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What, why and how financial development matters: Evidence of ASEAN-5, Asia-5 and OECD-7 economies

Swee Liang TAN
Singapore Management University, sltan@smu.edu.sg

What, Why and How Financial Development Matters: Evidence of ASEAN-5, Asia-5 and OECD-7 Economies

Swee Liang Tan, Singapore Management University[1]
sltan@smu.edu.sg

Abstract

This paper analyzed the association of bank and capital markets financial development on income per capita in three regions; ASEAN-5 economies (Singapore, Malaysia, Thailand, Philippines, Indonesia), Asia-5 (Japan, China, Hong Kong SAR, South Korea and India) and OECD-7 (Australia, Canada, Denmark, Norway, Sweden, UK and US) covering the period from 2000 to 2017 using panel data analysis. What ASEAN-5 can learn from Asia-5 and OECD-7 experience is that bank size does matter for Asia-5 and OECD-7 despite digital disruptions to their banking system; yet financial structure that favors banks is negatively associated with income per capita for Asia-5, and importantly, efficient banking system (not bank size alone) drives OECD-7 income per capita. The finding has practical policy implications for a ASEAN-5's financial sector liberalization programmes that impact the depth, breadth and efficiency of banks and capital markets.

Keywords: financial development, banking system, capital markets, economic growth
JEL Codes: C23, G20, 016

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1. Introduction

Since the early 1990s, a growing body of empirical literature showed that for economies to thrive, they need deep and broad financial systems. Countries with larger share of bank deposits, bank assets or bank credit to the private sector promote economic growth, after controlling for many other factors underlying economic growth; as do countries with more active stock markets as an alternative channel of financing for large enterprises (Levine, 1997). However financial structure, in terms of the size of the banking system relative to the capital markets, does not matter for economic growth. Lately, empirical literature on financial institutions and financial markets efficiency has gained importance as the role of financial sector development shifts away from mobilizing savings toward improving the efficiency of investment, and thereby contributing to higher economy-wide growth. Many empirical studies have found a positive relationship between depth of banks and stock market, and efficiency of banking and financial market services, to economic growth (Demirgüç-Kunt & Levine, 1999). The relationship about the role of financial sector development is complex and the answer varies depending on a country's level of economic and financial development (Demirgüç-Kunt et al, 2011).

In this paper, panel data from 2000 to 2017 is used to examine the association between bank and capital markets development with GDP per capita in ASEAN-5 (Singapore, Malaysia, Thailand, Philippines, Indonesia), Asia-5 (Japan, China, Hong Kong SAR, South Korea and India) and OECD-7 (Australia, Canada, Denmark, Norway, Sweden, UK and US) economies. My results show the complexity of the relationship and my contribution is to highlight the role of banks in Asia-5 and OECD-7 and what ASEAN-5 can learn from their financial sector experience in raising standard of living. Bank size (credit to the private sector) matters for Asia-5 and OECD-7 regions and bank efficiency (bank return on equity) is important for matured OECD economies. Banks remained important for Asia-5 and OECD-7 despite on-going digital disruptions' threat to their banking services (fintech); yet that financial structure (bank size relative to capital market size) that favors banks is negatively associated with income per capita for Asia-5 economies, and importantly an efficient banking system (not bank size alone) is an important driver for income per capita for matured economies.

The layout of the paper is as follows. Graphical and statistical analysis of the data is provided in Section 2. Methodology of panel data estimation is briefly explained in Section 3. Model

evaluation and results are shown in Section 4. Lastly, conclusions drawn from observations are summarized in Section 5.

2. Data

To effectively examine how financial institutions and financial markets correlate with the real sector of the economy, one would measure how well these institutions and markets (i) mobilize resources, (ii) identify profitable activities, (iii) exert corporate governance, (iv) manage risk, and (v) facilitate transactions. Proxies of financial development based on four broad features have been developed: depth and breadth; access to and use of; efficiency, and stability of financial institutions and markets (Svirydzenka, 2016).

This paper examines financial development as measured by: depth of the financial system (domestic credits to the private sector to GDP, stock market capitalization to GDP, outstanding domestic debt securities); structure of the financial system (ratio of bank credit to sum of bank credit, stock market capitalization and outstanding debt securities); and efficiency of the financial intermediaries (bank return on equity, after tax). The variables used to control for other factors affecting GDP per capita are broad money to GDP, exports of goods and services to GDP, inflation, government consumption to GDP and population growth. Data analysis using variance decomposition and scatter plots confirm within-region and across-region level heterogeneity; and this means that panel data regressions will produce diverse estimation results for the ASEAN-5, Asia-5 and OECD-7 models. All data are from the World Bank.

