	0.095	-2.775 ***	-2.479 ***	-3.259 ***	-4.074 ***	-3.633 ***	-2.743 ***	-1.280	-0.890	-0.880	-0.573	-0.352	-0.148	-0.054									
	Greece	0.091	-2.781 ***	-2.469 ***	-3.112 ***	-3.716 ***	-3.334 ***	-2.616 ***	-1.262	-0.922	-0.905	-0.623	-0.426	-0.252	-0.169	-0.096								
	United States	0.090	-2.918 ***	-2.774 ***	-4.478 ***	-8.082 ***	-6.991 ***	-4.013 ***	-2.255 **	-1.226	-1.495	-1.514	-0.778	-0.757	-0.503	-0.179	-0.035							
	Japan	0.087	-2.931 ***	-2.785 ***	-4.361 ***	-7.131 ***	-6.255 ***	-3.884 ***	-2.180 **	-1.258	-1.497	-1.431	-0.827	-0.775	-0.574	-0.256	-0.109	-0.160						
GROUP 3	Spain	0.044	-3.221 ***	-3.123 ***	-4.058 ***	-4.778 ***	-4.416 ***	-3.626 ***	-2.423 **	-1.872 *	-2.041 **	-1.923 *	-1.627	-1.610	-1.519	-1.200	-1.042	-1.333	-1.221					
	Cyprus	0.039	-3.407 ***	-3.528 ***	-5.539 ***	-8.127 ***	-7.410 ***	-5.176 ***	-3.825 ***	-2.453 **	-3.091 ***	-3.507 ***	-2.601 **	-3.122 ***	-2.896 **	-1.770 *	-1.481	-2.583 **	-2.242 **	-0.137				
	Luxembourg	0.033	-3.470 ***	-3.629 ***	-5.728 ***	-8.413 ***	-7.689 ***	-5.383 ***	-4.067 ***	-2.612 **	-3.312 ***	-3.805 ***	-2.837 ***	-3.440 ***	-3.205 **	-1.964 *	-1.655 *	-2.894 ***	-2.526 **	-0.300	-0.247			
	Switzerland	0.028	-3.579 ***	-3.872 ***	-6.951 ***	-14.510 ***	-12.731 ***	-6.824 ***	-5.813 ***	-3.069 ***	-4.453 ***	-7.378 ***	-4.058 ***	-8.316 ***	-6.959 **	-2.533 **	-2.064 **	-6.443 ***	-4.560 ***	-0.490	-0.627	-0.285		
	Netherlands	0.024	-3.624 ***	-3.949 ***	-7.143 ***	-15.217 ***	-13.328 ***	-7.048 ***	-6.111 ***	-3.202 ***	-4.686 ***	-8.005 ***	-4.321 ***	-9.332 ***	-7.709 **	-2.707 **	-2.211 **	-7.196 ***	-5.000 ***	-0.618	-0.874	-0.527	-1.056	

NOTES: Significance codes: *** = 0.01; ** = 0.05; *=0.1. T-statistics based on heteroskedasticity robust standard errors in italic letters. T-statistics test the null hypothesis of the equivalence of two single country estimates presented on the left. Total Financial Assets = sum of Bank Credit, Stock Market Capitalisation and Bonds Outstanding; Output = real GDP per employee ; Capital Stock = real capital stock per employee. Model estimated using EViews 4.1.

TABLE 8: TRANSITION ECONOMIES – SINGLE COUNTRY ESTIMATES, TEST OF EQUALITY OF SINGLE COUNTRY ESTIMATES

	Country	Estimate for Total Financial	T-test of equality of single country estimates										
			GROUP 4			GROUP 5					GROUP 6		
			Poland	Latvia	Lithuania	Slovakia	Estonia	Croatia	Slovenia	Czech Republic	Bulgaria	Hungary	Romania
GROUP 4	Poland	1.195											
	Latvia	1.056	-0.607										
	Lithuania	0.997	-0.664	-0.268									
GROUP 5	Slovakia	0.650	-1.379	-1.193	0.891								
	Estonia	0.570	-2.249 **	-2.536 **	-1.653 *	-0.211							
	Croatia	0.492	-3.221 ***	-6.653 ***	-2.428 **	-0.474	-0.441						
	Slovenia	0.428	-3.548 ***	-7.914 ***	-2.764 ***	-0.669	-0.811	-1.654 *					
	Czech Republic	0.254	-1.977 **	-1.859 *	-1.577	-0.735	-0.689	-0.558	-0.409				
GROUP 6	Bulgaria	-0.075	-5.842 ***	-13.771 ***	-5.174 ***	-2.176 **	-3.638 ***	-12.876 ***	-15.536 ***	-0.773			
	Hungary	-0.195	-5.910 ***	-10.282 ***	-5.279 ***	-2.449 **	-3.849 ***	-6.867 ***	-6.522 ***	-1.032	-1.229		
	Romania	-0.206	-4.340 ***	-5.000 ***	-3.807 ***	-2.089 **	-2.611 **	-2.874 ***	-2.630 ***	-0.943	-0.543	-0.044	

NOTES: Significance codes: *** = 0.01; ** = 0.05; *=0.1. T-statistics based on heteroskedasticity robust standard errors in italic letters . T-statistics test the null hypothesis of the equivalence of two single country estimates presented on the left. Total Financial Assets = sum of Bank Credit, Stock Market Capitalisation and Bonds Outstanding, Output = real GDP per employee , Capital Stock = real capital stock per employee. Model estimated using EViews 4.1.

The respective market economies and transition countries are listed on the left hand side of Table 7 and Table 8 together with the corresponding point estimates of α. On the right hand side a matrix presents t-statistics for the difference of point estimates for all country pairs. Dashed black lines border those country pairs, that exhibit no significant difference in the point estimates of α. As can easily be seen this explorative method yields three groups of countries in the case of market economies (ME) that show a similar nexus between the financial sector and economic growth:

- *Group ME-1* – Norway, Belgium, Austria, Ireland, Italy and Sweden
- *Group ME-2* – Portugal, Turkey, Denmark, United Kingdom, Malta, Germany, France, Finland, Greece, United States and Japan
- *Group ME-3* – Spain, Cyprus, Luxembourg, Switzerland and Netherlands

And three groups of countries in the case of transformation economies (TE).

- *Group TE-1* – Poland, Latvia and Lithuania
- *Group TE-2* – Slovakia, Estonia, Croatia, Slovenia and Czech Republic
- *Group TE-3* – Bulgaria, Hungary and Romania

Some countries (Spain, Czech Republic and Slovakia), however, cannot clearly be assigned to the one or the other country group. This is indicated by a divergence of the dashed black line and the solid black line. The solid black line hereby borders these areas of t-statistics that would exhibit insignificant results in the case of a clear classification. Let us take Spain (see Table 7) as an example for such a borderline case. It could either be assigned to group ME-2 or group ME-3. In

such an event we assigned a country to the one group that exhibits lower t-statistics for the parameter difference between countries. Hence Spain was assigned to group ME-3.[13]

The refined country split-up is reflected in the following specification and is tested against the unrestricted model *E 1*:

$$\ln(y_{it}) = \alpha_1 \cdot \delta_{ME-1} \cdot TFA_{it} + \alpha_2 \cdot \delta_{ME-2} \cdot TFA_{it} + \alpha_3 \cdot \delta_{ME-3} \cdot TFA_{it} + \\ + \alpha_4 \cdot \delta_{TE-1} \cdot TFA_{it} + \alpha_5 \cdot \delta_{TE-2} \cdot TFA_{it} + \alpha_6 \cdot \delta_{TE-3} \cdot TFA_{it} + \mu_i + \varepsilon_{it} \qquad (E\ 7)$$

The hypotheses of the equality of *E 1* and *E 7* is not rejected by the Chow-test at any significance level (Residual sum of squares: 279, Chow-test F-stats: 0.56, p-value: 0.9630).

We conclude that although the finance-growth nexus differs between and within the group of market economies and transition countries, sub-groups exhibit a similar nexus. Hence, these sub-groups may be pooled in empirical estimation without blurring results.

6. How strong is the finance-growth nexus and what transmission channel does it work through?

The estimation of the overall strength of the finance-growth nexus in different country groups is based on *E 7*. To assess the growth effect of the financial sector that runs through the productivity channel we add factor accumulation to *E 7*. We expect the parameters of the financial sector development variables ($\alpha_1,...,\alpha_6$) to decrease. The specification with factor accumulation can be written as:

$$\ln(y_{it}) = \alpha_1 \cdot \delta_{ME-1} \cdot TFA_{it} + \alpha_2 \cdot \delta_{ME-2} \cdot TFA_{it} + \alpha_3 \cdot \delta_{ME-3} \cdot TFA_{it} + \\ + \alpha_4 \cdot \delta_{TE-1} \cdot TFA_{it} + \alpha_5 \cdot \delta_{TE-2} \cdot TFA_{it} + \alpha_6 \cdot \delta_{TE-3} \cdot TFA_{it} + \beta \cdot \ln(k_{it}) + \mu_i + \varepsilon_{it} \qquad (E\ 8)$$

In order to avoid endogeneity bias of estimates we use two lags of financial sector variables as instruments. Cross-section heteroskedasticity is tackled by applying a 2-step estimation procedure. It uses the covariance information of 1-step residuals to construct a weighting matrix for further estimation steps.

