Equity markets and economic development: Does the primary market matter?

Andriansyah, Andriansyah and Messinis, George

Ministry of Finance, Indonesia, Victoria University, Australia

2014

Equity markets and economic development:

Does the primary market matter? *

Andriansyah[a,b,] and George Messinis[a]

[a]*Victoria Institute of Strategic Economic Studies, Victoria University, Melbourne, Australia*

[b]*Ministry of Finance of the Republic of Indonesia, Jakarta, Indonesia*

Abstract

This article examines the role played by primary and secondary equity markets in economic growth. It departs from standard literature to integrate both markets and to explicitly acknowledge the primary equity market. By employing a variety of dynamic panel estimators for 54 countries over the period 1995-2010, we show that the primary equity market is not an important determinant of economic growth, although it facilitates the development of the secondary market. This study also confirms the importance of liquidity provided by the secondary market. The evidence here calls for further investigation into the capital-raising function of equity markets.

Subject Keywords: Equity Markets, Primary Markets, Secondary Markets, Development

JEL Codes: E44, G23, 016

*We are greatly benefited from comment provided by three anonymous and the editor. However, we are responsible for all remaining errors.

Correspondence: Andriansyah, Centre for Strategic Economic Studies, Victoria University, PO Box 14428, Melbourne, Victoria, Australia 8001, Street address: Level 13, 300 Flinders St, Melbourne Victoria Australia 3000. E-mail: andriansyah.andriansyah@live.vu.edu.au

Equity markets and economic development:

Does the primary market matter?

I. Introduction

Early studies in the finance-growth nexus have focused on bank-based measures of financial development and only more recently market-based measures have been considered of importance. This has been particularly so since the World Bank conference on this issue in 1995 and the publishing of papers presented in a special edition of the Bank's economic journal a year later. In summarizing these papers, Demirguc-Kunt and Levine (1996b) stressed that equity market development is an important determinant of corporate financing choices and long-run economic growth. They argue that the main channel to economic growth is liquidity that leads to capital accumulation and allocation. If this is valid, this paper conjectures that the capital-raising function of primary equity markets may be as important for economic growth as the liquidity function of secondary equity markets. Although the secondary market assumes the primary market[1] the two perform different functions and the latter may transcend its role as a supplier of new shares to the secondary market. In this context, this paper examines the importance of both markets in an integrated framework.

The primary market can be defined as the marketplace where new shares are offered to public investors, either at the initial public offering (IPO) or seasoned equity offering (SEO) market. The new shares may then be traded on the stock exchange where they are listed; i.e., the secondary market. An economic consequence of these two markets is the cash or capital inflows to offering firms. New capital can be raised and then used by the listed firms, but no additional money can flow to firms from transactions in the secondary market. From a macroeconomic perspective, a transaction on a stock exchange is not considered as an investment, while the selling of new shares at the IPO and SEO markets is (Mankiw 2010).

[1] This point has been stressed by an anonymous reviewer.

The importance of this distinction can be illustrated by an analogy in the automotive market, as in Cecchetti and Redish (2010). The primary market resembles the new vehicle market where a purchase of a new vehicle is recorded as new revenue for the manufacture and adds to value-added products. Buyers can then sell the vehicle to other buyers at the used car market; i.e., the secondary market. The latter transaction in the secondary market does not account as revenue or value-added.

Despite these differences, economists tend to focus exclusively on secondary market indicators such as market liquidity, market capitalization, composite index returns and volatility as measures of stock market development. They overlook primary market indicators such as capital raised and the number of listed companies (see for example, Demirguc-Kunt and Levine (1996a), Levine and Zervos (1998), and most recently Lee (2012)). This oversight may be due to a misconception of the stock market as a secondary market – as in standard textbooks such as Pilbeam (2010).

Theoretically, the functions of the equity market are similar to those of the capital market. As noted by Levine (2005), the main functions of the equity market are similar to those of the financial system, namely: providing capital and efficiently allocating this capital into productive investments; utilizing domestic savings; improving information; effectively monitoring mechanisms of good corporate governance practices; providing risk-reduction mechanisms; and facilitating exchange of financial instruments that represent the ownership of capital. By ensuring that these five functions run well without any friction, Ang (2008) highlights that equity markets will drive long-term growth through two main transmission channels: the capital accumulation channel; and the total factor productivity (TFP) channel. The first channel relates to the most important function of capital accumulation and allocation, while the second channel mainly refers to the qualitative effects of these functions. In other words, the five functions summarized by Levine (2005) can practically be classified by type of market: the primary market adds to capital mobilization and allocation, while the secondary market plays other functions.

Some endogenous growth models have highlighted equity market development as an important driver of economic growth. For example, by drawing on Mankiw *et al.* (1992) and Greenwood and Jovanovic (1990), Atje and Jovanovic (1993) stress that the equity market is an important determinant of economic development, measured either at the actual level or growth rate. Furthermore, they maintain that funds will move to profitable investments when better information regarding investment projects becomes available. In another study, Bencivenga *et al.* (1996) explain that efficient allocation of resources can only be achieved by reducing the transaction costs of saving mobilization. This is because the liquidity created by efficiency in trading will secure permanent access to the capital invested by initial investors for the financing of long-term and high-return projects. However Bencivenga *et al.* (1996) also argue that the relationship between the equity market and economic development may be more complex. For example, they show that when there is a decrease in transaction costs, an efficiency or liquidity improvement in secondary equity markets will stimulate an increase in market activity. When, however, economic agents are only active in the secondary markets and do not invest in a new project (i.e. pure speculative trading), this increase may have no impact on the level of real activity. Deidda and Fattouh (2002) also find that the relationship may be non-linear and non-monotonic with the positive impact of financial development depending on the maturity stage of financial markets.

Numerous empirical studies have reported a positive relationship between equity market development and economic growth. Using a stock market development index that combines indicators of market size, liquidity, and risk diversification as well as controlling for initial conditions and factors, Levine and Zervos (1996) find evidence of a strong relationship between the two variables of interest. A recent study by Lee (2012) shows that causal relationship is mainly from financial markets to economic growth in cases of the U.S., the U.K., Japan, Germany and France. In fact, the assessment of direction of causality between finance and growth based on the notion of 'supply-leading' and 'demand-following' of Patrick (1966) has dominated most of the empirical studies. Rather than being 'caused by' (in Granger

causality sense) as implied in the supply-leading, the demand-following postulates that economic growth will stimulate demand for financial services and instruments. A recent study of Halkos and Trigoni (2010), for example, shows that there is a long-term relationship by these two notions of causality in 15 European countries. Rachdi and Mbarek (2011) provide similar evidence for some OECD and MENA (Middle East and North Africa) countries. However, the direction of causality is different; bi-directional causality exists for the OECD economies while demand-following exists for the MENA ones.