(a) Variance decomposition

Variance decomposition of the dependent and independent variables' total variation into between-country variation (differences between countries *i)*, and within-country variation (difference over time *t)*, are provided in Table 1. For most variables, the between-country variation is larger than the within-country variation; and this means that country-specific heterogeneities need to be accounted for when estimating the ASEAN-5, Asia-5 and OECD-7 panel data models.

Table 1: Variance Decomposition and Summary Statistics

Summary statistics: ASEAN-5

VarName	mean	min	max	sd	sd(w)	sd(b)	obs	n
GDPpc	12,737	1,669	57,379	16,645	3,561	18,077	90	5
PrivateCredit_gdp	78	16	164	43	14	45	90	5
MarketCap_gdp	98	14	259	66	24	69	90	5
OSDomPrivDS_gdp	22	0	65	21	9	21	83	5
FinStruc	33	20	65	9	4	9	90	5
ROE_aftT	13	0	29	6	5	3	90	5

Summary statistics: Asia-5

VarName	mean	min	max	sd	sd(w)	sd(b)	obs	n
GDPpc	20,518	827	48,511	16,674	3,011	18,233	90	5
PrivateCredit_gdp	118	26	219	52	19	54	90	5
MarketCap_gdp	210	19	1,099	320	135	323	90	5
OSDomPrivDS_gdp	39	0	80	26	9	28	78	5
FinStruc	39	11	68	14	6	14	90	5
ROE_aftT	12	-21	50	9	7	7	90	5

Summary statistics: OECD-7

VarName	mean	min	max	sd	sd(w)	sd(b)	obs	n
GDPpc	54,910	35,673	91,566	14,834	3,082	15,610	126	7
PrivateCredit_gdp	138	64	212	36	23	29	117	7
MarketCap_gdp	97	36	162	31	15	29	111	7
OSDomPrivDS_gdp	60	2	197	50	14	51	114	7
FinStruc	39	14	59	7	5	5	102	7
ROE_aftT	11	-8	34	7	6	3	126	7

Note:

- *sd is* overall variance *(it shows variation over both country and time dimensions)*:
  $x_{it} - x^{Overall\ mean}$ = Deviation of data point around the overall mean in the dataset
- *sd (b) is* between variance *(it shows variation over entity-country)*:
  $x_i^{Country\ mean} - x^{Overall\ mean}$ = *Deviation of country data-average around the overall mean in the dataset)*
- *sd (w) is* within variance *(it shows variation over time)*:
  $x_{it} - x_i^{Country\ mean} + x^{Overall\ mean}$= The variance around each unit's mean, with overall mean in the dataset added back to make results comparable).

Note: The dependent variable *GDPpc* is the GDP per capita. The independent variables are

- *Private Credit(%GDP) is* Private credit to GDP;
- *MarketCap(%GDP)* is stock market capitalization to GDP;
- *OutstandingDomesticPDS(%GDP)* is outstanding domestic private debt securities to GDP;
- *FinStruct is the* financial structure or ratio of bank credit to the sum of itself, market cap and debt securities (author computation);
- *ROE(aftT) is bank return on equity, after tax; used as measure of a country's banking sector profitability and efficiency. A rising ROE suggests increasing ability to generate profit without needing as much capital.*

The control variables broad money to GDP, exports of goods and services to GDP, inflation, government consumption to GDP and population growth. *All data are from the World Bank.*

For example, for the GDP per capita variable the between-country variation is very large when compared to the within-country variation; this means that GDP per capita has relatively large variation across-countries, when compared to variation within-country, over time. The between-

and within-country variations for the financial structure and ROE (after tax) variables are relatively small compared to the other variables; this means that these variables have little variations not only across countries, but also within-country, over time. Generally, for most variables their between-country variations are larger in size compared to their within-country variations.