[13] Some results of this classification procedure yielded surprising results. For example, Hungary with its relatively highly developed banking sector ends up in one group with Romania and Bulgaria. As the main focus of our paper is to show that the finance-growth link differs between countries we take these results as granted. Explanations for the difference in the finance-growth nexus form an interesting area for future research.

TABLE 9: ESTIMATION RESULTS ON THE STRENGTH AND TRANSMISSION CHANNEL OF THE FINANCE-GROWTH NEXUS

	Dependent variable: ln (OUTPUT)					
Independent variables	*(a)* STAT-LSDV	*(b)* STAT-LSDV	*(b) / (a)*	*(c)* STAT-DIFF	*(d)* STAT-DIFF	*(d) / (c)*
TOTAL FINANCIAL ASSETS MARKET ECONOMIES						
Group ME-1	0.205 ***	0.182 ***	89.0%	0.290 ***	0.285 ***	98.2%
	(0.028)	*(0.012)*		*(0.088)*	*(0.078)*	
Group ME-2	0.100 ***	0.059 ***	58.9%	0.184 ***	0.172 ***	93.5%
	(0.005)	*(0.010)*		*(0.051)*	*(0.052)*	
Group ME-3	0.026 ***	0.022 ***	87.4%	0.047 ***	0.046 ***	97.9%
	(0.004)	*(0.001)*		*(0.009)*	*(0.010)*	
TOTAL FINANCIAL ASSETS TRANSITION ECONOMIES						
Group TE-1	1.075 ***	0.750 ***	69.8%	1.062 ***	1.066 ***	100.4%
	(0.044)	*(0.132)*		*(0.101)*	*(0.246)*	
Group TE-2	0.451 ***	0.215 ***	47.7%	0.441 ***	0.436 ***	98.9%
	(0.003)	*(0.059)*		*(0.010)*	*(0.115)*	
Group TE-3	0.025	0.070	281.0%	-0.436	-0.211	48.4%
	(0.137)	*(0.138)*		*(1.270)*	*(2.034)*	
ln (CAPITAL STOCK)	--	0.292 ***	--		0.007	--
		(0.073)			*(0.149)*	
Observations	264	264	--	231	231	--
Wald test for joint significance (chi-squared statistics)	2.719E+04 ***	1.027E+04 ***	--	2.239E+03 ***	3.350E+03 ***	--
	(6)	*(7)*		*(6)*	*(7)*	
Sargan test (chi-squared statistics)	12.910 **	9.942	--	2.878	3.930	--
	(6)	*(6)*		*(6)*	*(6)*	

NOTES: Significance codes: *** = 0.01; ** = 0.05; *=0.1. Heteroskedasticity robust standard errors in parintheses under point estimates. Degrees of freedom in parintheses under Wald and Sargan test statistics. Total Financial Assets = sum of Bank Credit, Stock Market Capitalisation and Bonds Outstanding; Output = real GDP per employee ; Capital Stock = real capital stock per employee. STAT-LSDV - Static least square dummy variable 2-step estimator based on mean centred variables . STAT-DIFF - Static 2-step estimator in frist differences. Two lags of financial sector variables are used as instruments. Models are estimated using DPD 1.21 for Ox 3.20

COUNTRY GROUPS:
Market Economies:
Group ME-1: Austria, Belgium, Ireland, Italy, Norway, Sweden
Group ME-2: Denmark, Finland, France, Germany, Greece, Japan, Malta, Portugal, Turkey, United Kingdom, USA
Group ME-3: Cyprus, Luxembourg,Netherlands, Spain, Switzerland
Transition Economies:
Group TE-1: Latvia, Lithuania, Poland
Group TE-2: Croatia, Czeck Republic, Estonia, Slovakia, Slovenia
Group TE-3: Bulgaria, Hungary, Romania

Results on the overall growth effect obtained from STAT-LSDV-estimation[14] (Table 9 column *a*) show that there is a positive and significant link between the financial sector and economic growth in all country groups but group TE-3 (Bulgaria, Romania and Hungary). As expected the point estimate has a positive sign. However, it is not significantly different from zero. In line with existing empirical literature there can be seen a clear difference in the strength of the finance-growth nexus between market economies and transformation countries. While a strong nexus can be detected in the majority of transition countries (group TE-1 and TE-2), market economies exhibit a much weaker link. These first findings have to be interpreted with some caution. It cannot be excluded, that obtained estimates are affected by endogeneity problems. The Sargan-test closely rejects the exogeneity of instruments at the five percent level.

Results for the growth effect that runs via the productivity channel (Table 9 column *b*) are not affected by endogeneity concerns. The Sargan-test does not reject the exogeneity of instruments at any significance level. As expected the point estimates are throughout lower than those for the overall growth effect. The higher estimate for group TE-3 can be explained by the relatively high standard error. Findings from column *a* are confirmed.

To give insight into the question whether financial sector growth effects mainly run through factor accumulation or via the productivity channel, we divide the point estimates in column *b* by those in column *a*. Although explorative, this measure clearly indicates that the major growth effect works through the productivity channel. Just in group TE-2 less than half of the effect is due to technology increases.

Column *c* and *d* report output from estimation in first differences (STAT-DIFF[15]). The main findings are replicated. Two things, however, fall into the eye. On the one hand the degree to which the growth effect runs through the productivity channel is much higher, especially for country groups ME-2 and TE-2. On the other hand the capital stock coefficient falls close to zero and gets insignificant. We interpret this as a sign of multicollinearity between the capital stock and financial development in differenced data. As the capital stock coefficient from STAT-LSDV estimates is more in line with previous empirical evidence we put more confidence in the results of columns *a* and *b*.

We conclude that the main growth effect of the financial sector runs via the productivity channel.

[14] Static least square dummy variable estimation: To get rid of country fixed effects (μ_i) variables are mean-centred.

7. Does the financial sector induce long-run or short run growth effects?

The dynamics of financial sector growth effects are estimated with the help of *E 8* that is expanded to a partial adjustment model:

$$\ln(y_{it}) = \theta \cdot \ln(y^*_{it}) + (1-\theta) \cdot \ln(y_{i,t-1})$$

$$\ln(y_{it}) = \theta \cdot \alpha_1 \cdot \delta_{ME-1} \cdot TFA_{it} + \ldots + \theta \cdot \alpha_6 \cdot \delta_{TE-3} \cdot TFA_{it} + \quad \text{(E 9)}$$
$$+ \theta \cdot \beta \cdot \ln(k_{it}) + (1-\theta) \cdot \ln(y_{i,t-1}) + \theta \cdot \mu_i + \theta \cdot \varepsilon_{it}$$

where $0 \le (1-\theta) < 1$. $Ln(y^*_{it})$ represents the long run equilibrium level of output, that is determined by *E 8*. The observed output $\ln(y_{it})$ is the weighted average of the equilibrium level and the past output level. θ denotes the weighting or adjustment parameter. A value of (1-θ) close to zero means that there is immediate adjustment to the equilibrium level. The closer the value to one, the longer the adjustment process.

It is well known that the LSDV estimator is downward biased and inconsistent in dynamic panels that have a short time dimension and a large number of cross section units (Baltagi 2001:130). Anderson and Hsiao (1981) suggest to estimate the model in first differences. The lagged levels of the dependent variable serve as instrument for $\Delta \ln(y_{i,t-1})$. This estimation method leads to consistent but not necessarily efficient parameter estimates, as it does not use all possible instruments.

Arellano and Bond (1991) propose to use a GMM estimator in first differences that uses further lags of the dependent variable and exploits all moment conditions $(E[\ln(y_{i,t-s})(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0,\ s \ge 2)$. Essential for the consistency of estimates is the assumption of no serial correlation in the level disturbances ε_{it}. If the disturbances are not serially correlated there should be evidence of significant first order serial correlation in differenced residuals and no evidence of second order serial correlation. The Sargan test can be used to check the validity of instruments.

As Blundell and Bond (1998) note lagged levels may be weak instruments, if data are highly persistent. In order to reduce finite sample bias and increase efficiency of estimates, they suggest a system GMM estimator that combines the equation in differences with an equation in levels, where levels are instrumented with lagged differences.

[15] Static first differences estimation: to get rid of country fixed effects (μ_i) variables are transformed to first differences.

