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"ECONOMIC CONVERGENCE AND THE FINANCIAL DEVELOPMENT"

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ΧΡΙΣΤΟΥ ΧΡΙΣΤΙΝΑ (ΕΠΙΒΛΕΠΟΥΣΑ ΚΑΘΗΓΗΤΡΙΑ)

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Θα ήθελα να ευχαριστήσω την επιβλέπουσα καθηγήτρια κα. Χριστίνα Χρίστου για την πολύτιμη καθοδήγηση και την αμέριστη βοήθεια που μου προσέφερε κατά την εκπόνηση της παρούσας εργασίας.

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1. Introduction

A major issue of investigation in the economic literature is the income inequality and its causes. Two different economic approaches give different explanations of the mechanisms of the economic development. Although each of them has different implications about the convergence of the income across the countries, in both of them financial development may be a significant factor of economic growth.

The relationship between finance and growth is ambiguous, because it is not clear which is the direction of the causality. According to the literature the causality is either bi-directional either has direction from finance to growth. Independently of the direction of causality, at least feedback effects exist with direction of real economy to financial sector.

With the present work we examine whether the convergence in the per capita income coexists with convergence in the various measures of financial development. If indeed there is coincidence between the convergence in the per capita income and in the financial development indicators, this would be an additional evidence that financial sector is significant in order to facilitate economic growth and finally accelerates it.

In order to test for convergence we apply a new econometric methodology developed by Phillips and Sul. This methodology takes into account the possible heterogeneity across the countries and consequently gives more accurate results about the existence of convergence. Another useful property of this test is the fact that it allows for the detection of converging subgroups, in the case that there is not convergence across the full sample. Due to the fact that financial sector facilitates economic growth by many different ways and by many different means, we use various indicators of financial development in order to capture a broad spectrum of the financial services that facilitate economic growth.

More analytically the present work is organized as follows: At the second part we review the relative literature. We briefly present the two main economic growth theories, the neoclassical growth theory and the endogenous growth theory. Additionally, we present a number of works that attempted to test empirically the validity of the economic growth theories. Furthermore we briefly present the basic functions of the financial systems which facilitate and eventually accelerate economic growth process. We also present a number of theoretical studies that underpin the relationship between financial

development and growth and finally we present a number of studies which examine empirically the relationship between financial development and economic development. The empirical studies employed a lot of different econometric techniques, such as cross-country methods, time series methods and panel data methods.

At the third part we describe the issues to be examined and in addition we refer to the problems that exist in our effort and the approaches which we use to overcome these problems.

At the fourth part we present analytically the econometric methodology that we are going to apply in order to test for convergence. Furthermore we present the clustering algorithm that was developed by Phillips and Sul and allows us to detect for converging subgroups incase that there is not convergence across the full sample.

At the fifth part we analyze the variables and the data that we will use in order to examine whether the convergence in the per capita income is accompanied by convergence in the financial development. Furthermore we describe each one of the 5 datasets that we will use.

At the sixth part we present our results for each subgroup. Except from the arithmetic results for the whole sample, we present the formed subgroups and the corresponding results for them, in case that there is not convergence in the full sample. Moreover we present diagrams with the initial series of every subgroup and diagrams with the relative transition curves of the formed subgroups.

At the seventh part we further analyze the results of the sixth part and we compare the income subgroups that were formed in each dataset with the subgroups of the financial variables of the same dataset.

Finally at the eighth part we conclude, briefly reporting the theoretical underpins of the relationship between economic development and financial development and recapitulating the main results of our analysis.

2. Literature Review

2.1. Economic Growth Models

One of the major themes of the economic research is the income inequality across the economies. Which factors lead some countries to be rich whereas others remain poor? The answer of this question is very significant for policy implications which may accelerate the economic growth of poor countries and as a result lead them to converge with the richer countries in terms of per capita income. Do poorer countries grow with faster pace than richer countries? This is the meaning of economic convergence, i.e. the reduction of income inequality between the economies. In this point it would be useful to present the two main different economic theories that try to explain the growth procedure. Both of them are based in the aggregate production function, but they give different predictions about the existence of convergence.

