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Financial development and economic growth: New evidence from panel data

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ABSTRACT

This study provides evidence on the role of financial development in accounting for economic growth in low- and middle-income countries classified by geographic regions. To document the relationship between financial development and economic growth, we estimate both panel regressions and variance decompositions of annual GDP per capita growth rates to examine what proxy measures of financial development are most important in accounting for economic growth over time and how much they contribute to explaining economic growth across geographic regions and income groups. We find a positive relationship between financial development and economic growth in developing countries. Moreover, short-term multivariate analysis provides mixed results: a two-way causality relationship between finance and growth for most regions and one-way causality from growth to finance for the two poorest regions. Furthermore, other variables from the real sector such as trade and government expenditure play an important role in explaining economic growth. Therefore, it seems that a well-functioning financial system is a necessary but not sufficient condition to reach steady economic growth in developing countries.

1. Introduction

The relationship between financial development and economic growth has received a great deal of attention in recent decades. However, there are conflicting views concerning the role that the financial system plays in economic growth. For example, while Levine (1997) believes that financial intermediaries enhance economic efficiency, and ultimately growth, by helping allocate capital to its best uses, Lucas (1988) asserts that the role of the financial sector in economic growth is "over-stressed." Notwithstanding the controversy, modern theoretical literature on the finance–growth nexus combines the endogenous growth theory and microeconomics of financial systems (Grossman & Helpman, 1991; Khan, 2001; Lucas, 1988; Pagano, 1993; Rebelo, 1991; Romer, 1986; among others).

Early studies on financial development (FD) and economic growth (EG) were based on cross-country analysis. For instance, Goldsmith (1969), King and Levine (1993a, 1993b), and Levine and Zervos (1998) used cross-country analysis to study the relationship between financial development and economic growth. While their findings suggest that finance helps to predict growth, these studies do not deal formally with the issue of causality, nor do they exploit the time-series properties of the data.[1] Furthermore, conclusions based on cross-country analysis are sensitive to the sample countries, estimation methods, data frequency, functional form of the relationship, and proxy measures chosen in the study, all of which raise doubts about the reliability of cross-country regression analysis (see Al-Awad & Harb, 2005; Chuah & Thai, 2004; Hassan & Bashir, 2003; Khan & Senhadji, 2003).

Panel time-series analysis, on the other hand, exploits time-series and cross-sectional variations in data and avoids biases associated with cross-sectional regressions by taking the country-specific fixed effect into account (Levine, 2005). To mitigate the shortcomings of cross-sectional analysis, this paper examines the dynamic relationship between economic growth and financial development across geographic regions and income groups using time-series analysis.

In retrospect, our interest was motivated by three factors. First, it is argued that well-developed domestic financial sectors, such as those of developed countries [high-income Organization and Economic Cooperation and Development (OECD) countries], can

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[1] However, these studies define control variables and measures of financial development that are typically used in time-series analysis.

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significantly contribute to an increase in savings and investment rate and, eventually lead to economic growth (Becsi & Wang, 1997). Following this premise, most developing countries have reformed their economic and financial systems to improve the efficiency of their financial intermediaries with the objective of achieving financial sector development and promoting growth, starting in the 1980s. Therefore, we document the progress achieved by these countries over the last three decades in terms of revamping their financial systems, and assess the links between the reforms and economic performance.

Second, we employ unbalanced panel estimations and various multivariate time-series analysis technique to establish the direction, timing, and strength of the causal link between the real and financial sectors across geographic regions and income groups so that we may explore some policy implications. We also use financial development indicators employed in the literature and draw some conclusions about their impact on economic growth as measured by the annual growth rate of the domestic product (GDP) per capita.

Finally, instead of using heterogeneous cross-country samples, we investigate different geographic regions, each of which has a relatively homogeneous sample of countries. This is adequate for assessing the links between economic growth and financial development. Most time-series studies have analyzed either heterogeneous countries or a set of stand-alone countries.[2] We take a different approach in this paper. Rather than pooling worldwide data or analyzing each country, we study the relationship between finance and growth in geographic regions using World Bank classifications. The World Bank only categorizes geographic regions as low- or middle-income countries. High-income countries are excluded in its classification of geographic regions. Therefore, countries in each geographic region are homogenous with respect to the level of GDP per capita, financial development, and culture. Furthermore, we are able to capture the temporal dimension of the economic reforms by combining time-series with geographic cross-sectional data. The main advantage of this approach is that we are able to use enough data to estimate parameters in panel data regression and other multivariate analysis techniques that otherwise could not be estimated for a single country, and yet document the finance–growth association with the objective of deriving some policy implications for each region (and the countries that belong to the region). Also, to benchmark middle- and low-income countries against high-income countries, we include high-income countries classified by the World Bank as either high-income OECD countries or high-income non-OECD countries.

Using a neo-classical growth model, and in agreement with King and Levine (1993a), and Levine, Loayza, and Beck (2000), among others, we find strong long-run linkages between financial development and economic growth for developing countries. Specifically, as predicted in neo-classical growth models (Pagano, 1993), domestic gross savings is positively related to growth. Moreover, other proxies for financial development, such as domestic credit provided by the banking sector and domestic credit provided to the private sector, are positively related to economic growth.

Furthermore, consistent with the standard results for conditional convergence (Barro, 1997; Bekaert et al., 2005), we find that a low initial GDP per capita level is associated with a higher-rate of economic growth for most regions, after controlling for financial variables and real sector variables.

Likewise, using the Granger causality test developed by Toda and Yamamoto (1995), we find a two-way causality between finance and growth in all regions but Sub-Saharan Africa and East Asia & Pacific. This result is consistent with Shan, Morris, and Sun (2001) and Demetriades and Hussein (1996), who found bi-directional causality between finance and growth, but contrary to Christopoulos and Tsionas (2004), who found that the direction is from finance to growth. The results also provide some support to the theoretical models of Blackburn and Huang (1998) and Khan (2001), which predict a two-way causality between finance and growth.

However, we find that the causality runs from growth to finance in South Asia and in Sub-Saharan Africa, the two poorest regions in our sample. This result supports the views of Gurley and Shaw (1967), Goldsmith (1969), and Jung (1986), who hypothesized that in developing countries, growth leads finance because of the increasing demand for financial services.

The paper is organized as follows. Section 2 provides a literature review. Section 3 describes the data and the proxy measures of financial development, real sector, and economic growth. Section 4 describes the unbalanced panel estimations and multivariate time-series methodologies applied in the paper. Section 5 analyzes the empirical results, and Section 6 provides conclusions.

2. Literature review

Since the pioneering contributions of Goldsmith (1969), McKinnon (1973), and Shaw (1973) on the role of FD in promoting EG, the relationship between EG and FD has remained an important issue of debate among academics and policymakers (De Gregorio & Guidotti, 1995). Early economic growth theory argued that economic development is a process of innovations whereby the interactions of innovations in both the financial and real sectors provide a driving force for dynamic economic growth. In other words, exogenous technological progress determines the long-run growth rate, while financial intermediaries are not explicitly modeled to affect the long-run growth rate.

However, a growing contemporary theoretical and empirical body of literature shows how financial intermediation mobilizes savings, allocates resources, diversifies risks, and contributes to economic growth (Greenwood & Jovanovic, 1990; Jbili, Enders, & Treichel, 1997). The new growth theory argues that financial intermediaries and markets appear endogenously in response to market incompleteness and, hence, contribute to long-term growth. Financial institutions and markets, which arise endogenously to mitigate the effects of information and transaction cost frictions, influences decisions to invest in productivity-enhancing activities through evaluating prospective entrepreneurs and funding the most promising ones. The underlying assumption is that financial intermediaries can provide these evaluation and monitoring services more efficiently than individuals.

An important set of authors in the literature agrees that there is a relation between finance and economic growth. However, they disagree about the direction of causality. On one hand, some authors have theoretically and empirically shown that there is causal direction from FD to EG. That is, policies that move toward the development of financial systems lead to economic growth. McKinnon (1973), King and Levine (1993a), Levine et al. (2000), and Christopoulos and Tsionas (2004) support this argument. On the other hand, other authors argue that the direction is from economic growth to financial development. Since the economy is growing, there is an increasing demand for financial services that induces an expansion in the financial sector. This view is supported by Gurley and Shaw (1967), Goldsmith (1969), and Jung (1986).

[2] For instance, Calderon and Liu (2003) and Bekaert, Harvey, and Lundblad (2005) ran regressions using 109 and 95 worldwide countries, respectively. Shan, Morris, and Sun (2001) studied 10 developed countries running regressions for each country.

Other authors argue that the causal direction is two-way. Financial development (FD) and economic growth (EG) reinforce each other. FD supports EG and EG renders support to FD. Patrick (1966) postulated the stage of development hypothesis. At the early stage, causality runs from finance to growth, but at later stages causality runs from growth to finance. In the early stage of economic development, finance causes growth by inducing real per capita capital formation. Later on, the economy is in the growth stage and there will be increasing demand for financial services, which induces an expansion in the financial sector as well as the real sector. This implies causality from growth to finance. Blackburn and Huang (1998) also established a positive two-way causal relationship between growth and financial development. According to their analysis, private informed agents obtain external financing for their projects through incentive-compatible loan contracts, which are enforced through costly monitoring activities that lenders may delegate to financial intermediaries. More recently, Khan (2001) also established a positive two-way causality between finance and growth. He postulated that when borrowing is limited, producers with access to loans from financial intermediaries obtain higher returns, which creates an incentive for others to undertake the technology necessary to access investment loans, which in turn reduces financing costs and increases economic growth.

Levine (1997, 2005) surveyed a large amount of empirical research that deals with the relationship between the financial sector and long-run growth. Levine (1997) argued that financial systems can accomplish five functions to ameliorate information and transactions frictions and contribute to long-run growth. These functions are: facilitating risk amelioration, acquiring information about investments and allocating resources, monitoring managers and exerting corporate control, mobilizing savings, and facilitating exchange. These functions facilitate investment and, hence, higher economic growth.

The results in the literature, however, are ambiguous. On one hand, cross-country and panel data studies find a positive effect of financial depth on economic growth after accounting for other determinants of growth and potential biases induced by simultaneity, omitted variables or country-specific effects (Levine, 2005), suggesting that the causality runs from finance to growth (see Christopoulos & Tsionas, 2004; Khan & Senhadji, 2003; King & Levine, 1993a, 1993b; Levine et al., 2000). Furthermore, Claessens and Laeven (2005) related banking competition and industrial growth and found that the higher the competition among banks, the faster the growth of finance-dependent industries, suggesting also that higher financial development precedes economic growth.

On the other hand, Demetriades and Hussein (1996) and Shan et al. (2001), using time-series techniques, found that the causality is bi-directional for the majority of countries in their sample. Furthermore, Luintel and Khan (1999), using a sample of 10 developing countries, concluded that the causality between financial development and output growth is bi-directional for the 10 countries they studied. Calderon and Liu, using a sample of 109 developing and developed countries, found evidence that financial development generally leads to economic growth for developed countries, but that the Granger causality is two-way for developing countries.