We estimate *E 9* using all four proposed estimation procedures. Financial sector variables are instrumented with two lagged values to avoid endogeneity problems. Estimates of the adjustment parameter indicate that the dependent variable follows an integrated process $(1-\theta=1)$. Detailed estimation results can be found in the appendix. As the basic model collapses in the presence of an integrated independent variable and structural parameters are hard to interpret, we turn to a base equation in first differences:

$$\Delta \ln(y_{it}) = \theta \cdot \alpha_1 \cdot \delta_{ME-1} \cdot \Delta TFA_{it} + \ldots + \theta \cdot \alpha_6 \cdot \delta_{TE-3} \cdot \Delta TFA_{it} + \\ + \theta \cdot \beta \cdot \Delta \ln(k_{it}) + (1-\theta) \cdot \Delta \ln(y_{i,t-1}) + \theta \cdot \mu_i + \theta \cdot \varepsilon_{it} \qquad \textit{(E 10)}$$

Table 10 presents estimation results. As noted earlier the DYN-LSDV estimator (column *a*) yields biased estimates of the adjustment parameter. Additionally the Sargan test rejects the exogeneity of instruments. Although potentially consistent, Anderson and Hsiao (1981) estimates (AH-LEV in column *b*) as well as the Arellano and Bond (1991) results (GMM-DIFF in column *c*) may guide into the wrong direction. Negative first order serial correlation is absent in differenced residuals. The Sargan test statistics are significant. In contrast, GMM system estimates (columns *d* and *e*) fulfil all requirements for consistency. In both cases the adjustment parameter is not significantly different from zero implying that the financial sector mainly triggers short run growth effects. A change in the development of the financial sector cannot be expected to trigger output growth over a longer period of time. This finding is in contradiction with existing literature (e.g. Beck et al. 2000b, Beck and Levine 2002a). It has to be noted that these studies normally estimate level equations and use data averaged over 5-year periods. As can be seen from the results presented in Beck and Levine 2002a, most GMM-SYS estimates based on averaged data yield an adjustment parameter significantly different from one.[16] GMM-SYS estimates based on annual data do not lead to parameter estimates different from one and most structural parameters loose significance. This gives reason to believe that the estimated "long term growth effects" of the financial sector based on level equations and averaged data may just reflect the integrated nature of the dependent variable.

[16] Beck and Levine use a transformed version of *E 9*. From both sides $y_{i,t-1}$ is deducted. On the right hand side the adjustment term is reduced to $-\theta * y_{i,t-1}$. Hence, a parameter estimate of zero for the lagged dependent variable corresponsd to a parameter estimate of one in *E 9*.

TABLE 10: ESTIMATION RESULTS ON THE DYNAMICS OF THE FINANCE GROWTH NEXUS (EQUATION IN FIRST DIFFERENCES)

	Dependent variable: Δ ln (OUTPUT)				
Independent variables	*(a)* DYN-LSDV	*(b)* AH-LEV	*(c)* GMM-DIFF	*(d)* GMM-SYS	*(e)* GMM-SYS
Δ TOTAL FINANCIAL ASSETS MARKET ECONOMIES					
Group ME-1	0.480	0.028	0.037	0.192 **	0.282 *
	(0.423)	*(0.046)*	*(0.036)*	*(0.092)*	*(0.153)*
Group ME-2	0.009	-0.034 **	-0.019 *	-0.051 **	-0.096 **
	(0.025)	*(0.013)*	*(0.010)*	*(0.025)*	*(0.046)*
Group ME-3	0.054 *	-0.015 *	-0.008	0.029 **	0.044 *
	(0.030)	*(0.008)*	*(0.009)*	*(0.012)*	*(0.023)*
Δ TOTAL FINANCIAL ASSETS TRANSITION ECONOMIES					
Group TE-1	0.773 ***	0.185	0.009	0.631 *	0.794 *
	(0.260)	*(0.191)*	*(0.306)*	*(0.320)*	*(0.442)*
Group TE-2	-0.140 *	-0.004	0.143	-0.110 **	0.441 ***
	(0.077)	*(0.120)*	*(0.169)*	*(0.074)*	*(0.013)*
Group TE-3	0.091	0.925 ***	0.908 ***	0.933	1.022
	(0.827)	*(0.244)*	*(0.182)*	*(0.744)*	*(1.030)*
Δ ln (CAPITAL STOCK)	0.629 **	0.886 ***	0.758 ***	0.661 ***	--
	(0.247)	*(0.129)*	*(0.105)*	*(0.104)*	
Δ ln (OUTPUT (-1))	0.353	0.136	-0.056	0.049	restricted to 0
	(0.486)	*(0.130)*	*(0.097)*	*(0.079)*	
Observations	230	198	198	230	230
Wald test for joint significance (chi-squared statistics)	1.097E+02 ***	1.686E+02 ***	3.264E+02 ***	4.966E+03 ***	7.462E+02 ***
	(8)	*(8)*	*(8)*	*(8)*	
AR(1) test [N(0,1)]	-1.058	-1.194	-1.123	-2.130 **	-2.759 ***
AR(2) test [N(0,1)]	-1.333	-0.656	-0.961	-0.919	-0.084
Sargan test (chi-squared statistics)	9.353 *	13.440 **	23.930 **	26.910	24.510
	(5)	*(6)*	*(13)*	*(21)*	*(22)*

NOTES: Significance codes: *** = 0.01; ** = 0.05; *=0.1. Heteroskedasticity robust standard errors in parintheses under point estimates. Degrees of freedom in parintheses under Wald and Sargan test statisticst . Total Financial Assets = sum of Bank Credit, Stock Market Capitalisation and Bonds Outstanding; Output = real GDP per employee ; Capital Stock = real capital stock per employee. DYN-LSDV - Dynamic least square dummy variable estimator based on mean centred variables; AH-LEV - Anderson-Hsiao (1981) estimator in first differences using level instruments; GMM-DIFF - First differences GMM estimator by Arellano and Bond (1991); GMM-SYS - System GMM estimator in first differences and levels by Blundell and Bond (1998). As Arellano and Bond recommend point estimates and inference are based on 1-step estimates in dynamic models. The Wald test, Sargan test and AR test is based on 2-step estimates to ensure robustness against cross-section heteroskedasticity. Two lags of financial sector variables are used as instruments. Models are estimated using DPD 1.21 for Ox 3.20

COUNTRY GROUPS:
Market Economies:
Group ME-1: Austria, Belgium, Ireland, Italy, Norway, Sweden
Group ME-2: Denmark, Finland, France, Germany, Greece, Japan, Malta, Portugal, Turkey, United Kingdom, USA
Group ME-3: Cyprus, Luxembourg,Netherlands, Spain, Switzerland
Transition Economies:
Group TE-1: Latvia, Lithuania, Poland
Group TE-2: Croatia, Czeck Republic, Estonia, Slovakia, Slovenia
Group TE-3: Bulgaria, Hungary, Romania

We now turn to the interpretation of financial sector variables in column *d*. As in the static estimation financial sector indicators for groups ME-1 to TE-2 are significant. Again, two things fall into the eye. On the one hand coefficients of group ME-2 and TE-2 are negative. On the other hand the capital stock coefficient seems to be overestimated with a value of 0.66. In section 6 we assumed that multicollinearity caused the capital stock estimate to drop and the financial variable estimate to rise. If this is correct we would expect both financial variables to get significantly positive when the capital stock term is omitted. Column *e* reports results for this changed specification. To gain efficiency we additionally restricted the adjustment parameter to zero, as estimates of columns *a* to *d* propose. The coefficient for group TE-2 indeed becomes significantly positive. Results for group ME-2 do not change.

We conclude that the financial sector triggers short term growth effects. Most results do not change when a dynamic structure is controlled for. Just results for group ME-2 of market economies prove to be sensitive to changes in specification and estimation method.

8. Does financial sector structure matter?

Up to now we assumed that financial structure does not matter. As *Total Financial Assets* is the sum of *Bank Credit*, *Stock Market Capitalisation* and *Bonds Outstanding*:

$$TFA_{it} = BNK_{it} + STK_{it} + BND_{it} \qquad (E\ 11)$$

this assumption is equivalent to:

$$\begin{aligned} \ln(y_{it}) = {} & \alpha_1^{BNK} \cdot \delta_{ME-1} \cdot BNK_{it} + \alpha_1^{STK} \cdot \delta_{ME-1} \cdot STK_{it} + \alpha_1^{BND} \cdot \delta_{ME-1} \cdot BND_{it} + \\ & + \ldots + \alpha_6^{BNK} \cdot \delta_{TE-3} \cdot BNK_{it} + \alpha_6^{STK} \cdot \delta_{TE-3} \cdot STK_{it} + \alpha_6^{BND} \cdot \delta_{TE-3} \cdot BND_{it} + \\ & + \beta \cdot \ln(k_{it}) + \mu_i + \varepsilon_{it} \end{aligned} \qquad (E\ 12)$$

where the coefficients for financial segments are restricted:

$$\alpha_1^{BNK} = \alpha_1^{STK} = \alpha_1^{BND} = \alpha_1\ ,\ \ldots\ ,\ \alpha_6^{BNK} = \alpha_6^{STK} = \alpha_6^{BND} = \alpha_6 \qquad (E\ 13)$$

, which is equivalent to:

$$\alpha_1^{BNK} - \alpha_1^{BND} = 0,\ \alpha_1^{STK} - \alpha_1^{BND} = 0,\ \alpha_1^{BNK} - \alpha_1^{STK} = 0, \ldots \qquad (E\ 14)$$

If financial structure does indeed matter, we would expect this restriction not to hold. A Wald test based on both, mean centred level data (STAT-LSDV) and differenced data, clearly rejects the hypothesis of parameter homogeneity (Table 11).