Neoclassical Growth Theory

The first theory is the neoclassical (or exogenous) growth theory which was introduced by Solow (1956). Its main assumption is that the capital has diminishing returns. In addition, technological process rate, savings rate and population growth rate are determined exogenously. The effects of savings rate are positive to the income while the effects of population growth rate are negative, i.e. higher savings rate means that country is richer and higher population growth rates means that country is poorer.

Mankiw et al. (1992) expanded the Solow growth model including the accumulation of human and physical capital as well. They found that the expanded model estimates more precisely the magnitude of the effects of saving rate and population growth rate to the per capita income. In addition they introduced the notion of conditional convergence. Conditional convergence is the convergence which occurs after the control of the determinant factors of steady state income, i.e. the saving rate and the population growth rate. They estimated that, after controlling these variables, Solow model correctly predicts convergence.

According to Islam (1995) at the steady state level the per capita growth rate equals with the exogenously determined technological process rate. We can distinguish two different

kinds of convergence, the one occurs in the levels of income whereas the other occurs in the growth rate. The convergence in the income levels occurs within countries with similar preferences. Taking into account that technology is freely available, we conclude that technological rate is the same for the whole of the economies and eventually steady state growth rate is also the same for all the countries. Consequently, with time, the income of the countries with similar preferences will converge. When the preferences are not similar, only the growth rate of income would be the same- due to the fact of free spreading of technological process- and countries will converge in growth rate terms.

Endogenous Growth Theory

The second theory is the endogenous growth theory which was introduced by Romer (1986, 1990), Lucas (1988) and Rebelo (1991). The main differences of the endogenous growth models, in relation with the exogenous growth models, are two. The first difference is that the returns of the set of reproducible factors are not diminishing and the second is that the technology growth rate is not determined exogenously but endogenously. The endogenously determined technological rate leads one economy to grow even if there is not an external technological shock. This, in terms of convergence, means that it is not necessary for the incomes of all countries to converge. By this way, differences between countries may persist indefinitely. Another implication of the endogenous growth model is that every factor that may create incentives for improvements in the production and for innovation, may also affect positively growth. Such factors are the expenditures for R&D, the education or even the existence of subsidies.

But what is the empirical evidence about the convergence of income within the economies? Does the neoclassical growth model (thereafter NGM) or the endogenous growth models, give results that are consistent with the real facts?

Using the neoclassical framework and cross-sectional econometric methodology, Barro and Sala-i-Martin (1992) tested for convergence in the per capita income and in the gross product, across two different samples. The first sample consisted of 48 U.S. states and the second sample consisted of 98 countries. The periods of the data are, for per capita state income from 1840 to 1988 and for both gross state and gross domestic product from 1963 to 1986. Their results indicated convergence both in the per capita state income and in the per capita gross state product. Quantitatively, their results meet the predictions of the

NGM only if the capital returns diminish very slowly. In addition they pointed out that the convergence coefficients of income and of product are similar, something that contradicts with the theory. They suggested that a possible solution of this puzzle is the creation of a growth model that incorporates capital markets, factor mobility and technological diffusion. As for their international sample, their results indicate convergence only if the determinant factors of steady state remain constant (conditional convergence).

Mankiw et al. (1992) examined for convergence in income across a dataset consisted of 98 countries, from 1960 to 1985. They used the NGM framework slightly altered by the addition of the human capital and physical capital accumulation in the model. Using cross-sectional econometric methodology, they found evidence for conditional convergence, keeping constant the population growth and the capital accumulation.

Carlino and Mills (1993) employed time-series analysis in order to examine for convergence in per capita income across the U.S. states, for the period from 1929 to 1990. Their results confirm the NGM prediction about relative convergence, but only after allowing for a break to the rate of convergence in 1946.