Since financial development is not easily measurable, papers attempting to study the link between financial deepening and growth have chosen a number of proxy measures and subsequently have come up with different results (Al-Awad & Harb, 2005; Chuah & Thai, 2004; Hassan & Bashir, 2003; Khan & Senhadji, 2003; King & Levine, 1993a; Savvides, 1995; among others). However, the general consensus of these studies is that there is a positive correlation between financial development and economic growth.

3. Data and proxy measures

3.1. Structuring the panel dataset

Our sample period is 1980–2007, which covers an era of financial liberalization and development in many countries as well as output expansion, money growth, and an increasing volume of investment. Our comprehensive original dataset includes 168 countries and uses the nested panel data structure from the World Bank's *World Development Indicators* (WDI) 2009 database.[3]

To study how financial development and the real sector are linked to economic growth, we followed the World Bank classifications, which categorize all World Bank member economies, and all other economies with populations of more than 30,000 people, into six geographic regions and four income groups. Countries by regions, variable definitions, and time-series averages are listed in Appendix A.

This dataset allows us effectively to estimate panel regressions and analyze various multivariate time-series models within each geographic region and income group. Despite the shortcomings from regional aggregations, we believe that our approach to estimate models based on geographic regions and income groups has several advantages in terms of providing policy implications compared to previous time-series and cross-sectional studies that include large numbers of heterogeneous countries or individual cases. Each region is a set of homogeneous countries (e.g., similar GDP per capita, finance structure, culture, etc.) but with enough variation in explanatory variables to perform panel regressions and multivariate time-series models. Therefore, it is possible to document the association between finance and growth by dynamically examining different economic roles, causality, directions, and timing among proxy measures for financial development and economic growth across geographic regions and income groups with the objective of documenting financial liberalization and assessing some policy implications.

3.2. Proxy measures for financial development and economic growth

Various measures have been used in the literature to proxy for the "level of financial development," ranging from interest rates, to monetary aggregates, to the ratio of the size of the banking system to GDP (Al-Awad & Harb, 2005; Chuah & Thai, 2004; among others). For this study, we collected proxy measures for financial development and real sector and economic growth from the World Bank's *World Development Indicators* 2009 (WDI) database for the period from 1980 to 2007. In our analysis, we used GDP per capita growth rates as a proxy for economic growth (GROWTH). We also used six variables to measure financial development and the size of the real sector. Our proxy measures for FD incorporate information from banks and other financial intermediaries in addition to loan markets.

The first proxy is domestic credit provided by the banking sector as a percentage of GDP (DCBS). Higher DCBS indicates a higher degree of dependence upon the banking sector for financing. In other words, higher DCBS implies higher FD because banks are more likely to provide the five financial functions discussed in Levine (1997). It is assumed, however, that banks are not subject to mandated loans to priority sectors, or obligated to hold government securities, which may not be suitable for developing countries.

[3] The total number of countries in the WDI database is 209. However, we dropped countries that do not have enough data for analysis.

Because of this shortcoming, we also used domestic credit to the private sector as a percentage of GDP (DCPS) to measure FD. A high ratio of domestic credit to GDP indicates not only a higher level of domestic investment, but also higher development of the financial system. Financial systems that allocate more credit to the private sector are more likely to be engaged in researching borrower firms, exerting corporate control, providing risk management control, facilitating transactions, and mobilizing savings (Levine, 2005), which requires a higher degree of financial development.

We also used the broadest definition of money (M3) – as a proportion of GDP – to measure the liquid liabilities of the banking system in the economy. We used M3 as a financial depth indicator because the other two monetary aggregates (M2 or M1) may be a poor proxy in economies with underdeveloped financial systems because they "are more related to the ability of the financial system to provide transaction services than to the ability to channel funds from savers to borrowers" (Khan & Senhadji, 2000, p. ii93). A higher liquidity ratio means higher intensity in the banking system. The assumption here is that the size of the financial sector is positively associated with financial services (King & Levine, 1993b).[4]

The fourth indicator of financial development is the ratio of gross domestic savings to GDP (GDS). Pagano (1993) concluded that the steady state growth rate depends positively on the percentage of savings diverted to investment, suggesting that converting savings to investment is one channel through which financial deepening affects growth. In other words, financial development is expected to benefit from higher GDS and, consequently, higher volume of investment. Moreover, in most developing countries, financial repression and credit controls lead to negative real interest rates that reduce the incentives to save. According to this view, a higher GDS resulting from a positive real interest rate stimulates investment and growth (McKinnon, 1973; Shaw, 1973).

We followed the procedure of Levine et al. (2000) to address the potential stock-flow problem of our financial variables. The stock-flow problem refers to the fact the financial balance sheet items are measured at the end of the year, whereas GDP is measured throughout the year. We deflated end-of-year financial balance sheet items by end-of-year consumer price index (CPI), and then we computed the average of the real financial balance sheet items in years t and $t-1$ and divided it by real GDP in year t.[5]

The fifth and sixth indicators used in this study are the ratio of trade to GDP (TRADE) and the ratio of general government final consumption expenditure to GDP (GOV), respectively. They effectively measure the size of the real sector and the weight of fiscal policy. Many developing countries tend to rely heavily on international trades to achieve economic growth while financial liberalization is still in progress. In addition, some countries use expansionary or contractionary fiscal policies for steady economic growth by adjusting government spending. Finally, we included the inflation rate (INF) to control for price distortions.

4. Panel estimations and multivariate time-series methodology

4.1. Panel estimations with convergent term

To examine the general relationship between financial development, the real sector, and economic growth, we estimated panel regressions for each region as well as pooled data. Specifically, to study the long-term association between GDP per capita and the proxy variables, we followed the neo-classical growth model (see Mankiw, 1995).[6] Define growth of real GDP per capita as:

$$\text{GROWTH}_{i,t} = \log \text{GDPPC}_{i,t} - \log \text{GDPPC}_{i,t-1}, \quad i = \{1, 2, \ldots N\} \quad (1)$$

where GDPPC is the real GDP per capita and N is the number of countries in the region. Let $Q_{i,0}$ be the initial level of log(GDPPC) and Q_i^* the (long-run) steady state GDP per capita. The first-order approximation of the neo-classical growth model implies that

$$\text{GROWTH}_{i,t} = -\lambda(Q_{i,t} - Q_{i,t}^*)$$

where λ is a positive convergent parameter. The literature often implicitly models Q_i^* as a linear function of structural parameters; therefore, a typical growth relationship is:

$$\text{GROWTH}_{i,t} = -\lambda Q_{i,t} + \gamma' X_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $X_{i,t}$ is a vector of variables controlling for long-run GDP per capita across countries. Therefore, our regression models are:

$$\text{GROWTH}_{i,t} = \beta_0 Q_{i,1980} + \beta_1 \text{FIN}_{i,t} + \beta_2 \text{GDS}_{i,t} + \beta_3 \text{TRADE}_{i,t} + \beta_4 \text{GOV}_{i,t} + \beta_5 \text{INF}_{i,t} + \varepsilon_{i,t} \quad (3)$$

where $Q_{i,1980}$ is the log of GDP per capita and represents the initial GDP per capita proxy, whereas $\text{FIN}_{i,t} = \{\text{DCPS}_{i,t}, \text{DCBS}_{i,t}, \text{M3}_{i,t}\}$, represents different proxies for financial depth and development. In each regression, we included only two financial variables (FIN and GDS) because DCPS, DCBS and M3 are highly correlated amongst themselves for most developing countries. Thus, we performed three separate regressions to study the impact of finance on economic growth. To control for business cycles, we calculated nine non-overlapping-five-year averages for each variable and included a dummy variable for each quinquennium. We performed ordinary least squares (OLS) regressions using robust-heteroscedastic errors. Finally, since the number of countries differs in each region, we used weighted least square regressions (WLS) when estimating the pooled (worldwide) regression. Each set of regression was performed on the six geographic regions and on two high-income groups.

4.2. Multivariate time-series models

The precedent model regressions study association, but not causality, among variables. To consider dynamic causality, direction, and timing between financial development and economic growth, we estimated vector autoregressive (VAR) models (Sims, 1980) and tested whether and what proxy variables Granger-cause economic growth and vice versa. Granger causality tests allow us to overcome the endogeneity problem presented in panel regressions in the sense that VAR equations consider all variables as endogenous. In analyzing the results from the VAR model, we tested Granger causality among variables and focus on two tools: impulse response function (IRF) and forecast error variance decomposition (FEVD). IRF shows how one variable responds over time to a single innovation in itself or in another variable. Innovations in the variables are represented by shocks to the error terms in the equations of the *structural* VAR form. More importantly, we computed forecast error variance decompositions of GROWTH to examine what proxy measures are most important in economic growth over time and how much they contribute to economic growth.

Our VAR specification includes a total of six variables, including proxy measures for financial development (DCPS, and GDS), the real sector (TRADE, GOV and INF), and economic growth (GROWTH)

[4] Nevertheless, M3 may be influenced by factors other than financial depth, especially in developed countries.

[5] See Appendix A for calculation details.

[6] The model used in this paper has been used extensively in the literature. See for example, Barro and Sala-i-Martin (1995), Barro (1997), and Bekaert et al. (2005).

across six geographic regions and two high-income groups. Formally, the *standard* VAR model is expressed as:

$$Y_t = C + \sum_{s=1}^{m} A_s Y_{t-s} + e_t \quad (4)$$

where Y_t is a 6×1 column vector of 6 variables including proxy measures (GROWTH, DCPS, GDS, TRADE, GOV, INF); C and A_s are, respectively, 6×1 and 6×6 matrices of coefficients; m is the lag length; and e_t is a 6×1 column vector of forecast errors. By VAR construction, the elements of the vector e_t have zero means and constant variances, and are individually serially uncorrelated.[7] The ijth component of A_s measures the direct effect that a change on the jth variable would have on the ith variable in s periods.

We used Toda and Yamamoto's (1995) procedure to test Granger causality. It is well known that F test of causality in VAR is not valid in the presence of non-stationary series. Toda and Yamamoto (1995), however, propose a procedure that is robust enough to address the cointegration features of the series (e.g. it is valid without regard to the cointegration process of the variables). The procedure basically involves four steps. First, find the highest order of integration in the variables ($d_{\max}$). Second, find the optimal number of lag for the VAR model (m). Third, overfit (on purpose) the VAR by estimating a ($m + d_{\max}$) th order VAR using seemingly unrelated regression (SUR). We used SUR because the Wald test gains efficiency if the VAR is estimated using SUR (Caporale & Pittis, 1999). Finally, test the null hypothesis of no Granger causality using the Wald test, which follows a χ^2 distribution with m degrees of freedom.

We also used the estimated VAR to calculate impulse response functions on growth to innovations in each of the variables, as well as FEDV for each variable. The impulse response functions show how shock in our financial measures affects growth over time, whereas the decomposition of forecast error variance provides a measure of the overall relative importance of the variables in generating the fluctuations in proxy measures on their own and for other variables.