Yet, there are also studies that point to an ambiguous relationship between equity market development and economic growth. Singh (1997) and Harris (1997), for instance, argue that equity markets may be more beneficial for developed countries than for developing ones. Singh (1997) argues that equity markets in developing economies – that mainly evolve as the result of the financial liberalization – can associate with negative effects on economic development. He contends that the TFP channel is more dominant than its capital accumulation counterpart, but that channel becomes more elusive in the presence of trading and corporate controls. As a result, the markets tend to produce speculative market prices and financial-engineered-based (non-organic) growth. In support of Bhide (1993), Singh (1997) argues that liquidity has a devastating effect on financial stability because it makes the markets – such as the foreign exchange - more volatile. Bhide (1993) observes that the U.S. regulations aiming at increasing market liquidity have had negative effects on the governance of listed firms. Nagaishi (1999) and Chakraborty (2010) confirm the findings of Singh (1997), suggesting that the relationship between equity markets and economic growth in India is not clear and tends to be negative. Nagaishi (1999) finds that equity markets do not contribute to gross domestic savings and, in fact, foreign capital inflows potentially create more volatility in stock prices and the balance of payments. Furthermore, he argues that the substitutive function of stock markets is more dominant in financing private investments: public capital raised through the primary markets may not explain economic growth.

To summarize, the debate about the role of the equity market on economic development remains inconclusive. While both theory and empirical research support the importance of liquidity in secondary markets, the impact of such trading activities on capital allocation in primary markets needs further examination. Therefore, it may be beneficial to explicitly differentiate the role of the primary market and the secondary market in their relation to economic growth, as well as to empirically test if the latter impacts on the former. This paper attempts to address these questions.

To the best of our knowledge, this is the first study to explicitly differentiate the primary equity market from the secondary market in order to examine the role each of these two markets play in economic growth. Related to our study is Singh (2008) who uses the financial interrelation ratio (FIR) and new issue ratio (NIR) as measures of financial development developed by Goldsmith (1969).[2] Singh (2008) claims that these two ratios capture "the activities of both primary and secondary financial markets…" However, given that FIR measures the activities of both financial markets and intermediaries, while NIR just measures financial market activities, the author's claim that FIR and NIR identify both the primary and secondary markets respectively seems unwarranted. This is our first main contribution to the debate on the finance-growth nexus.

The structure of this paper is as follows. Section 2 describes the methodology adopted. Next, Section 3 summarises the data and Section 4 presents the empirical results. Section 5 concludes the paper.

[2] FIR measures total financial claims (i.e. the sum of primary issues of non-financial institutions and secondary issues of financial institutions), while NIR measures only primary issues of non-financial institutions. Both are scaled by net domestic capital formation at current assets.

II. Methodology

In order to assess the relationship between the equity market and growth, we adapt Beck and Levine (2004) and Rioja and Valev (2004) baseline dynamic panel growth regressions to incorporate both the primary and the secondary markets. We are interested in a stable dynamic model, provided $|\alpha| < 1$, in the following model specification:

$$PGDP_{i,t} = \alpha\, PGDP_{i,t-1} + \beta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (1)$$

where PGDP denotes the logarithm of real per capita GDP, X is a vector of explanatory variables including our variables of interest (i.e. a primary market indicator denoted by *primary*, a secondary market *secondary*, and a banking sector indicator denoted by *banking*), η is an unobservable country effect, and ε is the error term that is assumed to be homoscedastic and mutually uncorrelated over time and across countries either individually or collectively, and the subscript *i* and *t* denote country and time period, respectively.

In examining the relationship between equity markets and growth, it is also important to consider banking as an indicator of the financial structure of an economy since it may play an important role in economic development that is independent of that played by the two equity markets. In the case of developing countries or financially less-developed countries, the banking sector is often more advanced than the equity market. Rioja and Valev (2004) and Lee (2012), for example, conjecture that the banking sector is a more important determinant of economic development than equity markets in the early years of development. Thus, we also consider banking as part of X in Model 1. If the (equity market) banking sector is ignored, there may be a spurious relationship between the (banking sector) equity market and economic development. However, the presence of the banking sector in the analysis of equity markets and economic growth does not in general undermine the importance of equity markets, as shown by Lee (2012), Antonios (2010), Rousseau and Wachtel (2000), Caporale, Howells and Soliman (2004), and Levine and Zervos (1996, 1998).

We consider the links between banking, the two equity markets and economic growth as part of a system of equations where these variables are determined simultaneously and are potentially endogenous. Subrahmanyam and Titman (1999) suggest that the link between the primary market and the secondary market is essentially a "snow ball" effect; i.e., as more new firms are listed on a stock exchange, the secondary market becomes more liquid and efficient and, as a result, the whole equity market grows stimulating more listings and public offering in the primary market. In addition, it is also clear that the primary market is a supplier of the shares traded on the secondary market. Therefore, we adopt a simultaneous equation framework and reformulate Equation 1 to get a first order autoregressive distributed lag model of the following form:

$$\boldsymbol{z}_{i,t} = \boldsymbol{B}\boldsymbol{z}_{i,t-1} + \boldsymbol{\eta}_i + \boldsymbol{\epsilon}_{i,t} \tag{2}$$

where

$\boldsymbol{z}_{i,t} = \left[PGDP_{i,t}, primary_{i,t}, secondary_{i,t}, banking_{i,t}\right]'$, $\boldsymbol{\epsilon}_{i,t} = \left[\epsilon_{PGDP,t}, \epsilon_{primary,t}, \epsilon_{secondary,t}, \epsilon_{banking,t}\right]$, and $\boldsymbol{B}$ is the coefficient matrix, i.e.

$$\boldsymbol{B} = \begin{bmatrix} b_{11} & \cdots & b_{1,7} \\ \vdots & \ddots & \vdots \\ b_{41} & \cdots & b_{47} \end{bmatrix}$$

This ARDL model is more appropriate for small samples as it is the case here.

Most of the existing studies have utilized 5, 8, or 10-year averages of the series examined here. The main reason for employing averages is to accommodate business cycles and identify long-term relationship between the variables of interest (see for instance Harris & Tzavalis 1999). However, Aretis and Demetriades (1997) argue that this approach imposes an average effect limitation making it impossible to capture each country's individual idiosyncrasy. Attending to this, we argue that, instead of averages, the use of annual time series data could minimize such limitations associated with cross section estimation. We follow Beck and Levine (1999) who choose initial GDP as the only control variable to estimate Equation 1 using both 5-year average data, and annual data.

In the estimation of Equation 1, we employ the two-steps system GMM developed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). The population moment orthogonality condition used for Equation 1 is as follows:

$$E[\Delta PGDP_{it}\varepsilon_{it}] = 0 \qquad \text{for t=3,...,T} \qquad (3)$$

GMM estimators are suitable for small T and large N (Roodman 2006, 2009). However, simulations conducted by Jenkinson and Ljungqvist (2001) and Mitze (2012) show that the estimators could still be used in a finite sample. In fact, for a small sample (N=25, 35, or 50 and T=12, or 15), the level GMM estimators are relatively better than the system GMM estimators. Therefore, due to our small sample properties, for the annual data we avoid using the system GMM estimators used in Beck and Levine (2004) and Rioja and Valev (2004), rather we prefer the level GMM estimators for each Equation in 2. We also follow Roodman (2009) to employ the collapsing technique and only use one lag to reduce the number of instruments used. The corresponding moment orthogonality condition used for each Equation in 2 is therefore as follows:

$$E[z_{it-1}\Delta\varepsilon_{it}] = 0 \qquad \text{for t=3} \qquad (4)$$

We do not rule out the possibility of cross error correlations between equations, therefore we estimate the equations separately. In addition, the separated estimation is beneficial because it might avoid the misspecification of the sensitivity of the individual equation that can occur with a joint estimation.