In order to evaluate the difference of the growth impact of financial segments we calculate point estimates of the normalised restrictions (*E 14*)[17] and associated standard errors[18]. If let's say in country group ME-1 the point estimate of $\left(\alpha_1^{BNK} - \alpha_1^{STK}\right)$ is significantly lower than zero, the stock market has higher growth impact than the banking sector. Results for single restrictions are presented in Table 11.

As one can see most level estimates (STAT-LSDV in column *a*) loose significance if estimated in first differences (STAT-DIFF in column *b*). We take a conservative standpoint and consider just those results to be meaningful that are not sensitive to the estimation method.

In ME-1 (Austria, Belgium, Ireland, Italy, Norway and Spain) we find no evidence of a difference in the growth impact between the bank sector and stock markets. The bond market seems to have a weaker impact than the stock market. A similar picture shows up in group ME-2 (Denmark, Finland, France, Germany, Greece, Japan, Malta, Portugal, Turkey, United Kingdom and USA). Bond markets have low growth impact. Stock markets, however, are superior to the bank sector. In group ME-3 (Cyprus, Luxembourg, Netherlands, Spain, Switzerland) financial structure does not matter. Let's now turn to transition countries. In group TE-1 (Poland, Latvia and Lithuania) we find some evidence that stock markets are far more important for growth than bond markets. No difference is found between stock markets and the bank sector. In groups TE-2 (Croatia, Czech Republic, Estonia, Slovenia and Slovakia) and TE-3 (Bulgaria, Hungary and Romania) no influence of financial structure on growth can be traced.[19]

We conclude that financial structure might play a more vital role in the finance-growth nexus than hitherto assumed. The importance of financial structure differs between country groups. Generalising statements on a growth-optimal financial architecture for all countries seem to be misleading.

---

[17] The point estimate of a normalised restriction (e.g. $\alpha_1^{BNK} - \alpha_1^{STK} = 0$) equals the difference of the point estimates of α_1^{BNK} and α_1^{STK}, that have been received from the estimation of *E 12*.

[18] The standard error of the difference of two coefficients (e.g. α_1^{BNK} and α_1^{STK}) equals $\sqrt{Var\left(\alpha_1^{BNK}\right) - 2 \cdot Cov\left(\alpha_1^{BNK}, \alpha_1^{STK}\right) + Var\left(\alpha_1^{STK}\right)}$

[19] As we saw in section 5 some countries (Spain, Czech Republic and Slovakia) couldn't clearly be assigned to one country group. To see whether the decision met affects results we repeated the estimation with changed country groups (Spain changes from ME-3 to ME-2, Czech Republic changes from TE-2 to TE-3 and Slovakia changes from TE-2 to TE-1). The Wald test still clearly rejects the hypothesis of parameter homogeneity. Results for the difference in the growth impact of single financial sector segments, however, differ slightly for country group TE-2: Bond markets seem to have a stronger growth impact than stock markets and the banking sector. For TE-3 some signs come up that the stock market is of special importance. This slight instability of results does not affect the basic conclusion of this section. The homogeneity of the growth impact of single financial sector segments is still clearly rejected. More research, however, is needed to clarify the growth impact of different financial segments in different countries.

TABLE 11: TEST OF PARAMETER RESTRICTION OF FINANCIAL SCECTOR SEGMENTS

	(a) STAT-LSDV	(b) STAT-DIFF
Test of all restrictions		
Wald test (chi-squared statistics)	128.888 ***	33.164 ***
	(12)	*(12)*
Observations	330	297
Test of single restrictions (normalised)		
MARKET ECONOMIES		
GROUP ME-1		
Bank Credit - Bonds Outstanding	0.120 **	0.034
	(0.051)	*(0.059)*
Stock Market Capitalisation - Bonds Outstanding	0.117 ***	0.039 **
	(0.036)	*(0.017)*
Bank Credit - Stock Market Capitalisation	0.003	-0.005
	(0.040)	*(0.053)*
GROUP ME-2		
Bank Credit - Bonds Outstanding	-0.033	0.038 *
	(0.020)	*(0.020)*
Stock Market Capitalisation - Bonds Outstanding	0.055 ***	0.068 ***
	(0.017)	*(0.020)*
Bank Credit - Stock Market Capitalisation	-0.088 ***	-0.031 ***
	(0.014)	*(0.011)*
GROUP ME-3		
Bank Credit - Bonds Outstanding	0.045	0.045
	(0.034)	*(0.036)*
Stock Market Capitalisation - Bonds Outstanding	-0.011	0.013
	(0.010)	*(0.016)*
Bank Credit - Stock Market Capitalisation	0.056 *	-0.032
	(0.032)	*(0.033)*
TRANSITION ECONOMIES		
GROUP TE-1		
Bank Credit - Bonds Outstanding	0.090	0.638
	(0.312)	*(0.476)*
Stock Market Capitalisation - Bonds Outstanding	0.657 *	0.754 *
	(0.389)	*(0.390)*
Bank Credit - Stock Market Capitalisation	-0.567 **	-0.117
	(0.223)	*(0.591)*
GROUP TE-2		
Bank Credit - Bonds Outstanding	-0.190 ***	0.028
	(0.047)	*0.107*
Stock Market Capitalisation - Bonds Outstanding	-0.188 **	-0.041
	(0.091)	*(0.117)*
Bank Credit - Stock Market Capitalisation	0.002	0.068
	(0.067)	*(0.086)*
GROUP TE-3		
Bank Credit - Bonds Outstanding	-0.081	-0.026
	(0.167)	*(0.421)*
Stock Market Capitalisation - Bonds Outstanding	0.315 **	0.217
	(0.128)	*(0.151)*
Bank Credit - Stock Market Capitalisation	-0.396 ***	-0.244
	(0.081)	*(0.331)*

NOTES: Significance codes: *** = 0.01; ** = 0.05; *=0.1. Heteroskedasticity robust standard errors in parintheses under point estimates. Degrees of freedom in parintheses under Wald test statisticst . Total Financial Assets = sum of Bank Credit, Stock Market Capitalisation and Bonds Outstanding; Output = real GDP per employee ; Capital Stock = real capital stock per employee. STAT-LSDV - Static least square dummy variable 2-step estimator based on mean centred variables . STAT-DIFF - Static 2-step estimator in frist differences. Models are estimated using EViews 4.1.

COUNTRY GROUPS:
Market Economies:
Group ME-1: Austria, Belgium, Ireland, Italy, Norway, Sweden
Group ME-2: Denmark, Finland, France, Germany, Greece, Japan, Malta, Portugal, Turkey, United Kingdom, USA
Group ME-3: Cyprus, Luxembourg,Netherlands, Spain, Switzerland
Transition Economies:
Group TE-1: Latvia, Lithuania, Poland
Group TE-2: Croatia, Czeck Republic, Estonia, Slovakia, Slovenia
Group TE-3: Bulgaria, Hungary, Romania

9. Conclusion

Building on previous empirical literature, this paper explicitly analyses 4 questions: (1) Is the nexus between overall financial sector development and growth the same across market economies and transition countries? (2) How strong is the nexus in market economies and transition countries and what transmission channel does it work through? (3) Does the financial sector induce long run or short run growth effects? (4) Does financial structure matter, i.e. do different financial segments as the bank sector, stock markets or bond markets affect growth differently?

Based on an growth accounting framework and applying a wide range of static and dynamic panel estimation methods, we find that the development of the financial sector exerts positive and exogenous growth effects. The strength of this impact, however, is not the same across countries. Whereas the financial sector induces weak growth impulses in the case of market economies, the finance–growth link proves to be pretty strong in the majority of transition countries. The main growth impact runs via the productivity channel. In contrast to existing literature, we find that the financial sector development is triggering short run growth effects rather than spurring long term growth. Financial structure seems to play a more important role than hitherto assumed. Different financial sector segments have different growth impact in different country groups. Statements on the growth-optimal configuration of financial structure, that ignore country differences, might lead to policy measures that do not use the full growth potential of the financial sector.

Evidence found in this paper provides valuable input for policy makers and other relevant institutions to set right policy priorities and to promote growth. With regard to new EU members and EU accession countries this may be of special relevance for speeding up real convergence to the EU level.

10. Appendix

10.1. Variables and Sources

Definition and sources of data used are briefly summarised in this subsection. Principally, data are collected in national currencies. All data are deflated using the GDP-deflator and then converted to US Dollar using 1995 average exchange rates. For more detailed information see Blum et al. (2002).