5. Empirical results

5.1. Summary statistics of proxy measures

Table 1 compares key financial and real indicators along with the economic growth proxy across geographic regions and income groups. Among geographic regions made up of developing countries, Latin America & Caribbean has the highest GDP per capita, followed by Europe & Central Asia and Middle East & North Africa (MENA), whereas Sub-Saharan Africa shows the lowest GDP per capita (see medians).

East Asia & Pacific countries have growth rates comparable to those of high-income countries, reflecting the rapid economic expansion of many Asian countries in recent decades. Furthermore, Sub-Saharan Africa has the lowest median GDP per capita, followed by South Asia, which denotes the poverty level of those regions. Interesting, despite its low GDP per capita, South Asia has the highest GDP per capita growth among the regions. In general, developing countries (except those in South Asia) have experienced, at least for one year, negative GDP per capita growth during the sample period mainly due to economic recession or the political instability prevalent in those regions.

As expected, high-income OECD countries possess the highest values of DCBS, DCPS, and M3 proxy measures, which represent the relatively large sizes of their financial systems and their financial depth. It is obvious that developed countries with efficient financial intermediaries still tend to rely heavily on domestic credits provided by the banking sector and have plenty of liquid liabilities in their banking systems. However, financial depth indicators in the South Asia and Sub-Saharan Africa regions are relatively low, implying that they have insufficient credit available to their private sectors and inefficient financial systems, which may impair economic growth in these regions. However, most regions show a similar size of gross domestic savings as a percentage of GDP.

Latin America & Caribbean and Middle East & North Africa countries show trade levels similar to those of OECD countries. East Asia & Pacific has the highest level of trade, whereas South Asia and Sub-Saharan Africa have the lowest levels. Non-OECD countries have higher trade levels than OECD countries. In the latter countries, most trade is in commodities (such as petroleum and agriculture). Government expenditure is lower for middle- and low-income countries compared to high-income countries. Europe & Central Asia and Latin America & Caribbean are the regions with the highest inflation levels during the period.

5.2. Analysis of panel regressions

Table 2 shows results for panel regressions. Panels A, B, and C provide different regressions in which domestic credit to the private sector (DCPS), domestic credit provided by the banking sector (DCBS) and liquid liabilities (M3), respectively, pair with gross domestic savings (GDS) as financial development measures. These financial measures, as well as the other control variables, proxy for the steady state level of GDP.

The theoretical model explained above suggests that the coefficient for Q should be negative (see Eq. (2)). As expected, given the standard results for conditional convergence, the coefficients for Q, when significant, are negative for all regions but Latin America & Caribbean. These results are consistent with the previous literature (see, for example, Barro, 1997; Barro & Sala-i-Martin, 1995; Bekaert et al., 2005) and imply that a low level of initial GDP per capita is associated with a higher growth rate, conditional on the other variables. Nevertheless, the significant positive sign in Latin America & Caribbean suggests a decline in growth of the real GDP per capita since 1980 in this region.

Panel A displays results when DCPS and GDS are used as proxies for financial development. GDS, when significant, has a positive sign in all regions, confirming a long-run positive relationship between savings and growth as predicted in Pagano's (1993) theoretical model. This is also consistent with the argument that well-developed domestic financial sectors in developing countries may significantly contribute to an increase in savings and investment rates, which ultimately trigger economic growth (Becsi & Wang, 1997). GDS is significant in South Asia, Sub-Saharan Africa, and high-income OECD countries. For example, in South Asia the GDS coefficient is 2.35 and more than the 2 standard error from zero. This suggests that on average, a 1% increase in GDS implies a 2.35% increase in growth.

DCPS is significant and positively associated with growth in East Asia & Pacific and Latin America & Caribbean. The results are consistent with previous studies, which find a positive relationship between measures of financial development and growth (see Levine, 2005).

However, the results relating to high-income countries are surprising, since they indicate a significant negative relationship

[7] In the *structural* VAR system (not shown) the error terms are assumed to be white-noise disturbances. Under this assumption, errors in the *standard* form are individually serially uncorrelated, but there may be contemporaneous correlations among them. See Enders (2009) for a detailed explanation of VAR.

Table 1
Summary of statistics by region (1980–2007).

	Economic growth		Financial development				Real sector		
	GDP per capita (US $)	Growth (%)	DCPS (%)	DCBS (%)	M3 (%)	GDS (%)	TRADE (%)	GOV (%)	INF (%)
East Asia & Pacific (*N* = 14)									
Mean	1,049.3	3.0	43.0	51.2	51.4	18.1	93.3	14.4	9.9
Median	717.3	2.7	33.4	38.6	41.3	18.2	96.4	14.0	6.9
Max	3,237.2	8.4	128.2	156.8	110.6	38.4	162.6	26.5	34.3
Min	297.4	0.0	6.5	6.5	13.7	−17.0	40.9	5.0	3.1
Europe & Central Asia (*N* = 20)									
Mean	1,842.1	1.0	18.8	30.0	28.3	15.6	85.0	16.2	118.0
Median	1,438.4	1.6	16.3	29.9	26.5	15.8	89.7	17.2	51.3
Max	4,216.6	3.8	44.2	57.4	60.2	32.6	122.9	24.2	414.9
Min	256.0	−3.1	6.2	13.2	8.2	−0.4	34.2	9.6	12.1
Latin America & Caribbean (*N* = 28)									
Mean	2,865.2	1.3	36.6	56.5	46.3	15.5	78.7	14.6	74.8
Median	2,572.1	0.9	33.5	49.4	38.1	15.8	69.4	13.5	15.0
Max	7,149.0	4.0	70.1	177.6	101.3	28.2	180.9	29.8	515.6
Min	547.1	−2.5	14.0	20.4	21.8	2.1	20.0	6.9	1.5
Middle East & North Africa (*N* = 12)									
Mean	2,026.6	0.9	35.2	58.8	68.5	11.1	72.3	19.1	14.9
Median	1,406.3	1.3	33.7	55.8	60.2	15.3	65.4	16.3	7.8
Max	6,714.0	2.6	70.6	131.9	172.4	34.9	123.8	30.0	77.1
Min	498.8	−2.0	5.5	6.7	20.7	−23.8	38.4	13.1	4.3
South Asia (*N* = 7)									
Mean	727.3	3.7	21.7	35.6	40.1	20.4	62.4	12.3	7.7
Median	485.8	3.6	22.6	40.2	41.0	13.9	42.8	11.3	7.8
Max	2,403.9	5.9	30.4	50.4	47.8	44.7	163.9	20.6	11.0
Min	193.5	2.1	8.1	6.4	30.3	11.1	22.8	4.7	5.4
Sub-Saharan Africa (*N* = 40)									
Mean	849.1	0.5	30.9	80.3	40.7	7.8	71.5	16.7	88.3
Median	298.8	0.4	13.9	23.6	23.8	6.0	60.0	15.0	10.0
Max	5,904.8	5.0	515.0	1702.0	348.5	45.8	160.1	42.5	1302.4
Min	127.9	−6.2	1.8	−30.2	12.9	−38.5	25.4	8.4	2.7
High-income OECD (*N* = 27)									
Mean	19,476.5	2.2	85.3	103.6	72.4	23.8	77.7	19.0	5.1
Median	20,251.1	1.9	79.0	97.5	65.5	23.0	68.5	19.0	4.1
Max	36,442.1	5.6	183.1	265.7	194.2	37.8	220.0	27.2	15.3
Min	3,795.0	1.0	39.5	52.4	38.6	12.4	21.8	10.5	1.0
High-income non-OECD (*N* = 20)									
Mean	13,098.3	2.3	60.1	62.5	75.3	31.9	143.1	18.8	6.6
Median	10,486.7	2.7	53.7	48.8	64.1	30.5	116.3	19.0	3.9
Max	29,766.1	11.6	146.0	147.5	208.1	64.8	414.7	30.4	47.8
Min	2,809.2	−2.4	9.7	14.9	11.0	11.9	74.0	8.1	0.6

This table summarizes country-year statistics for six geographic regions and high-income OECD and non-OECD countries classified according to the World Bank. The time-series average of each variable is calculated and then statistics are collected cross-country. Economies are divided according to 2008 GNI per capita, calculated using the World Bank Atlas method. The groups are: low income, $975 per capita or less; lower middle income, $976–$3855 per capita; upper middle income, $3856–$11,905 per capita; and high income, $11,906 per capita or more. Geographic classifications are assigned only for low-income and middle-income economies. DCPS: domestic credit provided to private sector; DCBS: domestic credit provided by banking sector; M3: liquid liabilities; GDS: gross domestic savings; TRADE: import plus export; GOV: government expenditure, all as a proportion of GDP; INF: inflation rate. Detailed variable definitions are presented in Appendix A.

between DCPS and growth. This result contradicts what has been found in previous studies and highlights the importance of studying the relationship between finance and growth by income groups as opposed to an aggregation of worldwide economies. In fact, DCPS is not significant when pooling the worldwide data. Benhabib and Spiegel (2000) argue that not all indicators of financial development measure the same forces. We believe that our measures of financial development are more suitable for developing countries, since they are weighted more towards financial markets (banking) than capital market development (stock and bond markets). We acknowledge that our measures might not be measuring financial development in the case of high-income OECD countries.[8]

The worldwide-pooled regression shows that GDS is positive and significant, implying a long-term association between finance and growth. The level of trade has also positively impacted growth, whereas government expenditure and inflation have impaired growth since the 1980s. The latter results are significant for East Asia & Pacific, Europe & Central Asia, and Sub-Saharan Africa, denoting that government fiscal policies and price instability have harmed economic growth in those regions. Also, trade has been an important driver of growth in East Asia & Pacific, Latin America & Caribbean and Middle East & North Africa.

Panel B describes results when DCBS and GDS serve as proxies for financial development. As in the previous cases, Q is negative for East Asia & Pacific and Middle East & North Africa and positive for Latin America & Caribbean. There are also significantly negative coefficients for GOV in some regions, which implies that government expenditure has impeded growth. As found in Panel A, there is a positive relationship between GDS and growth rate. Moreover, the signs for DCBS enter positively for middle- and low-income countries but negatively for OECD high-income countries. These results together suggest a long-term association between finance and growth. Similar to panel A, trade has positive association with growth, whereas GOV and INF have negative association.

[8] Nevertheless, we were able to replicate King and Levine's (1993a, 1993b) finding: a significant positive association between DCPS and real GDP per capita growth in the period 1960–1989. DCPS is no longer significant after the 1990s.

Table 2
Economic growth regressions.