A set of control variables that are mainly found to be statistically significant to growth in existing studies such as in Levine and Zervos (1998), Rousseau and Wachtel (2000), Beck and Levine (1999), Rioja and Valev (2004), and Naceur and Ghazouani (2007) are used as

excluded instruments. They are trade openness (*Trade*), inflation rate (*Inflation*), government spending (*Gov*) and foreign direct investments (*FDI*).

The main concern about estimating a simultaneous equation is the selection of exogenous variables that must be excluded in each equation to satisfy the order of condition for identification, i.e. the number of excluded exogenous variables in the equation is at least as large as the number of endogenous variables included in the same equation. This condition is important to make sure that there are the necessary numbers of potential instrument variables for the included endogenous variables for identification. The GMM models constructed in this article guarantee that this condition is satisfied. The choice of variables to include and exclude in the equations is also based on both theoretical and practical considerations.

III. Data

The primary market series, *primary,* that we use here is the U.S. dollar value of capital raised through equity public offerings (either through initial public offerings or seasonal equity offerings) expressed as a percentage of GDP. We utilized annual data of the total capital raised by firms in the form of new shares at the equity market that can be either a mere transfer of ownership or new investment flow[3] over the period 1995-2011 from the World Exchange Federation (WFE). For countries with more than one stock exchange listed, we added up the observed values and treated the total as a representative primary market indicator for that country. The sample includes 54 countries.[4] Table 1 presents list of the countries and their corresponding data period coverage.

INSERT TABLE 1 ABOUT HERE

[3] It is only very recently that the World Federation of Exchanges has begun to differentiate these two roles in the primary market. Thus, this study is unable to distinguish between these two components of capital raised.
[4] The WFE data was downloaded from http://www.world-exchanges.org/. Note also that we excluded Taiwan from our sample since it absent in WDI data of the World Bank.

Market liquidity is used as a proxy for *secondary*, defined as the ratio of the value of shares traded to GDP. This measure has been used in the studies of Levine and Zervos (1996, 1998), Rousseau and Wachtel (2000), Rioja and Valev (2004), and Yu *et al.* (2012). For banking sector development, *banking*, we used private credit by deposit money bank as percentage of GDP which has also been used in Levine and Zervos (1998).[5] Variables *secondary* and *banking* are collected from an updated September 2012 database on financial development and structure (Beck *et al.* 2000). As explained in Beck *et al.* (2001), the private credit *banking* is calculated by deflating both the stock variable by the end-of-period customer price index and the flow variable by the average annual customer price index. This method is also employed here to adjust for inflation. Similar adjustment is not required for *primary* and *secondary* because both are stock variables. Neither is needed for exogenous control variables.

The data source is the World Development Indicators that is publicly available on the World Bank's website. From the same source, GDP per capita (*PGDP*) is used as an indicator of economic development. All variables and their definitions are presented in Table 2.

INSERT TABLE 2 ABOUT HERE

In our estimation we transform the data by taking the natural logarithm of variable X_i, $\log(X_i)$, except for *primary* and *Inflation* where we add one to these two series, $\log(1+X_i)$.

IV. Results

4.1. Descriptive statistics

Table 3 presents descriptive statistics for the variables of interest. The secondary market seems more dominant than the primary market in terms of the value of total shares traded, either in terms of percentage of GDP or market capitalization. Over the sample period,

[5] In an earlier draft, we used turnover (the ratio of value of shares traded to market capitalization) and liquid liabilities as alternative proxies for the secondary market and the banking sector respectively. We obtained similar results in all tables and estimates are available on request.

the average of capital raised through the public equity offering markets is only 3 per cent of GDP, far below the percentage of shares traded on the stock exchanges with a value of 54 per cent of the national output. There are three cases where no firm in a country reported offerings in a particular year. This occurred in Germany and Switzerland in 2003 and in Mauritius in 2006. Hong Kong has been the only country which was able to raise capital of more than a quarter of its GDP since 2003 with the highest record of 49 per cent in 2010. Hong Kong also had the highest total value traded in the last three years. In 2010, its value traded reached almost eight times the national product, which was much higher than the US that only reached four times its national product. The US equity market, however, is still the biggest market around the world in terms of market capitalization. Still, equity financing is not as important as bank credits. Banks provided about 38 times more capital than the value of equity market. In terms of sources of financing, Domowitz *et al.* (2001) show that on average, over the period 1980-1997, equity financing is responsible only for 1.93 per cent of external financing. This may due to the pecking order paradigm of finance firms that tend to use debt financing instead of equity financing (Froot *et al.* 1994).

INSERT TABLE 3 ABOUT HERE

The relationship between economic development measured by GDP per capita and the primary market is illustrated in Figure 1. The scatter plot shows a positive correlation between the two variables for the year 2010. The strength of the relationship is, however, rather weak as indicated by the correlation coefficient between *primary* and *PGDP*. A higher positive relationship between *PGDP* and other variables of the stock market and banks are visible. In general, however, simple correlation coefficients show a positive association between per capita GDP and all financial sector indicators. Economic output has a positive high correlation to equity trading and banking credit, while it has a small, but still positive, correlation with capital raised through equity public offerings.

INSERT FIGURE 1 ABOUT HERE

4.2. The 5-Year Average Data

The estimates of the traditional growth model using 5-year average data for the full sample are presented in Table 4. There are three 5-year average periods: 1995-1999, 2000-2004, and 2005-2010. The last period consists of six years. $PGDP_{i,t-1}$ is therefore the value of *PGDP* in year 1995, 2000 and 2005. We also deleted any samples that had only a one-year period. Here, *primary* is 5-year average of capital raised and has the same periods as above. The estimates are summarized in Table 4.

INSERT TABLE 4 ABOUT HERE

Model 1 presents the estimates for the full model, while Model 2 and Model 3 are for those without *secondary* and *primary*, respectively. We find that the coefficient estimate of *primary* is not statistically significant in Model 1 and Model 2. That of *secondary* (market liquidity*)*, on the other hand, is statistically significant in Model 1, and confirms previous evidence, although the coefficient sign is negative. Note, the secondary market coefficient estimate is not statistically significant when the primary market is ignored. Also, the schooling effect becomes less significant when the primary market is ignored (Model 3) and completely insignificant when both equity markets are considered (Model 1). These results allude to biases in the coefficient estimates possibly due to (a) mis-specification when either of the two equity markets are ignored, (b) endogeneity since *schooling* is treated as exogenous here, or (c) spurious regression since the series enter in levels but it is not clear whether they conform to the same order of integration as time-series processes. Hence, the estimation results in Table 4 can be seen as unreliable. Next, the analysis pays more attention to the data-generating processes and integration of the key series.

4.3. The Annual Data

To explore the time dimension of our series, we next utilize annual data.[6] Due to a lack of a balanced panel, however, we settled for nations with a minimum of 15 years data. There were 28 countries that fulfilled this requirement.