1. *Bank Credit:* value of credits of banking institutions on all residents divided by real GDP. In the case of transition economies data were cleared from bad loans (Source: International Financial Statistics of the IMF, Bad Loan Statistics from the EBRD Transition report)

2. *Stock Market Capitalisation* – value of listed domestic stocks on domestic exchanges divided by real GDP (Source: for most countries Federation of International Stock exchanges; for Switzerland, Greece and Portugal World Bank Financial Structure Database; additional data of national stock exchanges are used for Germany, Great Britain, Slovakia, Estonia, Hungary, Romania)

3. *Bonds Outstanding* –value of outstanding amounts of debt securities divided by real GDP (Source: Bank for International Settlement/Securities Statistics; for Accession Countries other than Poland, Hungary, Czech Republic data are just available for the size of public bond markets; as it seems that total bond market size is almost identical with public bond market size in these countries, we use data on public bond markets to proxy total market size)

4. *Total Financial Assets* – sum of *Bank Credit*, *Stock Market Capitalisation* and *Bonds Outstanding* (Source: see sources for *Bank Credit*, *Stock Market Capitalisation* and *Bonds Outstanding*)

5. *Output per Employee*– log of real gross domestic product divided by the number of employees (Source: Primarily International Financial Statistics of the IMF; if necessary time series were completed with data from the OECD Historical Statistics and OECD National Accounts of OECD Countries)

6. *Capital Stock per Employee* – log of real physical capital stock divided by the number of employees; time series on physical capital stock (K) were calculated by using perpetual inventory methods:

$$K_t = K_{t-1} \cdot (1 - d) + I_t$$

whereby I denotes gross fixed capital formation and d represent the constant rate of depreciation that is assumed to be 0.07; the initial capital stock values (K_0) were calculated following Easterly and Levine (2001) by

$$\frac{K_0}{Y_0} = \frac{(I/Y)^{\varnothing}}{\left(g_y^{\varnothing} + d\right)},$$

where $(I/Y)^{\varnothing}$ represents averaged investment rates over a ten year period and $g_y{}^{\varnothing}$ denotes output growth averaged over a ten year period. As in Transition countries data are just available for some year we use for calculations the longest period available for each country. (Source: real gross fixed capital formation data mainly from OECD Historical Statistics and National Accounts of OECD Countries, for transition economies from Economic Commission of Europe 2000 and International Financial Statistics of the IMF)

7. *Employment* –number of employed persons (Source: OECD Quarterly Labour Force Statistics, OECD Main Economic Indicators and ECE Economic Survey of Europe)

10.2. Summary Statistics

Table 12 presents summary statistics for financial development variables (*Bank Credit*, *Stock Market Capitalisation*, *Bonds Outstanding* and *Total Financial Assets*):

TABLE 12: SUMMARY STATISTICS (INDICATORS AVERAGED OVER THE WHOLE SAMPLE PERIOD)

Variable	Mean	Median	Minimum	Maximum	Standard Deviation
BANK CREDIT (% of GDP)					
Market Economies	129%	127%	43%	315%	57%
Transition Economies	33%	38%	14%	53%	14%
All Countries	97%	101%	14%	315%	66%
STOCK MARKET CAPITALISATION (% of GDP)					
Market Economies	114%	92%	16%	320%	72%
Transition Economies	14%	15%	1%	36%	11%
All Countries	81%	70%	1%	320%	76%
BONDS OUTSTANDING (% of GDP)					
Market Economies	126%	113%	57%	365%	70%
Transition Economies	24%	20%	4%	58%	18%
All Countries	91%	76%	4%	365%	75%
TOTAL FINANCIAL ASSETS (% of GDP)					
Market Economies	363%	326%	142%	621%	126%
Transition Economies	71%	69%	26%	136%	32%
All Countries	266%	295%	26%	621%	174%
Observations:					
Market Economies	22				
Transition Economies	11				
All Countries	33				

NOTES: Bank Credit =value of credits of banking institutions on all residents devided by GDP; Stock Market Capitalisation = value of listed domestic stocks on domestic exchanges divided by GDP; Bonds Outstanding = value of outstanding debt securities divided by GDP; Total Financial Assets = sum of Bank Credit, Stock Market Capitalisation and Bonds Outstanding; data are converted to US Dollars using 1995 average exchange rates.

10.3. Single country estimates

TABLE 13: SINGLE COUNTRY ESTIMATES OF THE FINANCE-GROWTH NEXUS

Country	Estimate for Total Financial Assets	Country	Estimate for Total Financial Assets
MARKET ECONOMIES		TRANSITION ECONOMIES	
Norway	0.369 ***	Poland	1.195 ***
	(0.095)		*(0.216)*
Belgium	0.252 ***	Latvia	1.056 ***
	(0.058)		*(0.077)*
Austria	0.217 ***	Lithuania	0.997 ***
	(0.027)		*(0.205)*
Ireland	0.213 ***	Slovakia	0.650 *
	(0.012)		*(0.332)*
Italy	0.201 ***	Estonia	0.570 ***
	(0.013)		*(0.175)*
Sweden	0.192 ***	Croatia	0.492 ***
	(0.024)		*(0.035)*
Portugal	0.136 ***	Bulgaria	-0.075 ***
	(0.018)		*(0.027)*
Turkey	0.133 ***	Hungary	-0.195 **
	(0.034)		*(0.094)*
Denmark	0.125 ***	Romania	-0.206
	(0.021)		*(0.240)*
United Kingdom	0.111 ***		
	(0.011)		
Malta	0.106 ***		
	(0.019)		
Germany	0.099 ***		
	(0.008)		
France	0.097 ***		
	(0.009)		
Finland	0.095 ***		
	(0.026)		
Greece	0.091 ***		
	(0.030)		
USA	0.090 ***		
	(0.009)		
Japan	0.087 ***		
	(0.013)		
Spain	0.044		
	(0.033)		
Cyprus	0.039 **		
	(0.017)		
Luxembourg	0.033 **		
	(0.013)		
Switzerland	0.028 ***		
	(0.003)		
Netherlands	0.024 ***		
	(0.002)		

NOTES: Significance codes: *** = 0.01; ** = 0.05; *=0.1. Dependent variable is Output (= real GDP per employee); Total Financial Assets = sum of Bank Credit, Stock Market Capitalisation and Bonds Outstanding; Output ; Heteroskedasticity robust standard errors in parintheses; Estimation with WLS; Cross section weights are based on country specific standard errors. 330 Observations included. Model is estimated using EViews 4.1

10.4. Dynamic estimation results (base equation in levels)

We estimate *E 9* in levels using all four proposed estimation procedures. As in other specifications we instrument financial sector variables with its lagged values to avoid endogeneity problems. Table 14 presents estimation results. Let's first focus on the estimation of the adjustment parameter. With a value of 0.48 the adjustment coefficient DYN-LSDV estimates (column *a*) points to a half-life of the effect of around one year. As noted earlier, the adjustment coefficient can be expected to be biased downward. Results of the Anderson and Hsiao estimator (AH-LEV) in column *b* and the Arellano and Bond estimator (GMM-DIFF) in column *c* are puzzling. The value of the adjustment coefficient is far below the DYN-LSDV estimate, in the case of the AH-LEV even insignificant. A closer look at the test statistics reveal that negative first order serial correlation is absent in differenced residuals. Estimates are inconsistent. Test statistics of Blundell and Bond (1998) estimates (GMM-SYS in column *d*) inspire confidence. The Sargan test does not reject the hypothesis of validity of instruments. Differenced residuals show negative first order serial correlation and no significant second order correlation. The value of $(1-\theta)$ is not significantly different from unity (probability 26%). This indicates that the dependent variable follows an integrated process. Results for structural coefficients are hard to interpret.

TABLE 14: ESTIMATION RESULTS ON THE DYNAMICS OF THE FINANCE GROWTH NEXUS (EQUATION IN LEVELS)

	Dependent variable: ln (OUTPUT)			
Independent variables	(a) DYN-LSDV	(b) AH-LEV	(c) GMM-DIFF	(d) GMM-SYS
TOTAL FINANCIAL ASSETS MARKET ECONOMIES				
Group ME-1	0.102 ***	0.129 ***	0.138 ***	0.000
	(0.027)	*(0.046)*	*(0.040)*	*(0.003)*
Group ME-2	0.028 ***	-0.001	0.008	-0.001
	(0.011)	*(0.021)*	*(0.013)*	*(0.002)*
Group ME-3	0.012 ***	0.013 *	0.015 ***	-0.003 *
	(0.003)	*(0.007)*	*(0.005)*	*(0.002)*
TOTAL FINANCIAL ASSETS TRANSITION ECONOMIES				
Group TE-1	0.397 ***	0.251	0.328 *	0.103 ***
	(0.120)	*(0.213)*	*(0.174)*	*(0.018)*
Group TE-2	0.092 *	-0.043	-0.028	0.015
	0.049	*(0.068)*	*(0.051)*	*(0.009)*
Group TE-3	0.199	-0.497	-0.384	0.011
	(0.228)	*(1.241)*	*(1.067)*	*(0.011)*
ln (CAPITAL STOCK)	0.160 ***	0.475 ***	0.487 ***	-0.021
	(0.051)	*(0.071)*	*(0.090)*	*(0.035)*
ln (OUTPUT (-1))	0.484 ***	0.247 *	0.204 *	1.024 ***
	(0.135)	*(0.136)*	*(0.115)*	*(0.038)*
Observations	264	231	231	264
Wald test for joint significance (chi-squared statistics)	2.113E+04 ***	6.681E+02 ***	1.144E+03 ***	4.939E+08 ***
	(8)	*(8)*	*(8)*	*(8)*
AR(1) test [N(0,1)]	-0.929	-1.079	-1.074	-3.123 ***
AR(2) test [N(0,1)]	-2.725 ***	0.138	0.387	-0.530
Sargan test (chi-squared statistics)	6.279	11.760 *	20.150	25.330
	(5)	*(6)*	*(14)*	*(23)*