Durlauf and Johnson (1995) dismissed the linear model that is frequently used to study the cross-country economic behavior in favor of multiple regimes. These multiple regimes will be common per group of countries that being formed according to the initial condition of the economies. Using data for 121 countries from 1960 to 1985, they reject the hypothesis of convergence in per capital income, while they found evidence for club convergence in multi steady states. Additionally they found that the marginal product of capital is varying with the level of economic development. Their results underpin the endogenous growth models.

Islam (1995) employed panel estimation techniques in order to test for convergence in per capita income. Using this method, he took into consideration the possibly different production functions of every economy. This heterogeneity in the production functions may lead into misleading results due to omitted variable biases, if the employed methodology is a simple cross-country regression. Using the same dataset with Mankiw et al (98 countries for the period from 1960 to 1985) he concluded that there is conditional convergence. Nevertheless, he criticized the significance of conditional convergence because what it shows us is that each country converges in a different steady state income. Bases on this, he emphasized the significance of the detection of the factors that determine the steady state of every country. Additionally he highlighted the role of

A(0) term as a determinant of steady state income and pointed that it would be useful to examine for the factors who affect this term. (The A(0) term is a part of the Cobb-Douglas production function and has the interpretation of production technology, resource endowments, institutions, etc. while it is different for every country).

Bernard and Durlauf (1995) used cointegration techniques to test for convergence in per capita income. Their sample consisted of the per capita income of 15 industrialized countries for the period between 1900 and 1989. Although their results indicate that there is not convergence in the per capita income, they found evidence for the existence of a group of long-run factors that jointly determine the output growth for the countries of their sample.

Evans (1996) dismissed the method of the regressions between the growth of the per capita output and the initial per capita output plus country characteristics, as valid technique to test for convergence. Instead of this method he proposed an alternative method that uses the cross-country variances of per capita income. He applied this method to data from 13 countries over the period 1870 to 1989 and found that per capita output revert to a common trend. His results opposed to the predictions of the endogenous growth models which state that trend growth rates would be different across countries.

Lee, Pesaran and Smith (1997) examined for convergence in the per capita income and its growth rate, across 102 countries for the period between 1960 and 1989. For their empirical investigation they constructed an empirical version of a stochastic Solow model. They used panel data econometric techniques in order to allow for possible heterogeneity across the countries. Their results indicate that there are significant differences in the steady state growth rates across countries and in addition they rejected the hypothesis that technology growth rates are equal across countries. They also highlighted the fact that the heterogeneity in the steady states should be taken into account in order to avoid biases in the estimations for convergence.

Canova (1999) proposed a new technique for grouping converging countries in terms of per capita income. This methodology implies that countries have multiple steady states of per capita income. He empirically tested for convergence across two samples. The first sample consisted of data for 144 European regions, for the period between 1980 and 1992, and the second sample consisted of 21 OECD countries, for the period between 1951 and 1985. He found that the steady state distribution of the income of the European

regions is clustered around 4 different poles whereas that of the OECD countries is clustered around 2 different poles.

Pesaran (2006) proposed a general probabilistic definition of convergence and used a pair-wise approach to test for output convergence across the countries. He applied his method to output data from the Penn World Tables over the period between 1950 and 2000. His results indicate the absence of convergence in per capita output whereas at the same time the growth is converging across the same sample. According to Pesaran the aforesaid combination (divergence of the levels and convergence of the growth rates) suggests that even if technological process is widely spread across the countries, there are other important country specific factors that prevent the output between countries to converge.