Panel A. Domestic credit provided to private sector

	C	*Q*	DCPS	GDS	TRADE	GOV	INF	Obs	Adj R^2
East Asia & Pacific	15.41*** (4.22)	−3.16*** (0.65)	1.20** (0.58)	0.29 (0.70)	1.81* (1.05)	−2.08** (0.93)	−14.47*** (4.96)	50	0.56
Europe & Central Asia	4.28 (10.27)	0.55 (1.01)	−0.07 (0.68)	0.52 (0.61)	1.73 (1.80)	−3.69* (2.02)	−6.71*** (1.44)	42	0.71
Latin America & Caribbean	−11.45*** (4.29)	0.80* (0.41)	0.68* (0.37)	−0.03 (0.37)	1.20*** (0.46)	−0.19 (0.56)	−1.01** (0.41)	128	0.33
Middle East & North Africa	0.53 (7.90)	−0.63 (1.01)	0.58 (0.48)	0.70 (0.62)	2.49** (0.88)	−3.04 (2.39)	2.93 (6.87)	32	0.29
South Asia	−7.13 (5.20)	0.63 (0.73)	−0.77 (1.17)	2.35** (1.04)	0.95 (0.84)	0.04 (0.80)	−23.20 (14.44)	28	0.39
Sub-Saharan Africa	0.59 (2.35)	−0.51 (0.32)	−0.38 (0.34)	0.70** (0.27)	0.86 (0.65)	0.12 (0.86)	−2.88*** (0.44)	145	0.26
High-Income OECD	9.87** (4.68)	−0.80** (0.37)	−0.57** (0.27)	1.21* (0.66)	0.31 (0.26)	−0.89 (0.61)	−11.38 (7.12)	127	0.38
High-Income Non-OECD	35.95*** (11.03)	−1.32 (1.02)	−3.17** (1.34)	−2.74 (1.86)	2.55 (1.54)	−3.57** (1.76)	−0.42 (8.79)	62	0.58
Pooled	4.16*** (1.48)	−0.10 (0.15)	−0.40 (0.31)	0.62** (0.27)	0.88** (0.35)	−1.46*** (0.48)	−4.17*** (1.04)	614	0.27

Panel B. Domestic credit provided by banking sector

	C	*Q*	DCBS	GDS	TRADE	GOV	INF	Obs	Adj R^2
East Asia & Pacific	15.66*** (4.20)	−3.30*** (0.69)	1.17* (0.58)	0.27 (0.68)	1.94* (1.05)	−2.10** (0.92)	−16.03*** (4.94)	50	0.55
Europe & Central Asia	4.99 (10.64)	0.90 (1.08)	−1.48 (0.97)	0.40 (0.63)	1.59 (1.81)	−2.98 (2.25)	−6.32*** (1.45)	43	0.73
Latin America & Caribbean	−11.08** (4.23)	0.81* (0.42)	0.07 (0.46)	0.07 (0.37)	1.42*** (0.49)	0.00 (0.59)	−1.03** (0.43)	128	0.32
Middle East & North Africa	−4.64 (8.66)	−1.49* (0.87)	1.53** (0.63)	1.54** (0.67)	2.95*** (0.90)	−1.92 (2.32)	0.40 (6.50)	33	0.33
South Asia	−12.18*** (3.48)	0.01 (0.58)	0.74** (0.33)	3.04*** (0.88)	1.61** (0.62)	−0.32 (0.63)	−29.22** (11.16)	27	0.47
Sub-Saharan Africa	2.49 (2.33)	−0.46 (0.30)	0.04 (0.30)	0.42 (0.26)	0.72 (0.63)	−0.71 (0.87)	−2.68*** (0.37)	140	0.26
High-Income OECD	14.71*** (4.20)	−0.58 (0.36)	−1.32*** (0.36)	0.95 (0.63)	0.17 (0.26)	−1.49** (0.61)	−12.77** (6.14)	127	0.42
High-Income Non-OECD	44.71** (19.49)	−2.57 (1.65)	−1.49 (1.14)	−2.13 (2.21)	1.00 (1.24)	−3.12* (1.85)	0.74 (8.55)	60	0.36
Pooled	4.57*** (1.43)	−0.07 (0.14)	−0.42 (0.27)	0.52** (0.24)	0.61* (0.32)	−1.13*** (0.37)	−3.98*** (0.95)	608	0.26

Panel C. Liquid liabilities

	C	*Q*	M3	GDS	TRADE	GOV	INF	Obs	Adj R^2
East Asia & Pacific	13.43*** (4.30)	−3.22*** (0.73)	1.30 (0.79)	0.62 (0.70)	2.12* (1.10)	−2.50** (1.08)	−15.09*** (5.03)	50	0.55
Europe & Central Asia	4.19 (9.75)	1.19 (0.96)	−2.17** (0.84)	0.67 (0.49)	1.81 (1.65)	−3.19* (1.81)	−6.27*** (1.31)	43	0.75
Latin America & Caribbean	−10.99** (4.23)	0.80* (0.42)	0.12 (0.64)	0.08 (0.37)	1.35** (0.53)	0.03 (0.66)	−0.94** (0.41)	129	0.31
Middle East & North Africa	−1.98 (12.95)	−0.49 (0.99)	0.68 (1.53)	0.94 (1.00)	2.39** (1.07)	−2.87 (2.79)	−1.58 (7.13)	33	0.19
South Asia	−5.88 (7.76)	0.45 (0.57)	−1.28 (2.32)	2.54** (0.93)	1.22* (0.62)	0.38 (1.16)	−24.89* (14.17)	28	0.38
Sub-Saharan Africa	0.61 (2.58)	−0.61** (0.30)	0.34 (0.56)	0.63** (0.28)	0.80 (0.64)	−0.30 (0.84)	−2.53*** (0.41)	146	0.24
High-income OECD	16.30*** (5.33)	−0.83** (0.35)	−1.78*** (0.56)	1.93* (1.05)	−0.36 (0.34)	−0.90 (0.66)	−13.12* (6.97)	78	0.39
High-income non-OECD	38.65*** (11.36)	−2.33* (1.17)	−1.99 (1.35)	−1.52 (1.98)	2.14 (1.75)	−3.57* (1.82)	1.89 (7.78)	62	0.53
Pooled	5.97*** (1.50)	−0.09 (0.13)	−1.07** (0.43)	0.80*** (0.27)	0.81** (0.34)	−1.21*** (0.44)	−4.01*** (0.94)	569	0.28

The table shows regression results for economic growth determinants. Each equation is estimated using OLS heteroskedastic-consistent error. The pooled regression uses WLS, where the weights are the inverse of number of countries by regions. GROWTH: the difference between natural logarithm of GDP per capita minus its lagged value; Q: GDP per capita in 1980; DCPS: domestic credit provided to private sector divided by GDP; GDS: gross domestic savings divided by GDP; TRADE: import plus export divided by GDP; GOV: general government consumption expenditure divided by GDP. All independent variables are in natural logarithm. INF is the log of one plus inflation rate. Except Q, each variable is a five-year non-overlapping average. The regression has dummy variables for each quinquennium (coefficients not reported). The hetero-robust adjusted standard errors are in brackets. The signs ***, ** and * denote significance at 1%, 5% and 10%, respectively. The sample period is 1980–2007.

Table 3
Forecast error variance decompositions of economic growth in VAR.

Period	GOV	INF	TRADE	GDS	DCPS	GROWTH
East Asia & Pacific						
2 years ahead	0.4	12.5	3.5	0.2	6.2	77.3
5 years ahead	0.3	12.8	4.0	0.3	6.2	76.4
10 years ahead	0.4	13.0	4.2	0.4	6.8	75.2
Europe & Central Asia						
2 years ahead	2.4	5.4	2.1	2.8	2.0	85.3
5 years ahead	9.7	4.6	4.8	5.2	3.1	72.7
10 years ahead	15.1	4.6	6.7	5.8	2.8	65.0
Latin America & Caribbean						
2 years ahead	0.3	4.7	0.3	0.2	1.8	92.7
5 years ahead	1.3	5.4	1.8	1.5	2.2	87.7
10 years ahead	1.4	5.4	2.2	2.0	2.6	86.4
Middle East & North Africa						
2 years ahead	15.3	2.2	9.0	0.4	1.7	71.4
5 years ahead	16.5	2.2	10.9	0.4	1.8	68.2
10 years ahead	17.1	2.5	11.5	0.5	1.7	66.8
South Asia						
2 years ahead	4.3	3.1	2.1	14.9	1.1	74.4
5 years ahead	4.3	3.6	2.1	14.9	1.7	73.3
10 years ahead	4.3	3.6	2.1	15.1	2.7	72.2
Sub-Saharan Africa						
2 years ahead	0.6	2.9	6.6	0.6	3.5	85.8
5 years ahead	0.7	4.4	7.2	0.6	3.3	83.8
10 years ahead	0.7	5.1	7.2	0.7	3.4	83.0
High-income OECD						
2 years ahead	15.4	13.2	1.7	0.3	1.3	68.1
5 years ahead	15.2	14.9	2.5	0.3	2.5	64.6
10 years ahead	15.1	14.8	2.6	0.3	2.9	64.3
High-income non-OECD						
2 years ahead	12.9	0.1	9.8	0.5	13.9	62.8
5 years ahead	13.5	0.2	11.2	0.9	15.9	58.3
10 years ahead	13.9	0.3	11.8	1.0	18.4	54.6

This table summarizes error variance decompositions of economic growth for six geographic regions and two groups of high-income countries classified according to the World Bank. Geographic classifications are assigned only to low-income and middle-income economies. GROWTH: the difference between natural logarithm of GDP per capita and its lagged value; DCPS: domestic credit provided to private sector divided by GDP; GDS: gross domestic savings divided by GDP; TRADE: import plus export divided by GDP; GOV: general government consumption expenditure divided by GDP. All independent variables are in natural logarithm. INF is the log of one plus inflation rate. The sample period is 1980–2007.

Panel C portrays results when M3 and GDS serve as proxies for financial development. The results are similar to those presented in panels A and B. That is, the initial GDP per capita is positively related to growth rate (except in Latin America & the Caribbean), GDS and TRADE are positively associated with growth rate, and GOV and INF are negatively related to growth. However, as seen in the pooled regression as well as the regression for Europe & Central Asia and high-income OECD countries, M3 is negatively related to growth rate.

In summary, our results show that trade has positively impacted economic growth, whereas government expenditure and inflation have impaired economic growth worldwide. Also, consistent with the neo-classical literature, the level of GDS is positively related with economic growth and both DCPS and DCBS are positively associated with economic growth. Thus, given the positive coefficients for our financial measures in low- and middle-income countries, we can conclude that there is a positive relationship between financial depth and economic growth in developing countries.

5.3. Analysis of VAR results by geographic regions and income groups

We turn to the VAR analysis for regions by highlighting the most important results first, and then providing detailed analysis of each region. We have decomposed the forecast error of the endogenous variable GROWTH over different time horizons into components attributable to unexpected innovations (or shocks) of itself and proxy measures in the dynamic VAR system. The forecast error variance decompositions of GROWTH in VAR across geographic regions (and income groups) are presented in Table 3. It is typical in VAR analysis that a variable explains a huge proportion of its forecast error variance, which is the case in our analysis of GROWTH variation, which explains the biggest part of itself in all regions. The second, more important variable in explaining GROWTH variation is not a finance measure, except in South Asia, where GDS explains a high proportion of GROWTH variation. Rather, real sector variables (government expenditure, inflation, or trade) explain more GDP growth movements in all regions. However, financial depth still explains an important component of economic growth across regions.