NOTES: Significance codes: *** = 0.01; ** = 0.05; *=0.1. Heteroskedasticity robust standard errors in parintheses under point estimates. Degrees of freedom in parintheses under Wald and Sargan test statisticst . Total Financial Assets = sum of Bank Credit, Stock Market Capitalisation and Bonds Outstanding; Output = real GDP per employee ; Capital Stock = real capital stock per employee. DYN-LSDV - Dynamic least square dummy variable estimator based on mean centred variables; AH-LEV - Anderson-Hsiao (1981) estimator in first differences using level instruments; GMM-DIFF - First differences GMM estimator by Arellano and Bond (1991); GMM-SYS - System GMM estimator in first differences and levels by Blundell and Bond (1998). As Arellano and Bond recommend point estimates and inference are based on 1-step estimates in dynamic models. The Wald test, Sargan test and AR test is based on 2-step estimates to ensure robustness against cross-section heteroskedasticity. Two lags of financial sector variables are used as instruments. Models are estimated using DPD 1.21 for Ox 3.20

COUNTRY GROUPS:
Market Economies:
Group TE-1: Austria, Belgium, Ireland, Italy, Norway, Sweden
Group TE-2: Denmark, Finland, France, Germany, Greece, Japan, Malta, Portugal, Turkey, United Kingdom, USA
Group TE-3: Cyprus, Luxembourg,Netherlands, Spain, Switzerland
Transition Economies:
Group TE-4: Latvia, Lithuania, Poland
Group TE-5: Croatia, Czeck Republic, Estonia, Slovakia, Slovenia
Group TE-6: Bulgaria, Hungary, Romania

11. References

Ahmed, S. (1998) 'Comment on: The legal environment, banks, and long-run economic growth', *Journal of Money, Credit, and Banking*, 30(2): 614-20.

Ahrens, R.A. (2002) 'Predicting recessions with interest rate spreads: a multicountry regime-switching analysis', *Journal of International Money and Finance*, 21: 519–37.

Anderson, T. and Hsiao, C. (1981), 'Estimation of dynamic models with error components', *Journal of the American Statistical Association*, 76: 598-606

Andres, J., Hernando, I. and Lopez-Salido, J. (1999) 'The role of the financial system in the growth–inflation link', *Bank of Spain Working Papers*, 9920.

Arellano, M and Bond, S (1991), 'Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations', *Review of Economic Studies*, 58: 277-97.

Baltagi, B. (2001), *Econometric Analysis of Panel Data*, 2nd ed., New York, Wiley & Sons.

Barro, R.J. (1991), 'Economic growth in a cross-section of countries', *Quarterly Journal of Economics*, 106(2), 407-43

Bassanini, A., Scarpetta, S. and Hemmings, P. (2001) 'Economic growth: the role of policies and institutions. Panel data evidence from OECD countries', *OECD Economic Department Working Paper*, 283.

Batten, J. and Kim, Y. (2000) 'Expanding long-term financing through bond market development: a post crisis policy task', *Deakin University School of Accounting and Finance Working Paper*, 2000/07.

Beck, T. and Levine, R. (2001) 'Stock markets, banks, and growth: correlation or causality?', *World Bank Working Paper*, 2670.

Beck, T. and Levine, R. (2002a) 'Stock markets, banks, and growth: panel evidence', *NBER Working Paper*, w9082.

Beck, T. and Levine, R. (2002b) 'Industry growth and capital allocation: does having a market- or bank-based system matter?', Journal of Financial Economics, 64(2): 147–80.

Beck, T., Demirguc-Kunt, A., Levine, R. and Maksimovic, V. (2000a) 'Financial structure and economic development: firm, industry, and country evidence', *World Bank Working Paper*, 2423.

Beck, T., Levine, R. and Loayza, N. (2000b) 'Finance and the sources of growth', *Journal of Financial Economics*, 58 (1–2): 261–300.

Benhabib, J. and Spiegel, M. (1994) 'The Role of Human Capital in Economic Development: Evidence from Aggregate Cross-Country Data', *Journal of Monetary Economics*, 34(2): 143–73

Benhabib, J. and Spiegel, M. (2000) 'The role of financial development in growth and investment', *Journal of Economic Growth*, 5: 341–60.

Berrer, H., Felderer, B., Fortin, I., Helmenstein, Ch., Kleissner, A., Polasek, W., Slavova, T, (2004) *Die Bedeutung von (Eigen-) Kapitalmärkten für dynamische Volkswirtschaften Europas*, IHS Institute for Advances Studies, Vienna

Blum, D., Federmair, K., Fink, G. and Haiss, P. (2002) 'The financial–real sector nexus – theory and empirical evidence', IEF Working Paper, 43.

Blundell, R. and Bond, S. (1998), 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics*, 87:115-43

Chow, G. (1960): 'Tests of equality between sets of coefficients in two linear regressions', *Econometrica*, 28: 591-605

Deidda, L. and Fattouh, B. (2001) 'Non linearity between finance and growth', *CRENOS Working Paper*, March 2001.

Demirguc-Kunt, A. and Maksimovic, V. (1998) 'Law, finance, and firm growth', *Journal of Finance*, 53(6): 2107–37.

Drakos, K. (2002) 'Imperfect competition in banking and macroeconomic performance: evidence from transition countries', paper presented at the Bank of Finland (BOFIT) Workshop in Transition Economies.

Easterly, W. and Levine R. (2001) 'It's Not Factor Accumulation: Stylized Facts and Growth Models', http://www.worldbank.org/research/growth/pdfiles/fact%20ross_rev.pdf

Eichengreen, B. and Luengnaruemitchai, P. (2004): 'Why doesn´t Asia Have Bigger Bond Markets?', *NBER Working Paper*, 10576.

Evans, A.D., Green, C.J. and Murinde, V. (2002) 'Human capital and financial development in economic growth: new evidence using the translog production function', *International Journal of Finance and Economics*, 7(2): 123–40.

Fink, G. and Haiss, P. (1999) 'Central European financial markets from an EU perspective: theoretical aspects and statistical analyses', *IEF Working Paper*, 34.

Fink, G., Haiss, P. and Mantler, H.C. (2004a) 'Financial sector macro efficiency – Concepts, measurement, theoretical and empirical evidence' in Balling, M., Lierman, F., and Mullineux. A. (eds.), *Financial Markets in Central and Eastern Europe: Stability and Efficiency*, Routledge, London and New York 2004

Fink, G., Haiss, P. and Vuksic, G. (2004b) 'Changing Importance of Financial Sectors for Growth from Transition to Cohesion and European Integration', *IEF Working Paper*, 58

Fink, G., Haiss, P. and Kirchner, H. (2004c) 'Die Finanzierung über Anleihenemissionen und Zusammenhänge zum Wirtschaftswachstum', paper presented at the *18th Workshop of the Austrian Working Group of Banking and Finance*, Innsbruck, 18th-19th June 2004

Fink, G, Haiss, P. and Hristoforova, S. (2004d) 'Growth Triggers in the European Union', in: Dreger, Ch. and Hansen, G. (eds.) *Advances in macroeconometric modeling*, Schriften des Instituts für Wirtschaftsforschung Halle, vol. 15, pp. 205-37, Nomos, Baden-Baden

Gamber, E. (1996) 'The policy content of the yield curve slope', *Review of Financial Economics*, 5(2): 163–79.

Gerlach, S. and Smeths, F. (1997) 'The term structure of Euro-rates: some evidence in support of the expectations hypothesis', *Journal of International Money and Finance*, 16(2): 305–21.

Hahn, F. (2002a) 'The finance–growth nexus revisited. New evidence from OECD countries', *WIFO Working Paper*, 176.

Hahn, F. (2002b) 'Financial development and output growth fluctuation. Evidence from OECD countries', *WIFO Working Papers*, 181.

Hahn, F. (2002c) 'Bedeutung von Aktienmärkten für Wachstum und Wachstumsschwankungen in den OECD-Ländern', *Materialien zu Wirtschaft und Gesellschaft*, 78.

Harvey, C.R. (1989) 'Forecasts of economic growth from the bond and stock markets'*, Financial Analysts Journal*, September–October 1989: 38–45.

Harvey, C.R. (1991) 'Interest rate based forecasts of German economic growth', *Review of World Economics*, 127(4): 701-718.