Grier and Grier (2007) tried to indicate which factors lead the per capita income to diverge. According to the NGM and the conditional convergence notion, the only possible explanation for the diverging income, is that some determinants of steady state income must also diverge. Using a sample that consisted of 90 countries from 1961 to 1999, they found strong evidence of income divergence across countries. In addition they found convergence in the investment rates of both human and physical capital, in the government spending, in the openness to trade, in the black market premium and in the inflation. They also divide their sample into rich countries and developing countries in order to examine whether there are different results between these two groups. Their findings indicate that although the basic determinants of income converge in both groups, the income itself diverge between them. As a result the adoption of the policies of the wealthier countries by the developing countries, do not give the expected results. They, finally, examined a number of variables that lie outside the neoclassical framework, in order to test if they are consistent with the divergence of the per capita income. The aforesaid variables are the R&D spending, the financial development (more specifically the private credit by deposit money banks and other financial institutions to GDP, the market capitalization and the openness to capital) and the institutional quality (more specifically the constraints on the executive, the bureaucratic quality, the corruption and the overall law and order). The only alternative variables that are consistent with the divergence in the income, are the R&D spending and the capital openness. Nevertheless they note that these variables may be endogenous, but they do not reject them at all as possible explanatory variables of the income. Overall, Grier and Grier highlighted the neoclassical anomaly of the diverging per capita income while at the same time the

determinant factors of it, converge. As a possible solution for this puzzle, they proposed the inclusion of new variables, outside of the NGM, as significant factors of the per capita income.

Phillips and Sul (2008), using their new methodology for testing for convergence, examined 3 different samples for convergence in per capita input. The first sample consisted of 48 U.S. states, for the period between 1929 and 1998, the second sample consisted of 18 western OECD countries, for the period between 1870 and 2001 and the third sample consisted of 152 countries from the Penn World Tables, for the period between 1970 and 2003. The results for the U.S. sample indicate that the transition paths for every state seem to converge. The results for the OECD sample indicate divergence in the per capita income until the World War II, but around 1950 this pattern changed and the transition paths of per capita income seems to converge. Finally, the results for the PWT sample indicate the existence of converging subgroups.

Briefly recapitulating the implications of the aforementioned growth theories for the income convergence hypothesis, we can isolate the following main points. According to the neoclassical growth models, the growth rate of the per capita income should converge across the countries and additionally, in the case that countries have the same preferences, the absolute value of the per capita income should also converge. Contrary to what NGM implies for convergence, the evidence rejects the convergence hypothesis, as the per capita income and its growth, rather seem to diverge than to converge. This difference between the theory and the evidence gave the incentives for the creation of two more specialized groups of models. On the one hand, there are the models of conditional convergence, in which every economy converges to its own steady state growth path, and on the other hand there are the endogenous growth models, in which differences in the per capita income may be persistent. In the framework of endogenous growth models, multi steady states may exist and a number of factors may affect the steady state path of every economy. Either the notion of conditional convergence is valid for the explanation of the convergence across countries, or the endogenous growth models are valid for this explanation, the inclusion of the financial development as a determinant factor of the steady state income, is possible (Barro and Sala-i-Martin, Islam, Pesaran, Grier and Grier). Besides, Klenow and Rodriquez-Clare (1997) and Easterly and Levine (2000), found that the total factor productivity (TFP), that is the part of growth which not accounted for by factor accumulation, accounts for about the 90% of the cross-country income differences. A possible part of the TFP may be the financial development of each

country. In this extend we will examine whether or not the convergence in financial development affects the convergence in per capita income.

2.2. The Functions of Financial Systems

Financial systems through a number of functions facilitate the growth process. According to Levine (2003) the basic functions of the financial systems are the following:

1. The collection of information about the possible investments and the allocation of capital to the more promising in terms of returns.
2. The monitoring procedure of the realized investments and the exertion of corporate governance, after providing finance.
3. The facilitation of the trading and additionally the risk management and the risk diversification.
4. The pooling of savings of a large number of agents and the mobilization of them.
5. The easing of the exchange of goods and services.

More generally, financial systems reduce the effects of information, enforcement and transactions costs. A better developed financial system provides this reduction in a more efficient way. The aforesaid functions could affect savings and investment decisions and eventually economic growth. We now further analyze each of the aforementioned functions.