GROWTH is said to be Granger-caused by proxy measures if proxy measures help in the prediction of GROWTH, or equivalently if the coefficients on the lagged proxy measures are statistically significant. A critical step of the Toda and Yamamoto (1995) procedure is the number of lags in the VAR. Using the Schwartz Bayesian criterion, the optimal number of lags is four or less for all regions, and therefore we set this value to four lags.[9] We report the results of the Granger causality tests in Table 4. The first column shows *p*-values of the hypothesis that each *i* variable does not cause GROWTH, where *i* = {DCPS, GDS, TRADE, GOV, INF}. At least either GDS or DCPS is significant for all regions but be East Asia & the Pacific and Sub Saharan Africa, meaning that financial development Granger-causes economic growth in those regions. TRADE is

[9] The maximum order of integration in all series is one. Toda and Yamamoto (1995) procedure can be applied regardless of whether there is cointegration among variables or not.

Table 4
Granger causality test (*p*-values).

Ho: The variable *i* = {DCPS, GDS, TRADE, GOV} does not cause GROWTH		Ho: The variable *i* = {GROWTH, GDS, TRADE, GOV} does not cause DCPS		Ho: The variable *i* = {GROWTH, DCPS, TRADE, GOV} does not cause GDS	
East Asia & Pacific					
DCPS	0.94	GROWTH	0.00***	GROWTH	0.02**
GDS	0.31	GDS	0.31	GDS	0.04**
TRADE	0.04**	TRADE	0.00***	TRADE	0.43
GOV	0.10	GOV	0.07*	GOV	0.64
INF	0.09*	INF	0.00***	INF	0.40
Europe & Central Asia					
DCPS	0.00***	GROWTH	0.00***	GROWTH	0.04**
GDS	0.05**	GDS	0.06*	GDS	0.26
TRADE	0.08*	TRADE	0.96	TRADE	0.06*
GOV	0.33	GOV	0.24	GOV	0.25
INF	0.90	INF	0.00***	INF	0.39
Latin America & Caribbean					
DCPS	0.70	GROWTH	0.00***	GROWTH	0.04**
GDS	0.03**	GDS	0.35	GDS	0.53
TRADE	0.00***	TRADE	0.41	TRADE	0.42
GOV	0.00***	GOV	0.06*	GOV	0.77
INF	0.28	INF	0.00***	INF	0.11
Middle East & North Africa					
DCPS	0.01***	GROWTH	0.00***	GROWTH	0.00***
GDS	0.08*	GDS	0.09*	GDS	0.02**
TRADE	0.00***	TRADE	0.09*	TRADE	0.50
GOV	0.11	GOV	0.39	GOV	0.08*
INF	0.00***	INF	0.23	INF	0.30
South Asia					
DCPS	0.02**	GROWTH	0.17	GROWTH	0.01***
GDS	0.00***	GDS	0.46	GDS	0.97
TRADE	0.02**	TRADE	0.00***	TRADE	0.01***
GOV	0.24	GOV	0.11	GOV	0.02**
INF	0.01**	INF	0.04**	INF	0.02**
Sub-Saharan Africa					
DCPS	0.15	GROWTH	0.00***	GROWTH	0.08*
GDS	0.43	GDS	0.25	GDS	0.21
TRADE	0.01**	TRADE	0.07*	TRADE	0.66
GOV	0.38	GOV	0.25	GOV	0.62
INF	0.00***	INF	0.00***	INF	0.66
High-income OECD countries					
DCPS	0.00***	GROWTH	0.00***	GROWTH	0.00***
GDS	0.01**	GDS	0.65	GDS	0.49
TRADE	0.11	TRADE	0.64	TRADE	0.30
GOV	0.00***	GOV	0.45	GOV	0.00***
INF	0.00***	INF	0.53	INF	0.05**
High-income non-OECD countries					
DCPS	0.45	GROWTH	0.00***	GROWTH	0.04**
GDS	0.09*	GDS	0.13	GDS	0.43
TRADE	0.04**	TRADE	0.02**	TRADE	0.07*
GOV	0.52	GOV	0.70	GOV	0.02**
INF	0.01**	INF	0.00***	INF	0.00***

In this table, the Toda and Yamamoto (1995) procedure is used to test the Granger causality among variables. This procedure can be used in presence of cointegration or not. The table reports *p*-values from the WALD test. GROWTH: difference between natural logarithm of GDP per capita and its lagged value; DCPS: domestic credit provided to private sector divided by GDP; GDS: gross domestic savings divided by GDP; TRADE: import plus export divided by GDP; GOV: general government consumption expenditure divided by GDP. All independent variables are in natural logarithm. INF is the log of one plus inflation rate. The sample period is 1980–2007.

also significant in all regions, implying that trade Granger-causes EG.[10]

The second and third columns show Granger causality tests for DCPS and GDS, respectively. DCPS Granger-causes GROWTH for all regions but South Asia, while GDS Granger-causes GROWTH in all regions, implying that FD causes EG. Thus, Granger causality tests imply a two-way causality between finance and growth in all regions but Sub-Saharan Africa and East Asia & Pacific, where the direction is from finance to growth. Our results, for most of the regions, are consistent with the findings of Shan et al. (2001), and Demetriades and Hussein (1996), who found bi-directional causality between finance and growth, and contrary to Christopoulos and Tsionas (2004), who found that the direction is from finance to growth. Moreover, our results give some support to the theoretical models of Blackburn and Huang (1998) and Khan (2001), which predict two-way causality between finance and growth. However, causality runs from growth to finance in South Asia and Sub-Saharan Africa. This result supports the view of Gurley and Shaw (1967), Goldsmith (1969), and Jung (1986), who hypothesize that in developing countries, growth leads finance because of the increasing demand for financial services.

[10] Note that the emphasis in Granger causality tests is on *short-run* relationships, because the results of panel regression and cointegration tests strongly suggest the presence of *long-run* linkages between financial development and economic growth. (The results of cointegration tests are not shown to preserve space and are available upon request.)

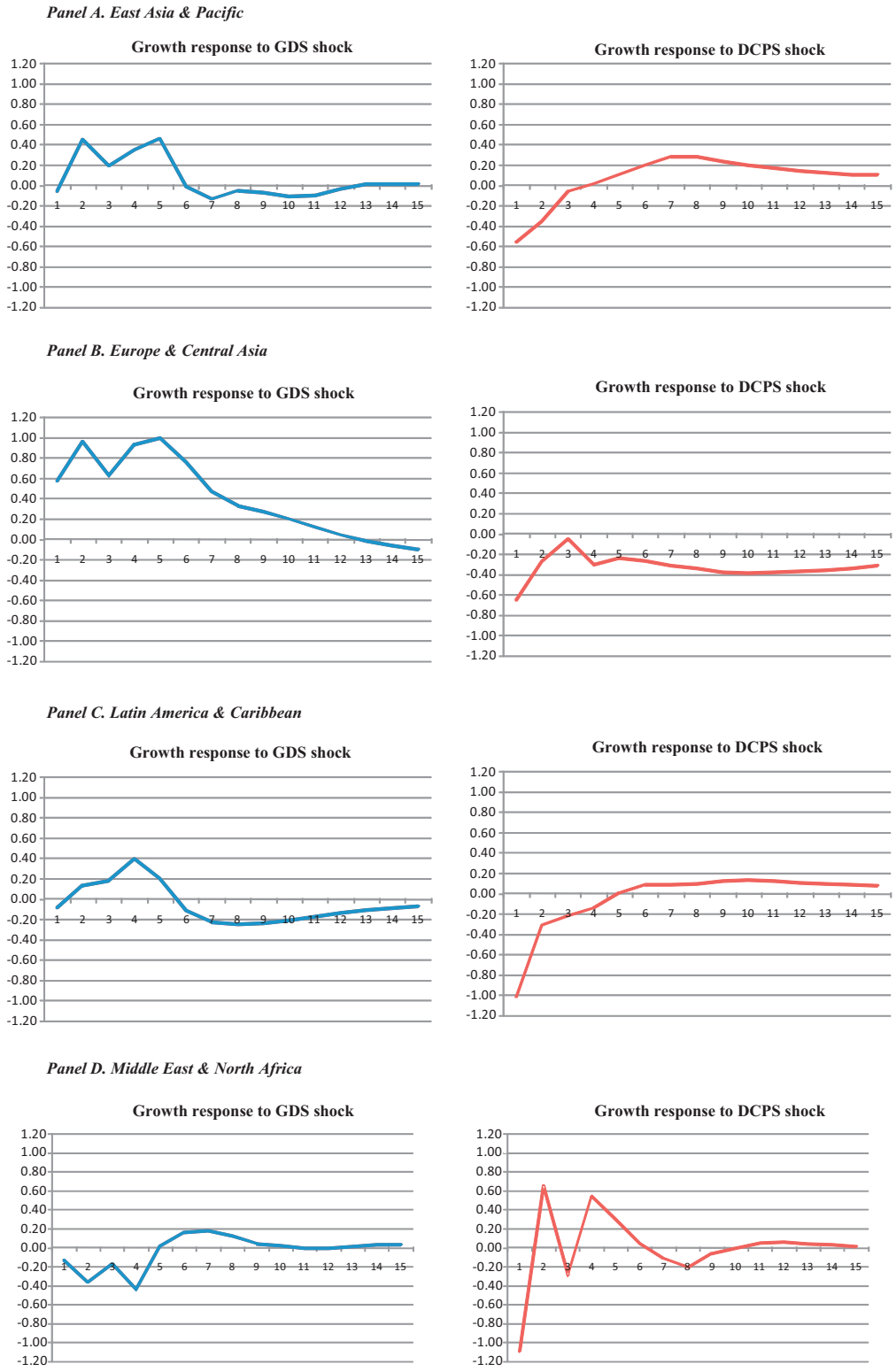

Fig. 1. Generalized impulse response functions of growth. This figure shows Pesaran and Shin's (1998) generalized impulse response functions of GROWTH to a shock in GDS and DCPS, respectively. A generalized impulse response function is invariant to variable ordering. GROWTH: difference between natural logarithm of GDP per capita and its lagged value; DCPS: domestic credit provided to the private sector; GDS: gross domestic savings. The horizontal axis is the number of years following the shock and the vertical axis is the percent growth rate of GDP per capita (difference in log). The vertical axis has the same scale across regions. The sample period is 1980–2007.