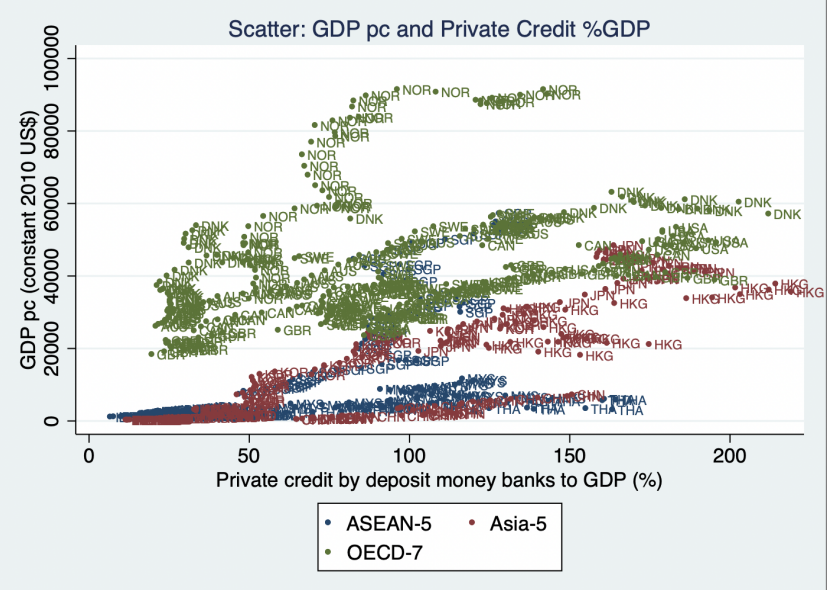
(b) Scatter plots

Cluster differences of scatter plots of GDP per capita against bank credit to GDP, stock market capitalization to GDP, financial structure and bank return on equity, from 2005 to 2017 for different countries are shown in Figure 1.

Figure 1

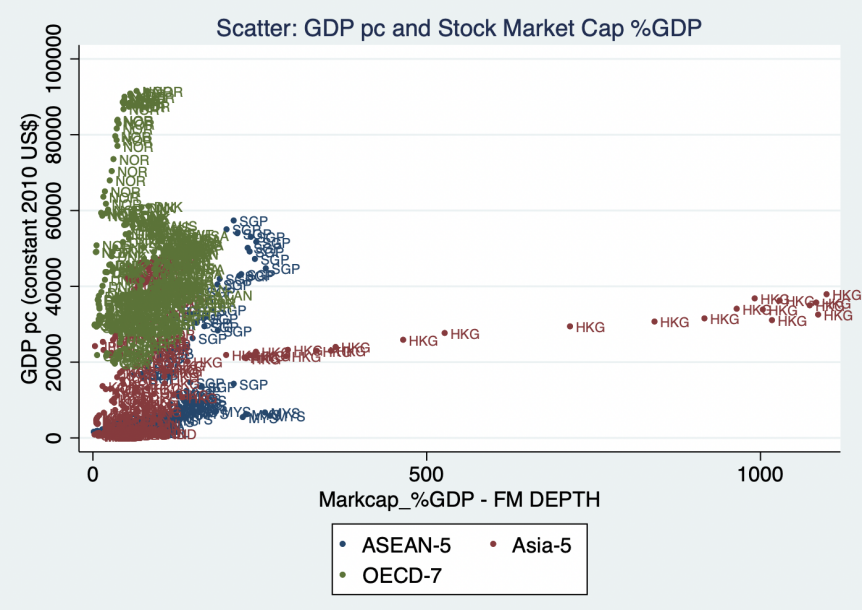
GDP per capita and Financial Development Indicators (2005 to 2017)

(i) Bank credit to GDP



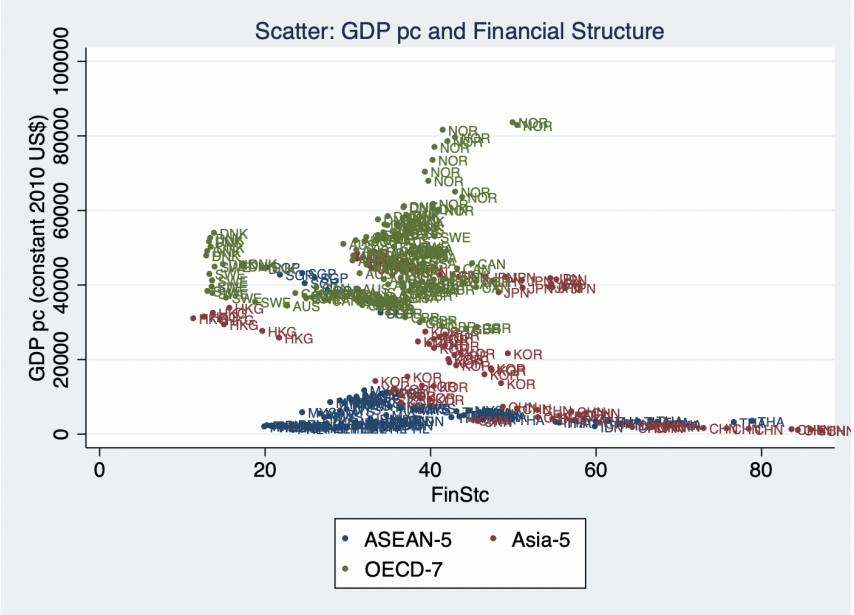
Note: As seen in Table 1, ASEAN-5, Asia-5 and OECD-7 GDP per capita dispersions are comparable.