There are large costs of collecting information about enterprises, new investments, innovations, managers and generally of the market conditions. A single agent does not have the ability to collect enough information neither the necessary specialized knowledge to analyze this information and take the right investment decision. A saver would be reluctant to invest in a project for which he has not enough information. As a result, information costs set impediments for promising investment projects for which there is not available information. Financial institutions may reduce the cost of receiving and processing information and by this way improve the research allocation (Boyd and Prescott, 1986). This reduction in information costs comes from the economies of scale that financial institutions enjoy when acquire and process the information. Because the capital is scarce, the provision of most qualifying information with less cost, channels the funds to the most productive investments which in turn accelerates economic growth. Feedback effects may also exist as a more developed economy may provide to the financial institutions new improved technologies to further reduce the costs of their operation, as well the information costs (Greenwood and Jovanovic, 1990). Except from the financial institutions, the development of stock markets may also be considered as a form of financial development that ameliorates information costs and improves asset

allocation (Grossman and Stiglitz, 1980). As markets become larger and more liquid, investors have more incentives to search for information, because it is easier for an investor to gain profits in a large and liquid market. Thus the existence of large and liquid stock markets may create more incentives for the acquisition of the information and consequently lead the capital to be allocated more effectively. (Merton, 1987).

Another function of the financial systems is the monitoring of the corporate governance and of the investment decisions after the provision of finance. According to the agency theory, corporate governance problem is defined as how the equity holders and the debt holders influence the managers of the firm to act in the best way for them. The absence of effective corporate control may impede the mobilization of capital from disparate savers to the enterprises and as a result, prevent the capital to flow in the most productive projects. This in turn slows down the growth procedure. (Stiglitz and Weiss, 1983). If shareholders and debt holders force the managers of the firms to maximize the firm value, they in turn would allocate the capital to the most productive and innovative projects, boosting the economic growth. Although theoretically the developed stock markets would provide the ability for corporate government control, it is very possible that small investors may not afford the cost, both in money and in time, to monitor the managers of the firm. By this way the argument for improvement of corporate monitoring is someway neutralized. But there is another opinion according to which even small shareholders can exert corporate control through the right to vote on critical issues, like mergers, liquidation and fundamental changes in business strategy. Of course shareholders have the ability to oversee management indirectly through the election of the board of directors and the reviewing of the managerial decisions. (Easterbrook and Fischel, 1991). In addition, in a well-functioning, liquid market, the threat of a takeover would also contribute to the corporate governance monitoring. (Manne, 1965).

Nevertheless there are serious counterarguments for the significance of the stock markets in the exertion of corporate governance. The information asymmetries between the management of the enterprise and the potential investors may impede several problems in the corporate governance exertion, preventing small investors to monitor the management actions and allowing managers to channel funds to projects that would benefit them but not the shareholders. Besides, small investors may not have special knowledge to control the management, the elected board of directors may cooperate with the managers and the legal system may not provide enough protection to the rights of the small investors. All these factors may affect in negative manner the significance of the stock markets to the

monitoring of the enterprises and of the managers and eventually impede the asset allocation of the scarce capital and the growth process. The possible weakness of the stock markets-as a part of the broader financial system-to facilitate corporate governance monitoring, creates the incentives for the development of financial intermediation forms to promote this function of financial systems. Debt contracts, give more power to their holders to monitor the actions of the managers. (Townsend-1979, Boyd and Smith-1994). Financial institutions may also facilitate the corporate management control, through the pooling of the savings of a large number of investors and the channeling of these savings to the promising firms. This delegated monitor reduces the costs of the corporate control through economies of scale and additionally ameliorates the free riding problem because it acts in the name of all the small investors. Furthermore, as the financial intermediaries develop long-run relationships with the firms, the costs of the information acquisition are further reduced. (Diamond, 1984). One additional important aspect of the facilitation of the monitoring by the financial institutions is that capital is more possible to "move" to regions that have better systems of corporate governance. In that way, if one region has developed financial intermediaries, has less possibilities to suffer from capital deficiency and furthermore it is more possible to attract capital from other regions. (Boyd and Smith, 1992). Bencivenga and Smith (1993) showed that the financial institutions, through economies of scale, reduce the cost of corporate control, reduce the credit rationing and as a result boost the productivity, the capital accumulation and eventually the growth. Also, Harrison, Sussman and Zeira (1999) developed a model in which financial intermediaries facilitate the flow of capital from savers to investors, in an environment where the information asymmetries take place. This has a positive implication to the growth. Finally, De la Fuente and Marin (1996) developed a model where financial intermediation facilitates growth through the reducing of the costs of monitoring innovative activities.