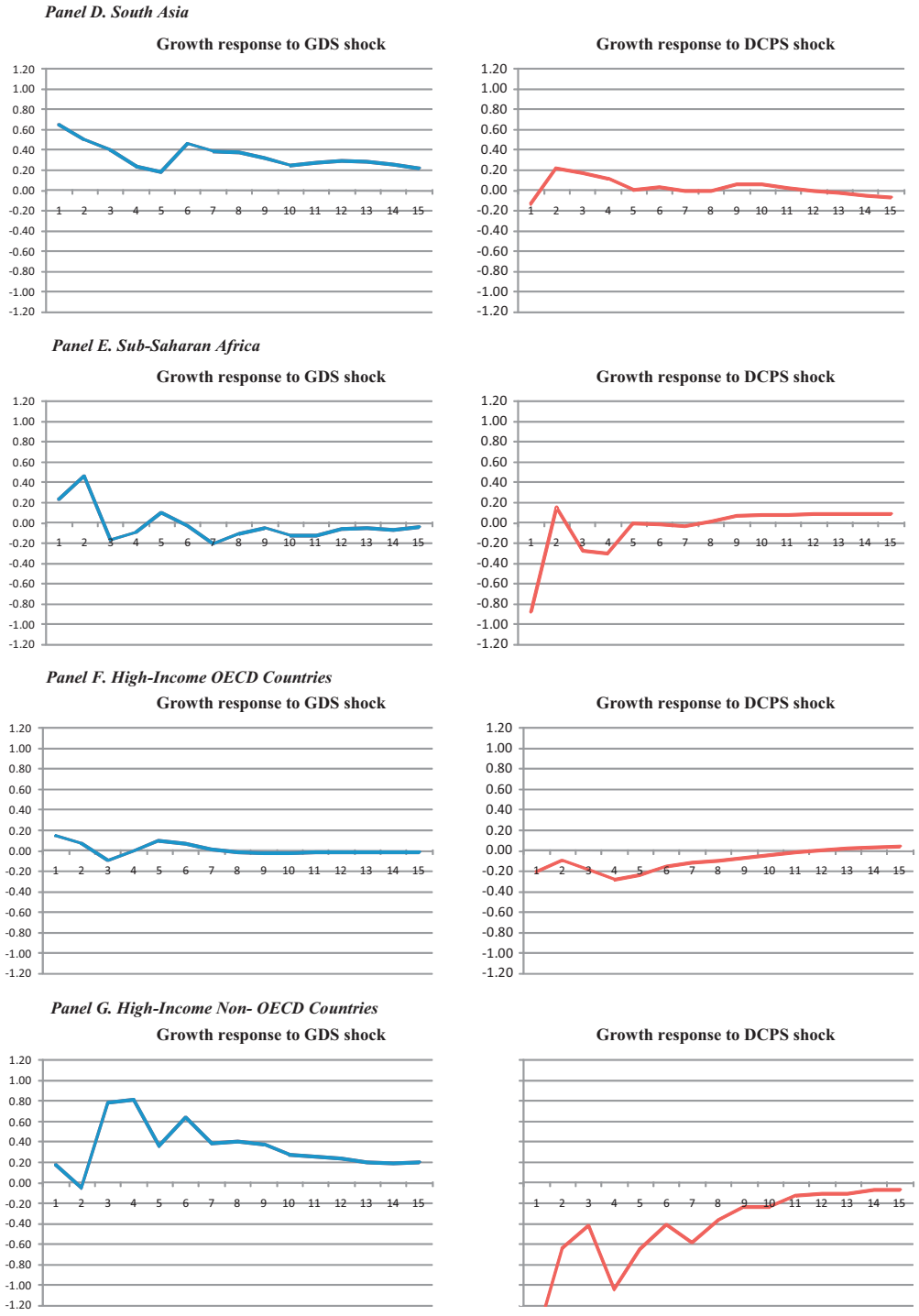

Fig. 1. (*Continued*).

Since our goal is to assess the role of the financial sector in economic growth, we also investigate the dynamic relationships among proxy measures and how two measures of financial development (GDS and DCPS) affect economic growth (GROWTH) over time.[11] Choleski decomposition is generally used to identify the system of equations in order to get the impulse response function. However, this decomposition implies that the ordering of variables matters; in other words, different ordering may yield different results. Therefore, we use the generalized impulse response function proposed by Pesaran and Shin (1998), which is invariant to the ordering of the equations. Fig. 1 illustrates how GROWTH responds over time to shock innovation in DCPS and GDS, respectively, by regions. We use the same scale in the axis to assess the magnitude of the shock on growth among regions.

A positive shock on GDS causes GROWTH to increase in the first few years for most of the regions. The highest jumps in GDS magnitude occur in East Asia & Pacific, Europe & Central Asia, and

[11] To save space, we have concentrated on the impact of shock on finance on growth. Thus, we have not reported the IRF of our financial measures to shocks in growth.

high-income non-OECD countries. On the other hand, DCPS has a negative effect on growth during the first two years but turns positive in the long-run for most countries. The only exception is for the high-income non-OECD countries, where DCPS yields a negative effect on GROWTH. Also, the highest impact of DCPS shock on GROWTH is seen in the Middle East & North Africa region, where the response is negative growth but a later jump to positive growth. In summary, savings appears to be an important finance variable in determining growth in developing countries, whereas DCPS encompasses marginal effect on growth. Thus, the results are consistent with the assertion that well-developed financial sectors may help to increase savings and therefore investment, which in turn is translated into economic growth because of the increased investment.

In next sub-sections, we analyze and derive some policy implications for each region given the results of the VAR analysis. Therefore, we will refer to error variance decomposition of growth, Granger causality tests between finance and growth, and the impulse response function of growth to shocks in finance (Tables 3 and 4, and Fig. 1, respectively) together for each region.

5.3.1. East Asia & Pacific (low- and middle-income countries)

DCPS explains 6.8% of variation in growth rate after 10 years in East Asia & Pacific countries. Furthermore, Fig. 1 shows that a shock in DCPS causes growth to decrease in the short-run (the highest decrease for middle- and low-income countries) and later to increase to a positive long-run growth rate. This long-term relationship is significant (as shown previously in Panel A of Table 2). However, DCPS does not Granger-cause growth in the short-run (see Granger causality test), but growth Granger-causes DCPS, implying one-way causality.

On the other hand, GDS only explains 0.4% of variation in growth rate after 10 years. However, there is no significant Granger causality from GDS to GROWTH, but there is a significant causality from GROWTH to GDS. It seems that policies designed to increase GDS and DCPS have not had significant effects in East Asia & Pacific. Rather, the region has enjoyed more growth because of trading and, thus, policies focused on trading might have more benefit than policies designed to increase DCPS and GDS. The increased trade might continue to foster production and, therefore, economic growth, which might implicitly help financial development as suggested by the Granger causality test. However, inflation accounts for 13% of growth variation and is significantly and negatively related to growth, suggesting that inflation in the regions has impaired economic growth, and, therefore, that high inflationary policies should be avoided.

5.3.2. Europe & Central Asia (low- and middle-income countries)

GDS accounts for 5.8% of variation in growth after 10 years in this region. As seen in the impulse response function, GDS will cause growth to increase and there is a significant Granger causality from GDS to GROWTH and from GROWTH to GDS, implying two-way direction. DCPS and GROWTH causality is significant and bi-directional as well. The impulse response function shows that a shock in GDS will cause GROWTH to increase. In summary, financial development has somewhat helped economic growth in the region and accordingly, the region may benefit from policies designed to improve the financial system.

5.3.3. Latin America & Caribbean (low- and middle-income countries)

INF explains the second-highest proportion of growth variation. DCPS and GDS explain only 2.6% and 2.0%, respectively. However, DCPS is significant in the long run and the impulse response function shows that innovations to DCPS cause a short-term decline in growth that gradually ends in a rise in growth in the long term. A shock in GDS causes growth in the short term but it gradually disappears in the long term. However, there is no evidence that DCPS Granger-causes growth, but GDS does, implying two-way causality. It seems that the region should pay more attention to the level of government expenditure (fiscal policies) and avoid inflationary policies. Trade is also an important variable to explain growth; hence, policies focused on improvement of trading might lead to economic growth in the region.

5.3.4. Middle East & North Africa (low- and middle-income countries)

DCPS and GDS explain only a small proportion of the variation compared with the real sector (1.7% and 0.5%, respectively) in this region. Nevertheless, a DCPS shock causes the growth rate to rapidly increase and then die out after four years (see Fig. 1). As a matter of fact, DCPS Granger-causes GROWTH and GROWTH Granger-causes DCPS (bi-directional causality). However, TRADE explains a higher proportion of growth variation and it Granger-causes GROWTH, implying that trading is a critical variable in the region. The results indicate that efforts to reform and deepen the financial system in the Middle East & North Africa region would prove fruitful only if accompanied by policies that provide an incentive to develop trade.

5.3.5. South Asia (low- and middle-income countries)

GDS explains 15.1% of GROWTH variation in this region, which is significantly higher than other geographic regions. Moreover, a shock in GDS causes growth rate to increase promptly (see Fig. 1). GDS Granger-causes GROWTH and GROWTH Granger-causes GDS, thus implying a two-way causality between finance and growth. Given the results in the regression above, and the causality test, it seems that GDS has been more important than DCPS for financial policy purposes.

5.3.6. Sub-Saharan Africa (low- and middle-income countries)

The financial variables explain only a very low proportion of variation of GDP per capita growth. The impulse response function also shows that shocks of these variables have insignificant effects on growth. A shock in GDS causes GROWTH to increase but this dies out quickly, whereas a shock in DCPS causes GROWTH to decline, but it recovers one period later. Granger causality tests indicate one-way causality from GROWTH to financial measures.

The only variable that explains a significant proportion of growth variation is TRADE. It seems, therefore, that the Sub-Saharan Africa region should increase trading to enhance growth. However, from the regression above, the Granger causality test and impulse response functions suggest that rising domestic saving may boost growth. Since this region is the poorest in our sample, it is not surprising that DCPS and GDS have little effect on growth, given the low level of these variables compared with other regions. Therefore, policies directed at increasing these variables should attract a higher level of investments to enhance long-run economic growth.

5.3.7. High-income OECD countries

The variance decomposition implies that proxy measures for the real sector play a more important role in explaining GROWTH fluctuations compared to those of financial development for OECD countries. GOV and INF shocks explain 15.1% and 14.8% of growth fluctuations, respectively, whereas DCPS and GDS shocks explain 2.9% and 0.3% respectively. A shock to GDS produces an increase in GROWTH that quickly dies out. Furthermore, there is two-way causality between finance (DCPS and GDS) and GROWTH. However, considering the results of the regression, variance decomposition,

causality test, and impulse response function, it seems that domestic credit and gross domestic savings have not been as important for growth as trade, government fiscal policies, and inflation.

5.3.8. High-income non-OECD countries

DCPS explains 18.4% of growth variation in non-OECD countries, and this proportion is significantly higher than the proportion observed in any other region. However, as shown in the regression and impulse response function, the relationship between DCPS and GROWTH is negative. The impulse response function shows that a positive shock in DCPS would cause the steepest decline in GROWTH compared to the other groups, culminating in a long-run decline. The Granger causality test shows that the direction of the causality is from GROWTH to DCPS. However, there is a positive two-way causality between GDS and GROWTH. Additionally, there is two-way causality between trade and GROWTH, most likely because countries in this group are basically exporters of commodities (mainly petroleum).

6. Conclusions

We examined panel regressions with cross-sectional countries and time-series proxy measures to study linkages between financial development and economic growth in low, middle and high-income countries as classified by the World Bank. We also performed various multivariate time-series models in the frame of VAR analysis, forecast error variance decompositions, impulse response functions, and Granger causality tests to document the direction and relationship between finance and growth in these countries with the objective of documenting the progress in financial liberalization and exploring some policy implications.