Many studies have shown that many macroeconomic variables contain unit roots and might be cointegrated. Here, we employ two panel unit root tests: the Im-Pesaran-Shin (IPS) test (Im *et al.* 2003) and the CSD test (Pesaran 2007). The two different tests actually yield different results; depending on the number of lags included in the ADF regressions (see Table 5). However, the results in general reveal that all variables contain a unit root. The first test for non-stationary (IPS W-t-bar) strongly confirms the existence of unit roots for all variables except for *primary* when the two lags are used instead of one lag. The second test (CADF Z-t-bar), on the other hand, indicates that *primary* contains a unit root. Overall, we consider that all variables are non-stationary. Furthermore, results of the panel unit root tests infirst difference confirm that the series are I(1) processes. As a result, GMM estimation below uses first differences of all examined variables.

INSERT TABLE 5 ABOUT HERE

INSERT TABLE 6 ABOUT HERE

Before we proceed, we consider the possibility of a long-run relationship and employ the panel cointegration test of Pedroni (1999) with an intercept, a deterministic trend, and one lag due to the limited time-series dimension of our sample. The results appear in Table 6 and fail to reject the null hypothesis of no cointegration between economic development and financial sector indicators. In contrast, four of the six statistics point to a cointegration

[6] The use of annual data is preferred because the 5-year average method considerably reduces the number of observations. The latter method leads to a practical problem when examining the time series properties of the average data. However, existing studies that have utilised annual data such as Beck and Levine (2004) still did not examine the properties such as testing for unit root.

between *primary* and *PGDP*, as well as *secondary* and *banking*. Yet, we maintain that the null of no cointegration cannot be rejected unequivocally.

Next, we re-examine the structural relationship between growth, the two equity markets and the financial sector by employing one-step GMM panel estimation using the ARDL specification as in Equation 2. The results are reported in Table 7. For diagnostics, we apply two specification tests: the AR(2) test in difference, and the Hansen (1982) test concerning the joint validity of the instruments, as well as the Pesaran (2004) cross-sectional dependence test. All three suggest that our model is acceptable.

INSERT TABLE 7 ABOUT HERE

Table 7 confirms the supply-leading hypothesis; short-term causality is from the secondary equity market to economic growth. *Primary* (capital raised) does not have a statistically significant effect on economic development *PGDP*, but does have an impact on market liquidity *secondary.* This indicates that primary equity market development does not affect economic growth. It only impacts on the secondary equity market which, in turn, affects both the primary market and economic growth; the latter reveals a positive the contemporaneous relation.

More challenging is how to interpret the non-rejection of the null hypothesis of zero *primary* market effect on, economic growth. Although this non-rejection indicates the absence of a capital-raising effect, the primary market may still be an important determinant of economic growth via alternative channels that are not examined here.[7] Yet, the evidence here suggests that its effect is not through a capital accumulation and allocation transmission channel.

In contrast to results in Table 4 which seem suspect, the results in Table 7 point to a positive secondary market effect and a mixed effect for the banking sector which are

[7] One is through innovative production, as suggested by an anonymous reviewer

consistent with Beck and Levine (2004) and Yu *et al.* (2012). In addition, the results also point to a bi-directional relationship between banking sector and economic development.

4.4. Further Analysis using the Annual Data

For robustness purposes, we experiment with a panel VAR as in Love and Zicchino (2006). In contrast to the models in Equation 2 and Table 4 , we next employ a first order panel VAR using only one lag for all endogenous variables. The estimation results are presented in Table 8.

INSERT TABLE 8 ABOUT HERE

Here, we find that *PGDP* is not statistically affected by the lag value of *secondary,* instead the current value of *secondary* is affected by the lag value of *PGDP*. The current value of *secondary* is also affected by the lag value of *primary*. In general, these results cannot reject the null of no relationship between the primary market and economic development as specified here. However, the former seems to impact on the secondary market.

We also consider an alternative model in order to account for potential parameter heterogeneity. This also accommodates the critique of Aretis and Demetriades (1997) on idiosyncratic country effects. Here, we utilise the pooled mean group estimator (PMG) of Pesaran *et al.* (1999) which allows for slope heterogeneity in the short run while it still assumes homogeneity in the long run. Even though the PMG estimator is robust to cointegration, Pesaran *et al.* (1999) recommend conducting a pre-test for a long-run relationship between variables. Table 6 indicates the possibility of a cointegration relationship between *primary*, *PGDP*, *secondary*, and *banking*. Based on this, we focus on the following model specification:

$$\Delta primary_{it} = \theta_{1i}(primary_{it-1} - \sigma_{11i}PGDP_{it} - \sigma_{12i}secondary_{it} - \sigma_{13i}banking_{it}) + \alpha_{11}\Delta PGDP_{it} + \alpha_{12}\Delta secondary_{it} + \alpha_{13}\Delta banking_{it} + \delta_{1i} + \varepsilon_{1it} \quad (5)$$

$$\Delta secondary_{it} = \theta_{2i}(secondary_{it-1} - \sigma_{21i}PGDP_{it} - \sigma_{22i}primary_{it} - \sigma_{23i}banking_{it}) + \alpha_{21}\Delta PGDP_{it} + \alpha_{22}\Delta primary_{it} + \alpha_{23}\Delta banking_{it} + \delta_{2i} + \varepsilon_{2it} \quad (6)$$

Using time-demeaned (i.e., subtracting cross-sectional mean) series in an attempt to mitigate the impact of cross-sectional dependence, the coefficient estimates appear in Table 9.

INSERT TABLE 9 ABOUT HERE

All models indicate the existence of a long-run relationship between *primary* and *secondary*. In the long run, the causality relationship tends to go only from *primary* to *secondary*. In the short run, however, the direction is reversed, i.e., it goes from *secondary* to *primary.* These results again indicate that primary equity markets function as a supplier of new shares to secondary equity markets.

4.5. Discussion

This article has considered the role of the primary equity market as an important driver of economic development. The evidence here suggests that the primary market merely functions as a supply to the secondary market. In view of this finding, we need to reconsider the capital accumulation channel to economic growth. First, *what is the main motivation of private firms going for public investment financing*? *What are the IPO proceeds used for*? Private firms go public because they expect to get the following benefits and opportunities: future growth financing; improvements of financial condition; incremental market value and shareholder value; future external source of financing opportunities; merger and acquisition possibilities; stock exchange listing; increase in corporate image and reputation due to public awareness; and increase in founders' wealth incremental (Draho 2004; Kleeburg 2005; Sherman 2005). However, a survey conducted by Brau and Fawcett (2006) show that managers' motives for going public is mainly for the purpose of future acquisitions. Investment financing as an alternative to debt provides, in fact, the least motivation when

compared to the motives of market valuation, reputation, cost of capital, and ownership distribution.