(ii) Stock market capitalization to GDP



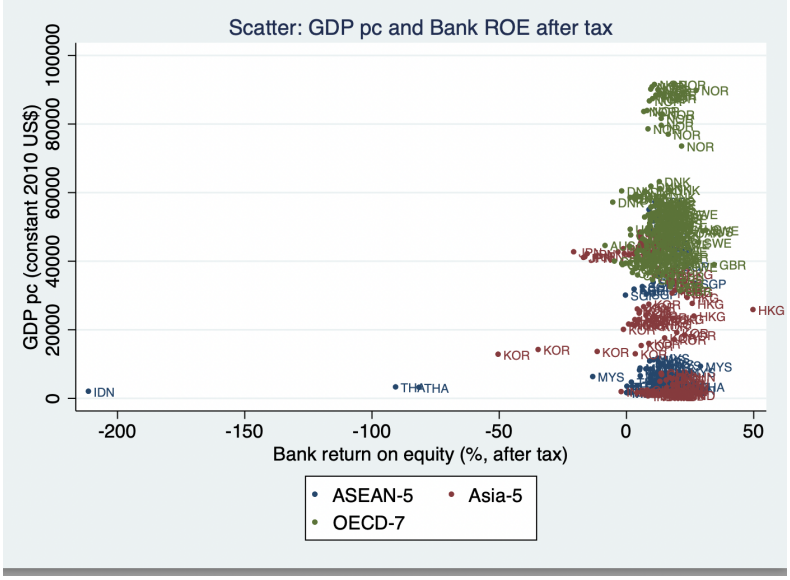
Note: As seen in Table 1, Asia-5 stock market capitalization to GDP is highly dispersed compared to those of ASEAN-5 and OECD-7.

(iii) Financial structure to GDP



Note: As seen in Table 1, Asia-5 financial structure is more dispersed compared to those of ASEAN-5 and OECD-7.

(iv) Bank ROE after tax



Note: As seen in Table 1, bank return on equity dispersions are relatively low compared to other variables.

3. Methodology of Panel Data Estimation

Panel data estimation is used to determine the association between financial development and income per capita for ASEAN-5, Asia-5 and OECD-7 regions. A panel data regression differs from a regular time-series or cross-section regression in that it has a double subscript on its variables (*i* subscript denotes the cross-section dimension, and *t* denotes the time-series dimension)

$$y_{it} = \alpha + x_{it}\beta + v_i + \mathcal{E}_{it} \quad \text{.....(1)}$$

for i = 1, …, N countries and *t = 1, …, T time periods;* where

- y_{it} is the dependent variable
- x_{it} represents the set of independent variables
- α is the constant term
- β is the coefficient for the independent variables
- $\mathcal{E}_{it}$ is the idiosyncratic error, (zero mean, equal variance, uncorrelated with itself, with *x* and with v_i)
- v_i (i=1….n) is the unknown intercept for each country (n country-specific intercepts), that is time invariant. It represents the unobservable or unmeasurable country-heterogeneity

(e.g. societal attitude to risk, culture, institutional and social factors)

v_i differs between countries, but for any particular country *i*, its value is constant across time *t*. These characteristics have time-invariant values *(i.e. value of the variable does not change across time)* and have time-invariant effects *(i.e. the variable has the same effect across time, e.g. the effect of social factors on the GDP per capita at time 1, is the same as the effect of social factors at time 5)*. If these unobservable or unmeasurable factors (e.g. social, institutional) are unfavorable in one country, its GDP per capita could be lower and v_i would be a negative value.