Consistent with Bekaert et al. (2005) and Barro (1997), among others, we found that a low initial GDP per capita level is associated with a higher growth rate, after controlling for financial and real sector variables. Furthermore, in agreement with King and Levine (1993a), and Levine et al. (2000), among others, we found strong long-run linkages between financial development and economic growth. Specifically, as predicted in neo-classical models (Pagano, 1993), domestic gross savings is positively related to growth. We also found that domestic credit to the private sector is positively related to growth in East Asia & Pacific, and Latin America & Caribbean, but is negatively related to growth in high-income countries.

Using Granger causality tests to study the direction between finance and growth, we found that, in the short run, there is two-way causality between finance and growth in all regions but Sub-Saharan and East Asia & Pacific. This result is consistent with the findings of Shan et al. (2001), and Demetriades and Hussein (1996), who found bi-directional causality between finance and growth, and contrary to Christopoulos and Tsionas (2004), who found that the direction is from finance to growth. Moreover, our results give some support to the theoretical models of Blackburn and Huang (1998) and Khan (2001), which predict a two-way causality between finance and growth.

However, Sub-Saharan Africa and East Asia & Pacific have causality that runs from growth to finance, supporting the view of Gurley and Shaw (1967), Goldsmith (1969), and Jung (1986), who hypothesized that in developing countries, growth leads finance because of the increasing demand for financial services. These two regions have the lowest GDP per capita in our sample, and not surprisingly, their underdeveloped financial systems do not Granger-cause growth. However, there is a long-term association between finance and growth, as shown in the regression. Policy should be centered on improving international trade in these regions with the objective of fostering growth.

Our empirical results based on Granger causality tests and panel regressions do not attempt to answer the question "What will happen in the future?" Rather, they tell us "what has happened in the past." More specifically, the question of whether finance leads to growth will still be subject to debate. We found that there has been a positive association between finance and economic growth for developing countries but contradictory results for high-income countries.

Nevertheless, given the evidence in our empirical analysis for middle- and low-income countries, it seems that well-functioning financial systems may boost economic growth in these countries. Of course, we have documented this positive relationship, but development of financial systems in developing countries is not a panacea since other real variables such as trade and government fiscal policies are important determinants of growth. Rather, policy makers and international organizations such the International Monetary Fund or the World Bank should consider a country's legal system, political stabilities, and stage of financial development when designing policies to boost economic growth and reduce poverty. In summary, while financial development may be necessary, it is not sufficient to attain a steady economic growth rate in developing countries.

Appendix A. Time-series averages of variables by country (1980–2007)

This appendix summarizes time-series statistics for six geographic regions and high-income OECD and non-OECD countries classified according to the World Bank. The time-series average of each variable is calculated, and then statistics are collected cross-country. Economies are divided according to 2008 GNI per capita, calculated using the World Bank Atlas method. The groups are: low income, $975 per capita or less; lower middle income, $976–$3,855 per capita; upper middle income, $3,856–$11,905 per capita; and high income, $11,906 per capita or more. Geographic classifications are assigned only for low- and middle-income economies.

Balance sheet financial variables are adjusted to address the potential stock-flow problem (Levine et al., 2000). Our measures of financial variables are calculated as follows:

$$\mathrm{FIN}_{i,t} = \frac{\frac{1}{2}[\mathrm{FIN}_{i,t-1}/\mathrm{CPI}_{t-1}] + \mathrm{FIN}_{i,t}/\mathrm{CPI}_{t}}{\mathrm{GDP}_{t}}$$

where $\mathrm{FIN}_i = \{\mathrm{DCPS}, \mathrm{DCBS}, \mathrm{M3}, \mathrm{GDS}\}$.

DCPS: Domestic credit provided by the banking sector, which includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available (including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits) (WDI, 2009).

DCBS: Domestic credit provided by the banking sector, which covers claims on private non-financial corporations, households, and non-profit institutions (WDI, 2009).

M3: Liquid liabilities, the broadest definition of money.

GDS: Gross domestic savings, which are calculated as GDP less final consumption expenditure (formerly total consumption). Final consumption expenditures cover the consumption expenditures by households and the general government (WDI, 2009).

TRADE: Import plus export.

GOV: Government expenditure.

INF: Inflation rate.

Table A
Time-series average of variables (1980–2007).

	Economic growth		Financial development				Real sector		
	GDP per capita (US $)	Growth (%)	DCPS (%)	DCBS (%)	M3 (%)	GDS (%)	TRADE (%)	GOV (%)	INF (%)
East Asia & Pacific									
Cambodia	313.2	6.1	6.5	6.5	13.7	4.9	102.1	5.0	4.3
China	697.8	8.4	86.5	93.2	92.4	38.4	40.9	14.8	6.4
Fiji	1,944.9	0.7	31.4	38.0	44.2	14.5	112.3	17.0	4.6
Indonesia	698.3	3.5	30.9	39.2	38.4	29.8	55.1	8.7	10.9
Lao PDR	297.4	3.4	7.2	8.5	14.1	12.3	55.3	7.9	26.4
Malaysia	3,237.2	3.6	128.2	156.8	110.6	36.6	162.6	13.3	3.1
Mongolia	484.0	1.9	16.2	20.8	29.0	19.2	112.3	19.7	34.3
Papua New Guinea	657.0	0.0	19.4	27.9	33.2	23.1	106.4	20.0	7.3
Philippines	964.4	0.8	35.3	51.0	47.2	17.1	76.2	10.2	9.6
Solomon Islands	736.3	1.3	22.3	33.1	28.3	14.9	119.6	22.1	10.6
Thailand	1,687.0	4.5	91.6	109.0	83.2	30.3	88.6	11.2	4.0
Tonga	1,408.8	1.8	51.6	57.2	36.3	−17.0	82.8	17.3	7.6
Vanuatu	1,221.8	0.8	36.0	34.8	101.4	8.7	101.1	26.5	4.9
Vietnam	341.9	4.9	38.7	40.9	47.2	20.3	91.8	7.3	4.8
Europe & Central Asia									
Albania	1,105.2	1.7	8.0	47.9	60.2	7.2	52.0	11.0	26.9
Armenia	732.2	3.6	8.9	13.2	18.7	−0.4	80.9	12.5	391.8
Azerbaijan	916.7	1.7	6.2	19.0	20.8	21.3	93.6	15.2	261.5
Belarus	1,386.2	2.7	11.7	21.3	18.5	23.6	122.9	20.2	329.9
Bulgaria	1,654.6	2.2	37.6	55.7	55.9	20.7	98.0	16.6	88.8
Croatia	4,216.6	1.5	44.2	57.4	49.0	14.5	103.2	24.2	212.3
Georgia	1,151.7	−1.2	9.3	18.0	11.5	13.8	80.6	11.7	21.8
Kazakhstan	1,454.6	2.2	20.6	17.5	18.3	24.4	90.9	12.2	156.7
Kyrgyz Republic	328.5	−0.6	6.4	14.0	16.6	5.6	88.6	19.5	13.2
Latvia	3,597.3	2.6	31.4	34.5	31.2	26.1	101.3	15.3	30.3
Lithuania	3,691.2	1.7	21.7	22.4	27.0	16.2	107.6	18.9	38.4
Macedonia, FYR	1,767.9	0.0	25.4	29.8	26.5	7.1	93.4	20.0	12.1
Moldova	552.4	−1.1	13.7	32.0	30.2	9.8	114.6	17.8	15.4
Poland	4,139.8	3.8	24.3	35.5	38.4	18.6	58.5	19.6	51.0
Romania	1,924.9	1.3	13.7	44.8	36.3	17.4	64.6	11.0	77.3
Russian Federation	2,070.3	0.3	17.2	27.2	25.3	32.6	56.8	17.8	111.3
Serbia	1,422.2	−1.5	27.4	30.0	19.7	−0.3	61.6	19.8	39.6
Tajikistan	256.0	−3.1	15.8	18.0	8.2	12.4	110.0	11.6	14.9
Turkey	3,527.0	2.6	16.8	31.8	26.6	15.5	34.2	9.6	51.6
Ukraine	946.1	−1.1	14.8	30.0	27.8	26.1	87.5	19.5	414.9
Middle East & North Africa									
Algeria	1,871.3	0.5	30.5	53.4	60.4	34.9	54.4	15.9	10.6
Djibouti	869.0	−2.0	35.2	39.9	67.5	−1.4	99.8	30.0	4.4
Egypt, Arab Rep.	1,285.5	2.6	40.9	97.5	88.0	14.5	53.3	13.1	11.2
Iran, Islamic Rep.	1,527.1	1.4	32.2	58.1	48.0	29.5	38.4	14.9	19.6
Jordan	1,872.0	0.6	70.6	91.8	108.6	−2.1	123.8	24.6	5.0
Lebanon	4,298.1	1.3	67.8	131.9	172.4	−12.1	71.2	16.5	77.1
Libya	6,714.0	1.6	20.2	11.2	40.5	25.8	55.5	23.2	4.4
Morocco	1,259.8	1.8	43.1	68.6	65.6	18.7	57.9	17.3	4.6
Syrian Arab Republic	1,113.2	0.9	9.0	53.2	59.9	16.2	59.5	15.6	11.8
Tunisia	1,763.3	2.5	61.2	67.4	51.8	21.8	88.7	16.0	4.9
West Bank and Gaza	1,246.5	−1.3	6.1	6.7	20.7	−23.8	87.0	25.6	4.3
Yemen, Rep.	498.8	1.3	5.5	25.0	39.0	10.8	78.5	16.1	20.5
Latin America & Caribbean									
Argentina	7,149.0	0.8	20.5	38.0	23.8	20.6	22.8	10.2	302.1
Belize	2,744.9	2.4	43.2	50.5	44.6	13.8	117.4	16.1	2.9
Bolivia	962.7	0.2	36.4	42.0	36.5	12.4	50.9	13.3	515.6
Brazil	3,568.8	0.7	50.5	84.3	44.7	20.1	20.0	16.3	432.7
Chile	3,891.5	3.3	66.1	83.7	37.2	23.5	59.3	11.7	11.9
Colombia	2,280.5	1.7	30.3	38.8	30.4	17.9	33.6	14.1	17.8
Costa Rica	3,557.7	1.8	20.3	31.6	28.4	16.7	79.7	13.7	18.9
Dominica	3,122.3	3.0	47.7	59.5	66.4	10.8	114.0	21.4	3.0
Dominican Republic	1,866.4	2.5	40.4	48.2	34.0	15.3	72.5	6.9	17.2
Ecuador	1,364.0	0.7	23.1	25.4	21.8	19.7	56.4	12.7	32.7
El Salvador	1,886.7	0.8	34.0	41.5	39.1	3.4	58.4	11.3	11.2
Grenada	3,049.4	2.9	56.6	69.2	80.2	12.1	113.6	18.3	3.5
Guatemala	1,593.7	0.4	19.1	29.7	26.6	8.3	46.6	7.3	11.6
Guyana	824.7	1.0	40.4	177.6	85.3	15.9	180.9	22.0	6.6
Haiti	547.1	−2.5	14.0	34.0	34.6	4.1	43.3	8.8	14.8
Honduras	1,129.0	0.9	33.0	36.8	35.8	16.6	88.6	12.9	13.1
Jamaica	2,872.9	1.0	25.6	56.1	54.7	16.7	99.8	15.2	18.0
Mexico	5,381.8	0.9	19.1	42.4	27.2	22.7	44.2	10.1	33.7
Nicaragua	796.0	−0.4	30.1	105.7	40.2	2.1	66.3	19.7	7.6
Panama	3,617.7	1.8	70.1	72.9	58.7	26.5	155.0	16.0	1.5
Paraguay	1,394.0	0.0	21.3	23.5	24.9	15.6	79.0	8.9	15.3
Peru	2,083.5	0.7	18.0	20.4	25.4	21.2	34.5	9.8	475.9
St. Kitts and Nevis	5,815.1	4.0	60.0	95.3	101.3	18.8	129.4	19.9	3.4