Second, *is there a disconnect between financial markets and the real sector*? As indicated by Bencivenga, Smith and Starr (1996), speculative trading boosts investors' reluctance to invest in a real rector investment project. Capitalists tend to invest their capital in financial markets, in particular the secondary markets. In this case, an increase in trading liquidity may lead to less long-term and productive investments because there will be less creation of new capital investments. Capital in equity markets is just transferred between investors through trading on stock exchanges. Savings are only utilized for capital formation and accumulation, but not for capital allocation to productive investments; therefore they may have no impact on the level of real activity. Singh (1997) also argues that the expected functions of trading and corporate controls from the secondary markets do not work efficiently. The primary markets themselves are not a preferred way to undertake investment in firm-specific human capital.

Thirdly, *does financial liberalization exclude long-term commitment*? The main assumption of Bencivenga *et al.* (1996) model is that a more productive investment needs a long-term fund commitment through the creation of new capital. Financial liberalisation allows foreign investors to invest in a country, allowing them to withdraw their money at any time without restrictions. They may prefer to just buy and sell existing shares on stock exchanges. The functions of trading and corporate control cannot work if there is no long-term commitment from investors, as indicated by Bhide (1993) that liquidity makes investors reluctant to monitor managers.

V. Conclusion

This paper has examined the different roles played by primary and secondary equity markets in economic growth. Previous studies on the finance-growth nexus have only considered secondary market indicators and have tended to ignore the primary market. This study departs from the literature to separate and integrate both markets in a simultaneous equation framework. From a microeconomic perspective, listed firms could raise money through primary markets by offering equity to publics, with no additional cash inflow for firms when their stocks traded on a stock exchange(s). From a macroeconomic point of view, however, these transactions are not classified as an investment, while the raising of new shares is.

We investigate the capital accumulation function of equity markets here by employing the dynamic panel regressions of Blundell and Bond (1998) and other alternative model specifications for small sample of 54 countries over the period 1995-2010. It seems that capital raised through the primary equity market is not an important determinant of economic growth. Overall, this study has found that no evidence that the null hypothesis of no primary effect on growth can be rejected. The primary market, however, is is significant as a supplier of new shares to the secondary market on the stock exchange. This study also confirms previous findings of the importance of the secondary market and that trading liquidity is an important determinant of the economic growth. Finally, further work is required to ascertain whether the primary equity market plays an indirect role in economic development via an influence on innovative capacity. Moreover, future research needs to more accurately differentiate between the investment and disinvestment functioning roles of the primary market where the former relates to value-added (i.e., new investment) while the latter highlights the transfer of ownership without the creation of value-added.

References

Ang, J.B., 2008. A Survey of Recent Developments in the Literature of Finance and Growth. Journal of Economic Surveys 22, 536-576

Antonios, A., 2010. Financial Development and Economic Growth: A Comparative Studies between 15 European Union Member States International Research Journal of Finance and Economics 2010, 143-149

Arellano, M., Bond, S., 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application toEmployment Equations. The Review of Economic Studies 58, 277-297

Arellano, M., Bover, O., 1995. Another Look at the Instrumental Variables Estimation of Error-components Models. Journal of Econometrics 68, 29-51

Aretis, P., Demetriades, P., 1997. Financial Development and Economic Growth: Assessing the Evidence. The Economic Journal 107, 783-799

Atje, R., Jovanovic, B., 1993. Stock Markets and Development. European Economic Review 37, 632-640

Beck, T., Demirguc-Kunt, A., Levine, R., 2000. A New Database on Financial Development and Structure World Bank Economic Review 14, 597-605

Beck, T., Demirguc-Kunt, A., Levine, R., 2001. The Financial Structure Database. In: Demirguc-Kunt A & Levine R (eds.) Financial Structure and Economic Growth: A Cross-country Comparison of Banks, Markets, and Development. MIT Press, Massachusetts, pp. 17-80.

Beck, T., Levine, R., 2004. Stock Markets, Banks, and Growth: Panel Evidence. Journal of Banking & Finance 28, 423-442

Bencivenga, V.R., Smith, B.D., Starr, R.M., 1996. Equity Markets, Transactions Costs and Capital Accumulation: An Illustration. The World Bank Economic Review 10, 241-265

Bhide, A., 1993. The Hidden Costs of Stock Market Liquidity. Journal of Financial Economics 34, 31-51

Blackburne, E.F., Frank, M.W., 2007. Estimation of nonstationary heterogeneous panels. The Stata Journal 7, 197-208

Blundell, R., Bond, S., 1998. Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. Journal of Econometrics 87, 115-143

Brau, J.C., Fawcett, S.E., 2006. Intitial Public Offerings: An Analysis of Theory and Practise. The Journal of Finance 61, 399-436

Caporale, G.M., Howells, P.G.A., Soliman, A.M., 2004. Stock Market Development and Economic Growth: The causal linkage. Journal of Economic Develpoment 29, 33-50

Cecchetti, S.G., Redish, A., 2010. Money, Banking, & Financial Markets. McGraw-Hill/Irwin, NY.

Chakraborty, I., 2010. Financial Development and Economic Growth in India: An Analysis of the Post-reform Period. South Asia Economic Journal 11, 287-308

Deidda, L., Fattouh, B., 2002. Non-linearity between Finance and Growth. Economic Letters 74, 339-345

Demirguc-Kunt, A., Levine, R., 1996a. Stock Market Development and Financial Intermediaries: Stylized Facts. The World Bank Economic Review 10, 291-321

Demirguc-Kunt, A., Levine, R., 1996b. Stock Markets, Corporate Finance, and Economic Growth: An Overview. The World Bank Economic Review 10, 223-239

Domowitz, I., Glen, J., Madhavan, A., 2001. International Evidence on Aggregate Corporate Financing Decisions. In: Demirguc-Kunt A & Levine R (eds.) Financial Structure and Economic Growth: A Cross-country Comparison of Banks, Markets, and Development. MIT Press, Massachusetts, pp. 263-295.

Draho, J., 2004. The IPO Decision: Why and How Companies Go Public. Edward Elgar, Cheltenham UK and Northampton USA.

Froot, K.A., Scharfstein, D.S., Stein, J.C., 1994. A Framework for Risk Management. Harvard Business Review November-December, 91-102