Herring, R. and Chatusripitak, N. (2000) 'The case of the missing market: the bond market and why it matters for financial development', *Asian Development Bank Institute Working Paper*, 11.

Heston, A. and Summers, R. (1996) 'International Price and Quantity Comparisons: Potentials and Pitfalls', *American Economic Review*, 78(2): 467-73

Jaffee, D. and Levonian, M. (2001) 'The structure of banking systems in developed and transition economies', *European Financial Management*, 7(2): 161–81.

Kahn, M. and Senhadji, A. (2000) 'Financial development and economic growth: an overview', *IMF Working Paper*, 00/209.

King, R. and Levine, R. (1993a) 'Finance and growth: Schumpeter might be right', *Quarterly Journal of Economics*, 108(3): 717–37.

King, R. and Levine, R. (1993b) 'Finance, entrepreneurship, and growth – theory and evidence', *Journal of Monetary Economics*, 32: 513–42.

Koivu, T. (2002) 'Do efficient banking sectors accelerate economic growth in transition countries?', BOFIT Discussion Paper, 14/2002.

Kominek, Z. (2002), 'Stock markets and industry growth: and eastern European perspective', *EBRD Working Paper*, 81.

Leahy, M., Schich, S., Wehinger,G., Pelgrin, F. and Thorgeirsson, Th. (2001) 'Contributions of financial systems to growth in OECD countries'*, OECD Working Paper*, 280.

Levine, R. (2002): 'Bank-based or market-based financial systems: which is better?', *Journal of Financial Intermediation*, 11: 398–428.

Levine, R. (1997) 'Financial development and economic growth – views and agenda', Journal of Economic Literature, 35: 688–726.

Levine, R. and Zervos S. (1998) 'Stock markets, banks and economic growth', *American Economic Review*, 88(3): 537–58.

Levine, R., Loayza, N. and Beck, T. (2000) 'Financial intermediation and growth: causality and causes', *Journal of Monetary Economics*, 46(1): 31–77.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (1998) 'Law and finance', *Journal of Political Economy*, 106(6): 1113–55.

Mankiw, G., Romer, D., Weil, D. (1992) 'A Contribution to the Empirics of Economic Growth', *Quarterly Journal of Economics*, 107(2), 407-37

Mooslechner, P. (2003) 'Finance for Growth, Finance and Growth, Finance or Growth ...? Three Perspectives on the Interaction of Financial Markets and the Real Economy', *Focus on Austria*, 2003(1), pp. 76-94

Platek, M. (2002) *Financial Sector Development and Economic Growth in Transition Countries*, Difo-Druck GmbH, Bamberg 2002.

Ram, R. (1999) 'Financial development and economic growth: additional evidence', *Journal of Development Studies,* 35(4): 164–74.

Stockhammer, E. (2003) 'Stock Markets, Shareholder Value and Investment', *Focus on Austria*, 2003(1), pp. 111-32

Temple, J. (1999) 'The New Growth Evidence', *Journal of Economic Literature*, 37, 112-56

Thiel, M. (2001) 'Finance and economic growth – a review of theory and the available evidence', *European Commission Economic Paper*, 158.

Ünalmis, D. (2002) 'The causality between financial sector development and economic growth : the case of Turkey', *Research Department Working Papers of the Central Bank of Turkey*, 2002(3)

EI Working Papers

1 Gerhard Fink, A Schedule of Hope for the New Europe, Oktober 1993.

2 Gerhard Fink, Jutta Gumpold, Österreichische Beihilfen im europäischen Wirtschaftsraum (EWR), Oktober 1993.

3 Gerhard Fink, Microeconomic Issues of Integration, November 1993.

4 Fritz Breuss, Herausforderungen für die österreichische Wirtschaftspolitik und die Sozialpartnerschaft in der Wirtschafts- und Währungsunion, November 1993.

5 Gerhard Fink, Alexander Petsche, Central European Economic Policy Issues, July 1994.

6 Gerhard Fink, Alexander Petsche, Antidumping in Österreich vor und nach der Ostöffnung, November 1994.

7 Fritz Breuss, Karl Steininger, Reducing the Greenhouse Effect in Austria: A General Equilibrium Evaluation of CO2-Policy-Options, March 1995.

8 Franz-Lothar Altmann, Wladimir Andreff, Gerhard Fink, Future Expansion of the European Union in Central Europe, April 1995.

9 Gabriele Tondl, Can EU's Cohesion Policy Achieve Convergence?, April 1995.

10 Jutta Gumpold, Nationale bzw. gesamtwirtschaftliche Effekte von Beihilfen - insbesondere Exportbeihilfen, April 1995.

11 Gerhard Fink, Martin Oppitz, Kostensenkungspotentiale der Wiener Wirtschaft - Skalenerträge und Kostendruck, August 1995.

12 Alexander Petsche, Die Verfassung Ungarns im Lichte eines EU-Beitritts, September 1995.

13 Michael Sikora, Die Europäische Union im Internet, September 1995.

14 Fritz Breuss, Jean Tesche, A General Equilibrium Analysis of East-West Migration: The Case of Austria-Hungary, January 1996.

15 Alexander Petsche, Integrationsentwicklung und Europaabkommen EU - Ungarn, Juli 1996.

16 Jutta Gumpold, Die Ausfuhrförderung in der EU, Juni 1996.

17 Jutta Gumpold, Internationale Rahmenregelungen zur Ausfuhrförderung, Juni 1996.

18 Fritz Breuss, Austria's Approach towards the European Union, April 1996.

19 Gabriele Tondl, Neue Impulse für die österreichische Regionalpolitik durch die EU-Strukturfonds, Mai 1996.

20 Griller, Droutsas, Falkner, Forgó, Klatzer, Mayer, Nentwich, Regierungskonferenz 1996: Ausgangspositionen, Juni 1996.

21 Stefan Griller, Ein Staat ohne Volk? Zur Zukunft der Europäischen Union, Oktober 1996.

22 Michael Sikora, Der „EU-Info-Broker“ – ein datenbankgestütztes Europa-informationssystem im World Wide Web über die KMU-Förderprogramme der Europäischen Kommission, November 1996.

23 Katrin Forgó, Differenzierte Integration, November 1996.

24 Alexander Petsche, Die Kosten eines Beitritts Ungarns zur Europäischen Union, Januar 1997.

25 Stefan Griller, Dimitri Droutsas, Gerda Falkner, Katrin Forgó, Michael Nentwich, Regierungskonferenz 1996: Der Vertragsentwurf der irischen Präsidentschaft, Januar 1997.

26 Dimitri Droutsas, Die Gemeinsame Außen- und Sicherheitspolitik der Europäischen Union. Unter besonderer Berücksichtigung der Neutralität Österreichs, Juli 1997.

27 Griller, Droutsas, Falkner, Forgó, Nentwich, Regierungskonferenz 1996: Der Vertrag von Amsterdam in der Fassung des Gipfels vom Juni 1997, Juli 1997.

28 Michael Nentwich, Gerda Falkner, The Treaty of Amsterdam. Towards a New Institutional Balance, September 1997.

29 Fritz Breuss, Sustainability of the Fiscal Criteria in Stage III of the EMU, August 1998.

30 Gabriele Tondl, What determined the uneven growth of Europe´s Southern regions? An empirical study with panel data, März 1999.

31 Gerhard Fink, New Protectionism in Central Europe - Exchange Rate Adjustment, Customs Tariffs and Non-Tariff Measures, Mai 1999.

32 Gerhard Fink, Peter Haiss, Central European Financial Markets from an EU Perspective. Review of the Commission (1998) Progress Report on Enlargement, Juni 1999.

33 Fritz Breuss, Costs and Benefits of EU Enlargement in Model Simulations, Juni 1999.

34 Gerhard Fink, Peter R. Haiss, Central European Financial Markets from an EU Perspective. Theoretical aspects and statistical analyses, August 1999.

35 Fritz Breuss, Mikulas Luptacik, Bernhard Mahlberg, How far away are the CEECs from the EU economic standards? A Data Envelopement Analysis of the economic performance of the CEECs, Oktober 2000.

36 Katrin Forgó, Die Internationale Energieagentur. Grundlagen und aktuelle Fragen, Dezember 2000

37 Harald Badinger, The Demand for International Reserves in the Eurosystem, Implications of the Changeover to the Third Stage of EMU, Dezember 2000.

38 Harald Badinger, Fritz Breuss, Bernhard Mahlberg, Welfare Implications of the EU's Common Organsiation of the Market in Bananas for EU Member States, April 2001

39 Fritz Breuss, WTO Dispute Settlement from an Economic Perspective – More Failure than Success, Oktober 2001.

40 Harald Badinger, Growth Effects of Economic Integration – The Case of the EU Member States, Dezember 2001.

41 Gerhard Fink, Wolfgang Koller, Die Kreditwürdigkeit von Unternehmen im Hinblick auf die Wirtschafts- und Währungsunion - Wien im österreichischen Vergleich, Dezember 2001.