If these country-specific characteristics have an influence on the explanatory and outcome variables, and are omitted (or absent when estimating the model and hence subsumed under $\mathcal{E}_{it}$) then panel data estimation suffers from omitted variable bias. The omitted variable can cause the exogeneity assumption (between the explanatory variables and the time-varying idiosyncratic error terms $\mathcal{E}_{it}$) to break down. How does one account for unobserved heterogeneity across entities? The way model (1) is estimated depends on whether the regressors (x_{it}) are correlated with the unobserved heterogeneity component v_i, or not. If x_{it} are uncorrelated with v_i, random effects framework applies: $E[v_i|x_{i1}, \ldots, x_{iT}] = E[v_i] (= 0)$ in which the model is estimated by Generalized Least Squares GLS. Since v_i is not correlated with x_{it}, the model allows for time-invariant variables to play a role as explanatory variables. If x_{it} are correlated with v_i, fixed effects framework applies: $E[v_i|x_{i1}, \ldots, x_{iT}] \neq E[v_i]$, in which the model is estimated by several methods such as using Least Squares with Dummy Variables (LSDV); within-estimation technique (differencing by subtracting the group-level average over time); or by taking first-difference technique. The within-estimation and first-difference techniques remove the fixed effects v_i, from the model during data transformations.

The *Hausman* test is used to decide whether the random effects or fixed effects model applies; it follows that the fixed effects (within) estimation is chosen. Following the fixed effects regression, the modified Wald test is used to test for groupwise heteroskedasticity in the fixed effect model using Stata *xttest3* command. The Wooldridge test is used to test for serial correlation in the idiosyncratic errors using Stata *xtserial* command. The Breusch-Pagan test is used to test for cross-sectional independence in the residuals of a fixed effect regression model using Stata xttest2 command. To account for the problem of heteroskedastic and autocorrelated error structure, the Driscoll-Kraay standard errors are estimated using Stata *xtscc* command.

4. Model and Results

Table 2 presents the estimation results of the country fixed-effects (within) regression with Driscoll-Kraay standard errors, covering the period from 2000 to 2017, for ASEAN-5, Asia-5 and OECD-7 models (columns 2, 3 and 4, respectively). Pooled OLS model for ASEAN-5 is also presented (column 1).

Table 2

Fixed-effect (within) regression with Driscoll-Kraay standard errors

VARIABLES	(1) Pooled-OLS	(2) ASEAN-5	(3) Asia-5	(4) OECD-7
PrivateCredit_gdp	0.004	0.001	0.004**	0.001*
PrivateCredit_gr	-0.373	-0.073	-0.205*	-0.018
MarketCap_gdp	0.012***	0.006***	-0.001*	0.001
OSDomPrivDS_gdp	0.008***	0.004**	0.010***	-0.000
FinStruc	0.020***	0.005	-0.011***	0.002
ROE_aftT	0.010**	0.001	-0.001	0.001*
Constant	7.594***	8.498***	8.387***	10.725***
Control variables	Yes	Yes	Yes	Yes
Observations	83	83	78	95
R-squared	0.961			
Fixed Effect D-K	No	Yes	Yes	Yes
Prob > F	0	7.58e-06	9.26e-07	2.78e-09
Number of groups		5	5	7
Within-r2		0.791	0.885	0.529

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The fitted ASEAN-5 panel data model using Driscoll-Kraay standard errors is (column 2) :

*ln_GDP_pc = 8.498 + 0.001*PrivateCredit(%GDP) - 0.073*PrivateCredit_gr + 0.006*MarketCap(%GDP)*
*+ 0.004*OutstandingDomesticPDS(%GDP) + 0.005*FinStruc*
*- 0.001*BankROE + control variables*

Private credit to GDP, Stock market capitalization to GDP and Outstanding domestic private debt securities to GDP are used as a measure of financial deepening in banks and capital markets. Private credit growth is used as a measure of financial excesses. Financial structure is used to measure relative size of banks to capital markets. Bank return on equity is used as a measure of bank efficiency. The outcome variable GDP per capita is natural-log transformed given data skewness, hence the coefficient interpretation requires exponentiation.

In all 3 regions, the models are statistically significant in explaining GDP per capita (the F test statistic has p-value < 0.01 hence the null hypothesis that all coefficients are zero is rejected). For the ASEAN-5 and Asia-5 regions, the explanatory variables explain almost 79% and 89% of

the within-country variation in GDP per capita over time, respectively; and 53% in the OECD-7 region. Our key variables of interest are the financial development indicators since the central question of our empirical analysis is the correlation between financial development and growth, hence p-values of control variables are largely ignored[2].