Goldsmith, R.W., 1969. Financial Structure and Development. Yale University Press, New Haven and London.
Greenwood, J., Jovanovic, B., 1990. Financial Development, Growth, and the Distribution of Income. Journal of Political Economy 98, 1076-1107
Halkos, G.E., Trigoni, M.K., 2010. Financial Development and Economic Growth: Evidence from the European Union. Managerial Finance 36, 949-957
Hansen, L.P., 1982. Large Sample Properties of Generalized Method of Moments Estimators. Econometrica 50, 1029-1054
Harris, R.D.F., 1997. Stock Markets and Development: A Re-assessment. European Economic Review 41, 139-146
Harris, R.D.F., Tzavalis, E., 1999. Inference for unit roots in dynamic panels where the time dimension is fixed. Journal of Econometrics 91, 201-226
Im, K.S., Pesaran, M.H., Shin, Y., 2003. Testingfor unit roots in heterogeneous panels. Journal of Econometrics 115, 53-74
Jenkinson, T., Ljungqvist, A., 2001. Going Public: The Theory and Evidence on How Companies Raise Equity Finance. Oxford University Press, New York.
Kleeburg, R.P., 2005. Intitial Public Offerings. Thomson, Ohio.
Lee, B.-S., 2012. Bank-based and Market-based Financial Systems: Time-series Evidence. Pasific-Basin Finance Journal 20, 173-197
Levine, R., 2005. Finance and Growth: Theory and Evidence. In: Aghion P & Durlauf SN (eds.) Handbook of Economic Growth. Elsevier B.V., North Holland, Burlington, pp. 865-934.
Levine, R., Zervos, S., 1996. Stock Market Development and Financial Intermediaries: Stylized Facts. The World Bank Economic Review 10, 323-339
Levine, R., Zervos, S., 1998. Stock Markets, Banks, and Economic Growth. The American Economic Review 88, 537-558
Love, I., Zicchino, L., 2006. Financial Development and Dynamic Investment Behavoir: Evidence from Panel VAR. The Quarterly Review of Economics and Finance 46, 190-210
Mankiw, N.G., 2010. Macroeconomics. Worth Palgrave Macmillan, New York; Basingstoke.
Mankiw, N.G., Romer, D., Weil, D.N., 1992. A Contribution to the Empirics of Economic Growth. The Quarterly Journal of Economics 107, 407-437
Mitze, T., 2012. Dynamic Simultanoeus Equations with Panel Data: Small Sample Properties and Application to Regional Econometric Modelling In: Empirical Modelling in Regional Science. Lecture Notes in Economics and Mathematical Systems 657. Springer-Verlag, Berlin Hidenberg, pp. 219-271.
Naceur, S.B., Ghazouani, S., 2007. Stock markets, banks and economic growth: Empirical evidende from the MENA region. Research in International Business and Finance 21, 297-315
Nagaishi, M., 1999. Stock Market Development and Economic Growth: Dubious Relationship. Economic and Political Weekly 34, 2004-2012
Patrick, H.T., 1966. Financial Development and Economic Growth in Underdeveloped Countries. Economic Development and Cultural Change 14, 174-189
Pedroni, P., 1999. Critical Values for Cointegration Tests in Heterogenous Panels with Multiple Regressors. Oxford Bulletin of Economics and Statistics 61, 653–670
Pesaran, M.H., 2004. General Diagnostic Tests for Cross Section Dependence in Panels. In: Discussion Paper No. 1240. Institute for the Study of Labor (IZA)
Pesaran, M.H., 2007. A Simple Panel Unit Root Test in the Presence of Cross-sectional Dependence. Journal of Applied Econometrics 22, 265-312
Pesaran, M.H., Shin, Y., Smith, R.P., 1999. Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. Journal of the American Statistical Association 94, 621-634
Pilbeam, K., 2010. Finance & Financial Markets. Palgrave Macmillan, New York.

Rachdi, H., Mbarek, H.B., 2011. The Causality between Financial Development and Economic Growth:Panel Data Cointegration and GMM System Approaches. Intemational Joumal of Economics and Finance 3, 143-151

Rioja, F., Valev, N., 2004. Does One Size Fit All? A Reexamination of the Finance and Growth Relationship. Journal of Development Economics 74, 429-447

Roodman, D., 2006. How to Do xtabond2: An Introduction to "Difference" and "System" GMM in STATA. In: Working Paper Number 103. Center for Global Development

Roodman, D., 2009. Practitioner's Corner: A Note on the Theme of Too Many Instruments. Oxford Bulletin of Economics and Statistics 71, 135-158

Rousseau, P.L., Wachtel, P., 2000. Equity Markets and Growth: Cross-country evidence on timing and outcomes 1980-1995. Journal of Banking & Finance 24, 1933-1957

Sherman, A.J., 2005. Raising Capital. American Management Association, New York.

Singh, A., 1997. Financial Liberalisation, Stockmarkets and Economic Development. The Economic Journal 107, 771-782

Singh, T., 2008. Financial development and economic growth nexus: a time-series evidence from India. Applied Economics, 1615-1627

Subrahmanyam, A., Titman, S., 1999. The Going-Public Decision and the Development of Financial Markets. The Journal of Finance 54, 1045-1082

Yu, J.-S., Hassan, M.K., Sanchez, B., 2012. A Re-examination of Financial Development, Stock Market Developments and Economic Growth. Applied Economics 44, 3479-3489

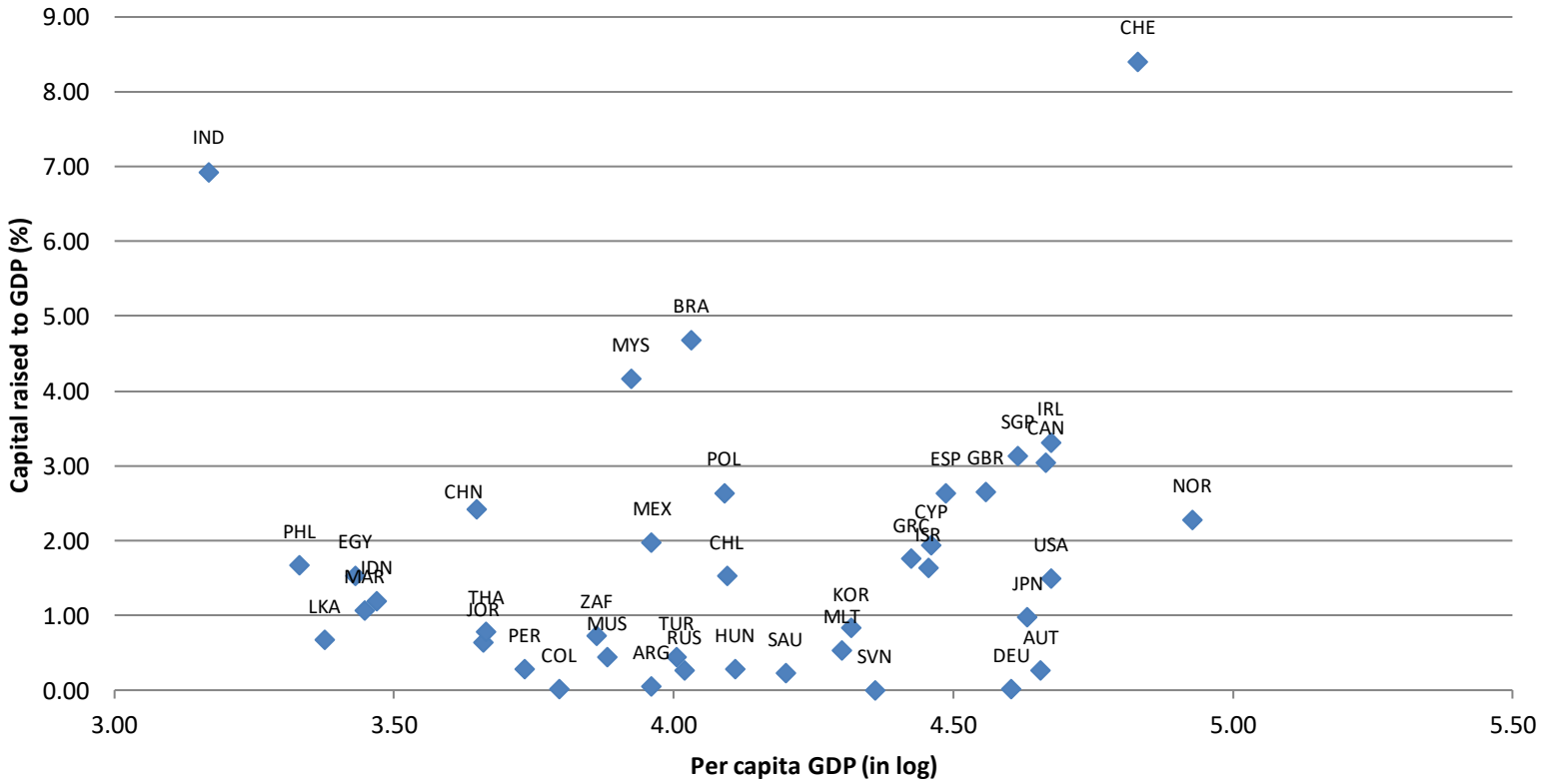

Figure 1.Scatter plot capital raised (as percentage of GDP) and GDP per capital (current USD, in log), 2010