42 Harald Badinger, Gabriele Tondl, Trade, Human Capital and Innovation: The Engines of European Regional Growth in the 1990s, Januar 2002.

43 David Blum, Klaus Federmair, Gerhard Fink, Peter Haiss, The Financial-Real Sector Nexus: Theory and Empirical Evidence, September 2002.

44 Harald Badinger, Barbara Dutzler, Excess Reserves in the Eurosystem: An Economic and Legal Analysis, September 2002.

45 Gerhard Fink, Nigel Holden, Collective Culture Shock: Constrastive Reactions to Radical Systemic Change, Oktober 2002.

46 Harald Badinger, Fritz Breuss, Do small countries of a trade bloc gain more of its enlargement? An empirical test of the Casella effect for the case of the European Community, Oktober 2002.

47 Harald Badinger, Werner Müller, Gabriele Tondl, Regional convergence in the European Union (1985-1999). A spatial dynamic panel analysis, Oktober 2002.

48 Harald Badinger, Fritz Breuss, What Has Determined the Rapid Post-War Growth of Intra-EU Trade?, February 2003.

49 Gerhard Fink, Peter Haiss, Sirma Hristoforova, Bonds Market and Economic Growth, April 2003.

50 Fritz Breuss, Markus Eller, Efficiency and Federalism in the European Union, The Optimal Assignment of Policy Tasks to Different Levels of Government, May 2003.

51 Gabriele Tondl, Goran Vuksic, What makes regions in Eastern Europe catching up? The role of foreign investment, human resources and geography, May 2003.

52 Fritz Breuss, Balassa-Samuelson Effects in the CEEC: Are they Obstacles for Joining the EMU?, May 2003.

53 Angelika Hable, Handlungsformen und Kompetenzen in der Europäischen Verfassungsdebatte, September 2003.

54 Heinrich Schneider, „Kerneuropa“ Ein aktuelles Schlagwort und seine Bedeutung, Februar 2004.

55 Harald Badinger, Do we really know that the EU’s Single Market Programme has fostered competition? Testing for a decrease in markup ratios in EU industries, February 2004.

56 Michaela Seifert, Die Rechtlichen Grundlagen des Bologna-Prozesses und der Lissabon-Strategie – europaweite Vereinheitlichung der Studienstrukturen und Maßnahmen zur Erleichterung der Anerkennung von Diplomen, März 2004.

57 Heinrich Schneider, Liquidiert Präsident Bush das Völkerrecht? Macht, Recht und Europa in der heutigen Weltordnungspolitik, April 2004.

58 *Gerhard Fink, Peter Haiss, Goran Vukšić, Changing Importance of Financial Sectors for Growth from Transition to Cohesion and European Integration, July 2004.*

59 Gabriele Tondl, EU Regional Policy. Experiences and Future Concerns, July 2004.

60 Gerhard Fink, Anne-Katrin Neyer, Marcus Kölling, Sylvia Meierewert, An Integrative Model of Multinational Team Performance, November 2004.

61 Kathrin Blanck, Flexible Integration in the Common Foreign and Security Policy, December 2004.

62 Gerhard Fink, Marcus Kölling, Anne-Katrin Neyer, The Cultural Standard Method, January 2005.

63 Peter Haiss, Stefan Marin, Options for Developing Bond Markets – Lessons from Asia for Central and Eastern Europe, January 2005.

Europe Institute Publication Series

12. (available via bookstores)

1 Österreichisches Wirtschaftsrecht und das Recht der EG. Hrsg von *Karl Korinek/Heinz Peter Rill*. Wien 1990, Verlag Orac. XXIV und 416 Seiten. (öS 1.290,-)

2 Österreichisches Arbeitsrecht und das Recht der EG. Hrsg von *Ulrich Runggaldier*. Wien 1990, Verlag Orac. XIII und 492 Seiten. (öS 1.290,-)

3 Europäische Integration aus österreichischer Sicht. Wirtschafts-, sozial und rechtswissenschaftliche Aspekte. Hrsg von *Stefan Griller/Eva Lavric/Reinhard Neck*. Wien 1991, Verlag Orac. XXIX und 477 Seiten. (öS 796,-)

4 Europäischer Binnenmarkt und österreichisches Wirtschaftsverwaltungsrecht. Hrsg von *Heinz Peter Rill/Stefan Griller*. Wien 1991, Verlag Orac. XXIX und 455 Seiten. (öS 760,-)

5 Binnenmarkteffekte. Stand und Defizite der österreichischen Integrations-forschung. Von *Stefan Griller/Alexander Egger/Martina Huber/Gabriele Tondl*. Wien 1991, Verlag Orac. XXII und 477 Seiten. (öS 796,-)

6 Nationale Vermarktungsregelungen und freier Warenverkehr. Untersuchung der Art. 30, 36 EWG-Vertrag mit einem Vergleich zu den Art. 13, 20 Freihandelsabkommen EWG - Österreich. Von *Florian Gibitz*. Wien 1991, Verlag Orac. XIV und 333 Seiten. (öS 550,)

7 Banken im Binnenmarkt. Hrsg von *Stefan Griller*. Wien 1992, Service Fachverlag. XLII und 1634 Seiten. (öS 1.680,-)

8 Auf dem Weg zur europäischen Wirtschafts- und Währungsunion? Das Für und Wider der Vereinbarungen von Maastricht. Hrsg von *Stefan Griller*. Wien 1993, Service Fachverlag. XVII und 269 Seiten. (öS 440,-)

9 Die Kulturpolitik der EG. Welche Spielräume bleiben für die nationale, insbesondere die österreichische Kulturpolitik? Von *Stefan Griller*. Wien 1995, Service Fachverlag.

10 Das Lebensmittelrecht der Europäischen Union. Entstehung, Rechtsprechung, Sekundärrecht, nationale Handlungsspielräume. Von *Michael Nentwich*. Wien 1994, Service Fachverlag. XII und 403 Seiten. (öS 593,-)

11 Privatrechtsverhältnisse und EU-Recht. Die horizontale Wirkung nicht umgesetzten EU-Rechts. Von *Andreas Zahradnik.* Wien 1995, Service Fachverlag. (öS 345,-)

12 The World Economy after the Uruguay Round. Hrsg von *Fritz Breuss*. Wien 1995, Service Fachverlag. XVII und 415 Seiten. (öS 540,-)

13 European Union: Democratic Perspectives after 1996. Von *Gerda Falkner/ Michael Nentwich*. Wien 1995, Service Fachverlag. XII und 153 Seiten. (öS 385,-)

14 Rechtsfragen der Wirtschafts- und Währungsunion. Hrsg von *Heinz Peter Rill* und *Stefan Griller*. Wien 1997, Springer Verlag Wien/New York, 197 Seiten.

15 The Treaty of Amsterdam – Facts Analysis, Prospects. Von *Stefan Griller*, *Dimitri P. Droutsas*, *Gerda Falkner*, *Katrin Forgó*, *Michael Nentwich*. Wien 2000, Springer Verlag Wien/New York, 643 Seiten.

16 Europäisches Umweltzeichen und Welthandel. Grundlagen, Entscheidungs-prozesse, rechtliche Fragen. Von *Katrin Forgó*. Wien 1999, Springer Verlag Wien/New York 1999, 312 Seiten.

17 Interkulturelles Management. Österreichische Perspektiven. Von *Gerhard Fink*, *Sylvia Meierewert* (Hrsg.), Springer Verlag Wien/New York, 2001, 346 Seiten

18 Staatshaftung wegen Gemeinschaftsrechtsverletzung: Anspruchsgrundlage und materielle Voraussetzungen. Zugleich ein Beitrag zur Gemeinschaftshaftung, Von *Birgit Schoißwohl*, Springer Verlag Wien/New York, 2002, 512 Seiten.

19 The Banana Dispute: An Economic and Legal Analysis. Von *Fritz Breuss, Stefan Griller, Erich Vranes* (Hrsg.), ca 400 Seiten (2003).

20 External Economic Relations and Foreign Policy in the European Union, Von *Stefan Griller, Birgit Weidel* (Hrsg.), Springer Verlag Wien/New York, 2002, 500 Seiten.

21 Wachstumseffekte der Europäischen Integration, Von *Harald Badinger*, Springer Verlag Wien / New York 2003, 235 Seiten.

22 The European System of Central Banks: An Autonomous Actor? The Quest for an Institutional Balance in EMU, *Barbara Dutzler*, Vienna / New York (Springer) 2003, 293 pages.

23 Institutional, Legal and Economic Aspects of the EMU, Von *Fritz Breuss, Gerhard Fink, Stefan Griller* (Hrsg.), Springer Verlag Wien / New York 2003, 346 Seiten.

24 Russia – Continuity and Change, *Hans-Georg Heinrich, Gerald Hinteregger* (Hrsg.), Springer Verlag Wien / New York 2004, IV and 549 pages.

25 Access to Affordable Medicines. Developing Responses under the TRIPS Agreement and EC Law, *Katharina Gamharter*, Wien / New York (Springer) 2004, X and 303 pages.