In general, our results are sensible and consistent with economic intuition, as well as, the findings of the empirical literature. For example, private credit growth (used as a measure of financial excesses) has negative signs for ASEAN-5, Asia-5 and OECD-7 models, which suggests excessive credit is detrimental to GDP per capita. According to the ASEAN-5 estimated model, stock market and bond market size to GDP are statistically significant and positively correlated with GDP per capita, at the 5% significance level; in contrast, bank size does not matter statistically. For the Asia-5 estimated model, the depth of the bank, stock market and bond market in terms of size to GDP, as well as financial structure, matter statistically. All development indicators have the expected positive signs, except for stock market size which suggests welfare instability effects arising from rapid increase in stock market size for the Asia-5 region. Outstanding domestic private debt securities to GDP is statistically significant in explaining ASEAN-5 and Asia-5 GDP per capita, which highlights the importance of a well-developed debt market in promoting GDP per capita. Financial structure (which measures the relative bank size to capital markets) is negatively and statistically significant only in the Asia-5 model. One interpretation of the result is that a relatively strong bank-based system (which reflects households' preference for storing wealth, and businesses' funding preferences for financial institutions) has affected GDP per capita negatively in Asia-5. In other words, the size of indirect financing mechanisms through financial intermediaries (relative to direct financing mechanisms through financial markets) has been negative for the Asia-5 economies. Lastly for the OECD-7 estimated model, only bank size to GDP and bank efficiency matter; in contrast, stock market and bond market size do not matter statistically, which suggest that as one's economy matures, its financial market should shift focus to becoming more efficient in the services it provides, instead of simply sourcing more quantity of funds and allocating funds to business (Cecchetti & Kharroubi, 2012).

[2] In the ASEAN-5 estimated model, most of the control variables are statistically significant (broad money to GDP, exports of goods and services to GDP, and government size) and have the expected signs. Large monetary expansion affects GDP per capita negatively, and a relatively large public sector helps GDP per capita. In the Asia-5 and OECD-7 estimated models, a relatively large public sector affects GDP per capita negatively. Macroeconomic instability (inflation) affects GDP per capita negatively, although not statistically significant.

5. Conclusions

This research raises important questions about the role of a country's financial development and its associations with income per capita. My results show that the relationship is complex and the answer varies depending on a country's level of economic and financial development. Three different regions were used in the study covering the period from 2000 to 2017: ASEAN-5 economies (Singapore, Malaysia, Thailand, Philippines, Indonesia), Asia-5 (Japan, China, Hong Kong SAR, South Korea and India) and OECD-7 countries (Australia, Canada, Denmark, Norway, Sweden, UK and US). Fixed effect regression models with Driscoll-Kraay standard errors to account for the problem of heteroskedastic and autocorrelated error structure are used.

Based on the results of this paper, there are three lessons that ASEAN-5 can draw from the experience of Asia-5 and OECD-7. One, banks matter in driving Asia-5 and OECD-7 income per capita, and this result is important because it highlights that banks will not disappear and there is a future of bank services despite fintech disruptions to banking models (OECD, 2020). Two, a relatively strong bank-based system (which reflects households' storing of wealth preference, as well as, firms' funding preferences for financial institutions) has affected income per capita negatively in Asia-5. This result is interesting because some studies found that both banks and financial markets are important for economic growth (Boyd and Smith, 1998; Levine and Zervos, 1998), but others found that financial structure per se does not matter: it is the overall provision of financial services (banks and financial markets taken together) that is important for growth (Demirgüç-Kunt and Levine, 1996; Levine, 2002). Three, bank efficiency matters in driving OECD-7 income per capita, and this result is important because it emphasizes the need for banks to shift from mobilizing savings toward improving efficiency of investment, and thereby contributing to higher economy-wide standard of living. These findings are useful for policy makers in relation to financial sector liberalization policies that impact the depth, breadth and efficiency of banks and capital markets (Svirydzenka, 2016).

Further research determining the "why and how" effects of bank efficiency (lending deposit spread, return on assets), stock market efficiency (turnover ratios) and bond market efficiency (bid-ask spread) on income per capita, as well as, effects of financial structure on income per capita will be carried out in-depth (Levine & Zervos, 1998).

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