Note: Hong Kong is excluded because it is an outlier. Its ratio of capital raised to GDP is 48.76%. Australia and Iran are not displayed due to incomplete data.

Table 1
List of selected countries, their corresponding exchanges and data period coverage

Country	Stock exchange	Data period
Argentina	Buenos Aires SE	1995-2010
Australia	Australian SE	1995-2010
Austria	Wiener Börse	1995-2010
Belgium	Euronext Brussels	1995-1999
Bermuda[1]	Bermuda SE	1998-2006
Brazil	BM&FBOVESPA	1995-2010
Canada[2]	TMX Group	1995-2010
Chile	Santiago SE	1995-2010
China[3]	Combined	2001-2010
Colombia	Colombia SE	2003-2010
Cyprus	Cyprus SE	2004-2010
Denmark[4]	Copenhagen SE	1995-2003
Egypt	Egyptian Exchange	2004-2010
Finland[4]	OMX Helsinki SE	1995-2003
France	Euronext Paris	1995-1999
Germany	Deutsche Börse	1995-2010
Greece	Athens Exchange	1995-2010
Hong Kong	Hong Kong Exchanges	1995-2010
Hungary	Budapest SE	2000-2010
India[5]	Combined	2001-2010
Indonesia	Indonesia SE	1995-2010
Iran	Tehran SE	1995-2010
Ireland	Irish SE	1995-2010
Israel	Tel Aviv SE	1995-2010
Italy	Borsa Italiana	1995-2008
Japan[6]	Combined	1995-2010
Jordan	Amman SE	2006-2010
South Korea	Korea Exchange	1995-2010
Luxembourg	Luxembourg SE	1995-2006
Malaysia	Bursa Malaysia	1995-2010
Malta	Malta SE	1998-2010
Mauritius	Mauritius SE	2006-2010
Mexico[7]	Mexican Exchange	1995-2010
Morocco	Casablanca SE	2009-2010
Netherland	Euronext Amsterdam	1995-1999
New Zealand	New Zealand SE	1995-2008
Norway	Oslo Børs	1995-2010
Peru	Lima SE	1995-2010
Philippines	Philippine SE	1995-2010
Poland	Warsaw SE	1995-2010
Portugal	Lisbon SE	1995-2000
Russia[8]	Combined	2009-2010
Saudi	Saudi Stock Market - Tadawul	2008-2010
Singapore	Singapore SE	1999-2010
Slovenia	Ljubljana SE	1996-2010
South Africa	Johannesburg SE	1995-2010
Spain	BME Spanish Exchanges	1998-2010
Sri Lanka	Colombo SE	1997-2010
Sweden[4]	OMX Stockholm SE	1995-2003
Switzerland[9]	SIX Swiss Exchange	1995-2010
Taiwan[10]	Combined	1995-2010
Thailand	Thailand SE	1995-2010
Turkey	Istanbul SE	1995-2010
U.K.	London SE Group	1995-2010
U.S.A[11]	Combined	1995-2010

Note: (1) 1999-2000 is not available. (2) Before 2001, combined Canadian Venture Exchange and Toronto Stock Exchange. 2008 data is not available. (3) Combined Shanghai Stock Exchange and Shenzhen Stock Exchange. (4) Merged into NASDAQ OMX Nordic Exchange in 2004. After that data for each country is not available. (5) Combined Bombay Stock Exchange and National Stock Exchange India. 2011 data is only from National Stock Exchange India. (6) Combined Tokyo Stock Exchange Group and Osaka Securities Exchange. Before 2009, JASDAQ also included. (7) 2001 data is not available. (8) Since 2010, combined MICEX and RTS Stock Exchange. (9) 2008 data is not available. (10) Taiwan is excluded. Since 2010, combined Taiwan Stock Exchange Corp and Gretai Securities Market. Before that, data is only from Taiwan Stock Exchange Corp. (11) Combined NASDAQ and NYSE. Before 2005, combined NASDAQ, NYSE and American Stock Exchange.

Table 2
List of variables and their definitions

Variable	Definition	Source
PGDP	Gross domestic product divided by the number of population (in current $US)	WDI
primary	Total amount of capital raised through primary equity markets either by an initial public offering or seasonal equity offering (as a percentage of GDP)	WFE and WDI (for GDP)
secondary	Value of total shares traded on the stock market exchange (as a percentage of GDP)	Beck, Demirguc-Kunt and Levine(2000)
banking	Deflated private credit by deposit money banks (as percentage of GDP)	Beck, Demirguc-Kunt and Levine(2000)
Schooling	Gross rate of secondary enrollment (as percentage of GDP)	WDI
FDI	Net inflow of foreign direct investment (as percentage of GDP)	WDI
Trade	Total value of export and import of goods and services (as percentage of GDP)	WDI
Gov	Government expense (as percentage of GDP)	WDI
Inflation	Annual percentage change in the consumer price index	WDI

The deflation index used to calculate *banking* is $\frac{0.5\times(C_t/CPI_t + C_{t-1}/CPI_{t-1})}{GDP_t/\overline{CPI}_t}$ where C_t is the value of private credit by deposit money banks, CPI_t is the end-of-period consumer price index, $\overline{CPI}_t$ is the average annual consumer price index, and GDP_t is the value of GDP.