Table A (*Continued*)

	Economic growth		Financial development				Real sector		
	GDP per capita (US $)	Growth (%)	DCPS (%)	DCBS (%)	M3 (%)	GDS (%)	TRADE (%)	GOV (%)	INF (%)
St. Lucia	3,497.1	3.0	63.8	68.6	72.3	13.9	137.8	18.0	3.4
St. Vincent and the Grenadines	2,399.3	3.7	46.7	59.7	73.9	11.7	131.8	21.0	3.3
Suriname	2,223.4	0.4	25.9	60.0	63.0	9.7	74.6	29.8	46.4
Uruguay	5,566.4	1.3	40.2	53.4	47.5	15.6	43.6	12.7	39.7
Venezuela, RB	5,038.6	0.0	28.3	32.6	36.8	28.2	49.8	10.9	30.9
South Asia									
Bangladesh	298.7	2.4	29.7	30.3	12.4		4.7	6.0	
Bhutan	626.2	5.9	6.4	32.6	25.3		19.0	7.9	
India	381.5	4.1	50.4	47.8	22.6		11.3	7.8	
Maldives	2,403.9	5.4	43.5	47.7	44.7		20.6	5.4	
Nepal	193.5	2.1	31.5	37.9	11.1		8.8	8.4	
Pakistan	485.8	2.5	47.6	43.1	12.7		11.4	7.5	
Sri Lanka	701.8	3.6	40.2	41.0	13.9		10.4	11.0	
Sub-Saharan Africa									
Angola	748.6	2.2	5.4	20.0	24.3		36.1	640.2	
Benin	298.8	0.4	16.2	25.2	1.9		11.9	6.1	
Botswana	2,772.0	5.0	−30.2	25.1	40.4		24.2	10.0	
Burkina Faso	199.8	1.8	11.3	18.9	3.5		19.9	3.7	
Burundi	127.9	−1.1	27.0	20.1	−3.8		15.7	10.4	
Cameroon	716.3	0.0	20.2	18.0	20.3		10.2	5.7	
Cape Verde	984.0	3.2	54.3	62.9	−5.4		16.5	4.9	
Central African Rep.	259.7	−1.2	14.9	17.3	1.7		13.7	3.4	
Chad	187.6	2.2	12.3	12.9	1.6		8.6	3.9	
Congo, Dem. Rep.	156.8	−3.6	8.7	13.2	8.5		8.9	1302	
Congo, Rep.	1,121.1	0.5	18.4	16.2	36.6		17.0	4.5	
Ethiopia	130.7	0.7	36.0	30.5	9.0		11.4	6.6	
Gabon	4,673.0	−0.6	19.1	17.5	45.8		14.0	3.7	
Gambia, The	310.5	0.3	23.6	29.9	7.6		19.7	10.5	
Ghana	230.1	1.0	23.8	20.3	6.1		10.7	31.8	
Guinea-Bissau	163.1	−0.4	16.8	28.7	−0.8		14.0	26.9	
Kenya	422.9	0.2	44.2	41.4	14.2		17.0	13.0	
Lesotho	388.2	2.5	10.5	35.4	−38.5		23.5	11.2	
Liberia	298.7	−6.2	324.1	125.9	−4.1		17.0	4.9	
Madagascar	253.3	−1.2	23.8	22.3	5.4		8.4	15.8	
Malawi	142.7	−0.2	23.7	21.9	6.4		15.8	21.7	
Mali	235.6	0.5	18.5	22.9	5.9		11.6	3.0	
Mauritania	432.2	0.2	26.5	19.8	1.9		22.8	6.7	
Mauritius	2,975.0	4.1	68.5	74.1	21.8		13.4	7.1	
Mozambique	214.2	2.0	1702	348.5	−0.5		11.3	26.4	
Namibia	1,837.8	0.4	48.5	40.3	13.6		28.5	5.1	
Niger	188.6	−1.7	13.4	14.4	4.9		13.0	3.1	
Rwanda	237.2	0.1	12.5	15.6	0.7		12.2	6.6	
Senegal	454.7	0.4	29.9	24.7	6.3		15.7	4.5	
Seychelles	5,904.8	1.8	75.1	65.2	20.4		29.3	2.7	
Sierra Leone	224.6	−0.7	39.4	18.3	3.7		10.6	41.8	
South Africa	3,199.2	0.3	102.8	128.1	50.5	21.9	18.5	10.1	
Sudan	335.2	2.3	6.6	52.7	19.1	8.9	9.6	44.5	
Swaziland	1,243.8	2.3	17.5	14.7	25.3	5.2	18.5	10.7	
Tanzania	277.0	1.7	8.4	17.9	21.6	5.4	13.9	20.1	
Togo	261.2	−1.4	20.6	22.8	32.7	7.5	14.3	4.7	
Uganda	220.1	2.3	5.7	12.6	13.4	5.0	11.9	44.3	
Zambia	365.3	−0.6	11.0	54.8	24.7	12.2	17.9	53.9	
Zimbabwe	596.0	−1.4	24.0	45.6	41.0	14.7	18.8	1007	
High-income non-OECD									
Antigua and Barbuda	7,449.7	4.0	53.4	69.1	72.5	28.7	19.8	4.6	
Bahamas, The	15,391.0	0.7	57.0	69.1	57.9	22.9	13.6	3.5	
Bahrain	11,024.7	1.0	49.8	30.8	66.1	34.7	20.1	1.0	
Barbados	7,873.4	0.4	54.3	70.0	62.1	17.7	19.1	4.0	
Brunei Darussalam	19,780.4	−1.9	46.8	27.0	69.0	41.4	21.5	1.9	
Cyprus	9,696.4	3.4	128.4	147.5	146.8	18.9	16.2	3.9	
Equatorial Guinea	2,809.2	11.6	9.7	14.9	11.0	42.9	17.4	4.0	
Estonia	4,070.6	2.8	39.8	37.9	38.1	24.0	19.2	16.3	
Hong Kong, China	21,847.0	3.9	146.0	137.3	208.1	31.6	8.1	4.7	
Israel	16,621.5	1.9	69.2	106.1	82.1	11.9	30.4	47.8	
Kuwait	16,773.2	−0.8	61.3	79.5	77.6	30.3	26.8	3.0	
Macao, China	14,402.8	5.1	69.4	52.7	138.9	50.4	9.5	3.6	
Malta	7,589.2	3.2	82.9	95.7	109.0	16.7	19.0	2.5	
Oman	7,503.2	3.3	26.5	23.8	28.7	32.1	24.7	1.6	
Qatar	29,766.1	2.6	29.6	36.7	41.3	64.8	22.8	4.0	
Saudi Arabia	9,948.7	−1.7	54.0	42.5	43.5	30.7	27.0	0.6	
Singapore	17,633.2	4.3	100.6	80.1	109.2	44.0	10.6	1.7	
Slovenia	9,631.7	2.8	36.3	42.7	41.0	24.3	18.9	9.5	
Trinidad and Tobago	6,338.5	1.6	43.1	44.9	51.9	28.2	14.4	7.6	

Table A (*Continued*)

	Economic growth		Financial development				Real sector		
	GDP per capita (US $)	Growth (%)	DCPS (%)	DCBS (%)	M3 (%)	GDS (%)	TRADE (%)	GOV (%)	INF (%)
United Arab Emirates	25,815.4	−2.4	43.6	42.4	51.9	41.4	16.8		
High-income OECD									
Australia	18,363.1	1.9	67.1	77.2	58.9	23.5	18.4	4.6	
Austria	20,838.1	1.9	90.4	113.8	75.1	23.6	18.8	2.7	
Belgium	19,753.3	1.7	54.4	97.5		22.7	22.1	3.0	
Canada	20,704.7	1.7	107.7	125.1	84.8	22.5	21.0	3.5	
Czech Republic	5,618.3	2.0	51.2	55.0	67.2	27.3	21.5	5.0	
Denmark	26,097.4	1.9	72.8	86.7	54.8	23.0	25.9	3.5	
Finland	20,519.0	2.2	65.0	65.4	50.8	25.8	21.4	3.6	
France	19,916.9	1.6	89.6	103.0	69.9	19.8	23.0	3.5	
Germany	20,251.1	1.7	96.8	116.4	65.5	21.5	19.7	2.0	
Greece	10,778.1	1.6	43.1	84.7		12.4	15.7	11.4	
High-income OECD									
Hungary	4,438.0	1.9	79.7	47.6	24.2		10.5	13.1	
Iceland	27,977.7	1.9	74.0	38.6	19.7		21.5	15.3	
Ireland	18,373.5	4.3	80.4	50.4	27.2		17.0	4.8	
Italy	16,917.6	1.6	93.0	70.9	22.1		19.0	5.6	
Japan	33,130.4	2.0	265.7	194.2	29.5		15.3	1.0	
Korea, Rep.	8,267.4	5.6	72.6	60.7	32.3		12.2	5.1	
Luxembourg	36,442.1	3.7	97.9		37.8		16.1	3.1	
Netherlands	20,364.1	1.9	129.4	79.7	25.8		23.7	2.4	
New Zealand	12,274.9	1.5	81.8	73.2	22.6		18.4	5.3	
Norway	31,630.7	2.4	80.3	53.5	31.0		20.7	4.1	
Portugal	8,956.7	2.2	101.9		17.4		17.0	9.0	
Slovak Republic	3,795.0	2.3	52.4	59.8	24.7		21.1	7.2	
Spain	12,123.1	2.3	111.1		22.3		16.9	5.7	
Sweden	24,574.9	1.9	109.6	49.8	22.6		27.2	4.1	
Switzerland	32,513.5	1.0	162.6	145.3	28.4		11.2	2.2	
United Kingdom	21,314.4	2.2	109.1		16.6		20.6	4.3	
United States	29,930.8	1.9	170.2	70.0	16.3		16.2	3.5	

All variables but INF are divided by gross domestic product (GDP). The table below presents time-series statistics (1980–2007) (Table A).

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