Table 3
Descriptive statistics

Statistic	*PGDP*	*primary*	*secondary*	*banking*
Full Sample				
No. observations	664	660	655	626
Mean	19,335.596	2.482	53.904	76.600
Std. dev.	17,154.697	4.636	75.364	47.828
Min	459.230	0.000	0.271	9.617
Max	93,366.810	48.763	740.057	270.840
Correlation (No. observations = 604)				
PGDP	1.000			
primary	0.162	1.000		
secondary	0.385	0.512	1.000	
banking	0.587	0.280	0.402	1.000
Pesaran CD Cross-sectional Independence test				
Average coefficient	0.775	0.100	0.329	0.148
CD-statistic	57.76***	7.46***	24.57***	10.46***

Table 4
Two-step system GMM estimates regressions of the relationship between the primary market, the secondary market, the banking sector and PGDP growth, 5-year average data

Variables	Model 1	Model 2	Model 3
$PGDP_{i,\,t}$	-0.0150	-0.0200*	-0.0158
	(0.0102)	(0.0116)	(0.0140)
$schooling_{i,t}$	0.0584	0.0887**	0.0579**
	(0.0490)	(0.0407)	(0.0242)
$primary_{i,t}$	-0.0043	-0.0170	
	(0.0448)	(0.0397)	
$secondary_{i,t}$	-0.0103**		-0.0105
	(0.0049)		(0.0070)
$banking_{i,t}$	0.0009	-0.0045	-0.0012
	(0.0175)	(0.0164)	(0.0185)
Observations	112	112	112
Number of instruments	22	22	20
AR(1)	0.248	0.243	0.244
Hansen test	0.151	0.144	0.125

Notes: ***, **, and * indicate p<0.01, p<0.05, and p<0.1, respectively. Standard errors are in parentheses. The standard errors are robust to heteroskedasticity and autocorrelation with Windmeijer correction. Covariance matrix estimate is based on small sample correction. The number of instruments used is reduced both by using only one lag (i.e. lag 1) and collapsing the instrument matrix. The instrument variable set is one-period lag exogenous variables. Year dummies are included.

Table 5
Panel unit root tests

Variable	IPS Test [W-t-bar]		CADF Test [Z-t-bar]	
	Lag(1)	Lag(2)	Lag(1)	Lag(2)
In Level				
PGDP	0.637	0.6423	-1.165	-2.236**
primary	-3.125***	-2.2914**	-0.257	1.504
secondary	-1.360*	2.3793	0.013	4.569
banking	-0.677	2.0722	-1.470*	5.871
In First Difference				
ΔPGDP	-5.188***	-2.9358***	-1.159	-0.438
Δprimary	-7.443***	-3.1963***	-5.846***	1.440
Δsecondary	-6.939***	-1.387*	-6.568***	-2.861***
$\Delta banking_{i,t}$	-4.153***	-0.8498	-2.661***	4.741

Notes: ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. The unit root tests remove cross-sectional effects and include a time trend. The null hypothesis is panels contain unit roots. We set the number of lag for ADF regression in the tests to one due to our limited sample size.

Table 6
Pedroni residual panel cointegration tests

Statistics	Dependent variable			
	PGDP	***primary***	***secondary***	***banking***
Within-dimension				
Panel v-Statistics	-0.8486	-4.1360	0.3010	0.2929
Panel rho-Statistic	5.4232	2.1834	4.3589	4.7979
Panel PP-Statistic	3.7271	-29.0333***	1.3954	2.3868
Panel ADF-Statistic	2.9966	-10.4401***	-1.7631***	1.4703
Between-dimension				
Group rho-Statistic	6.9818	3.3216	6.8511	6.2594
Group PP-Statistic	4.2852	-28.1544***	2.7530	1.4635
Group ADF-Statistic	3.7312	-3.4975***	-3.4995***	-0.6597

Notes: ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. The tests use a deterministic trend, , one lag length and Newey-West automatic bandwidth selection and Bartlett kernel.

Table 7
One-step level GMM estimates regressions of the inter-relationship between the primary market, the secondary market, banks, and PGDP growth, selective sample, annual data

Variables	***Dependent***			
	PGDP	***primary***	***secondary***	***banking***
$\Delta PGDP_{i,t-1}$	0.8494***	0.0371	-0.3587	0.2327***
	(0.1449)	(0.0393)	(0.4342)	(0.0538)
$\Delta primary_{i,t-1}$	-0.6810	-0.3659	6.1435	-0.6322
	(2.1880)	(0.3885)	(3.9578)	(0.9528)
$\Delta secondary_{i,t-1}$	0.0159	0.0029	0.3154*	0.0518
	(0.0923)	(0.0174)	(0.1763)	(0.0343)
$\Delta banking_{i,t-1}$	1.0379**	0.2038*	-1.6515*	0.5568***
	(0.4875)	(0.1109)	(0.8203)	(0.1253)
$\Delta PGDP_{i,t}$		-0.0391	0.7703**	-0.1479***
		(0.0241)	(0.2934)	(0.0426)
$\Delta primary_{i,t}$	-2.9643		6.2154*	-1.2713
	(2.1230)		(3.5323)	(0.9195)
$\Delta secondary_{i,t}$	0.3319***	0.0354**		0.0524
	(0.1096)	(0.0154)		(0.0542)
$\Delta banking_{i,t}$	-2.1315***	-0.2419	1.7536	
	(0.6559)	(0.1480)	(1.2111)	
Observations	214	214	232	214
Number of instruments	26	26	26	26
AR(2)	0.847	0.183	0.0720	0.325
Hansen test	0.134	0.788	0.236	0.301

Notes: ***, **, and * indicate p<0.01, p<0.05, and p<0.1 respectively. Robust standard errors with Windmeijer correction are in parentheses. Covariance estimates are also based on a small sample correction. The number of instruments used is reduced by using only one lag (i.e. lag 1) and collapsing the instrument matrix to one-period lag of each exogenous variable.

Table 8
Panel 4-variable VAR estimates

Response to	*Response of*			
	PGDP	***primary***	***secondary***	***banking***
$PGDP_{t-1}$	0.9918***	-0.0106	0.1587**	0.0977***
	(0.0396)	(0.0082)	(0.0761)	(0.0294)
$primary_{t-1}$	-0.0440	0.1856	1.6927**	-0.0569
	(0.1853)	(0.2539)	(0.6929)	(0.2522)
$secondary_{t-1}$	0.0214	0.0044	0.8476***	0.0404***
	(0.0153)	(0.0037)	(0.0320)	(0.0104)
$banking_{t-1}$	-0.0826	0.0111	-0.2693***	0.8196***
	(0.0637)	(0.0087)	(0.0.990)	(0.3778)
No. Observations		354		

Notes: ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. Time-demeaned removal and helmet transformation are employed before the system GMM estimation.

Table 9
Estimates of heterogeneous panels

Variables	***Δprimary***		***Δsecondary***
Long-run relationship		Long -run relationship	
$PGDP_{i,,t}$	-0.0020**	$PGDP_{i,,t}$	4.9401***
	(0.0009)		(0.8080)
$secondary_{i,,t}$	0.0001	$primary_{i,,t}$	1.0873***
	(0.0004)		(0.0841)
$banking_{i,,t}$	-0.0002	$banking_{i,,t}$	-0.0309
	(0.0007)		(0.1401)
Speed of adjustment	-0.8780***	Speed of adjustment	-0.3026***
	(0.0833)		(0.0497)
Short-run relationship		Short-run relationship	
$\Delta PGDP_{i,,t}$	0.0174	$\Delta PGDP_{i,,t}$	0.2412
	(0.0294)		(0.1852)
$\Delta secondary_{i,,t}$	0.0094*	$\Delta primary_{i,,t}$	2.9015
	(0.0052)		(2.3985)
$\Delta banking_{i,,t}$	-0.0226	$\Delta banking_{i,,t}$	1.0976***
	(0.0232)		(0.2892)

Notes: ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. Estimates and standard errors (in parentheses) are calculated using Stata's *xtpmg* routine developed by Blackburne and Frank (2007).