Another function of financial systems is the facilitation of the trade, the risk management and the risk diversification. Levine (2003) divided the risk diversification into tree sub-categories: the cross-sectional diversification, the inter-temporal diversification and the liquidity diversification. Cross sectional diversification is the traditional notion of diversification in finance. Developed financial systems may diversify the risk which derives from individual projects, firms, industries, regions, or either countries (international diversification). The incentives for the diversification arise from two facts. The first is that agents do not like risk and the second is that high-yield projects are more

risky. Although higher yielding projects promote growth, agents may prefer less risky - less profitable projects which they do not boost economic development. Financial intermediaries that promote risk diversification tend to alter the investment portfolios into projects with higher returns. (Greenwood and Jovanovic, 1990; Devereux and Smith, 1994; Obstfeld, 1994). Consequently, the existence of financial systems that diversify risk can potentially boost growth. (Acemoglu and Zilibotti, 1997). Cross sectional diversification also affects positively the innovation, which in turn accelerates the technological progress and the growth. Although succeed innovative projects are high-yielded, there is a large possibility that these project will failed. Financial institutions that facilitate the diversification reduce this risk and allow to more investors to channel their funds into innovations. (King and Levine, 1993).

As we aforementioned, Levine recognized except from the cross-sectional diversification the inter-temporal diversification. This kind of diversification refers to macro-economic risks that could be diversified across more than one generation. Long-lived institutions may facilitate inter-generation risk diversification which smoothes the returns, i.e. relative lower returns in boom times and relative higher returns in slack times. The third type of diversification that is distinguished by Levine is the liquidity risk diversification. The term liquidity refers to the ease and to the speed that any agent could transform financial assets into a medium of exchange, at a previously agreed price. Informational asymmetries and transaction costs may reduce liquidity and increase the liquidity risk. Thus, financial intermediaries that reduce informational asymmetries and transaction costs, through economies of scale, may also reduce liquidity risk. Liquidity is important for growth because some high-return projects require long-term commitment. Investors are more willing to invest in a long-commitment project, if it is easy to draw their savings back in case they need them. Levine (1991) created a growth model in which a stock market rises endogenously. In this model, the investors trade in impersonal stock exchanges and as a result they do not have information about the investment decisions that are received by the rest participants. Due to the existence of the stock market, equity holders may sell their shares, while the firms have permanent access to the capital that was initially invested by the investors. Consequently, the operation of the enterprises is not affected from possible changes of the ownership. The aforesaid implications refer to the reduction of information costs as a solution for greater liquidity.

Transaction costs are also an important factor the existence of liquidity risk. Bencivenga, Smith and Starr (1995) developed a model in which the high-yielded, long-commitment

investment projects require that ownership be transferred in secondary security markets. If there are significant costs of exchange in these markets, the participants would be not so willing to invest to these projects. As a result, liquidity, as measured by the transaction costs, affects production decisions. Consequently greater liquidity turns the production into higher-return projects. Except from stock markets, financial institutions may also provide liquidity risk diversification. Especially banks, can offer liquid deposits to the savers and transform a part of them into illiquid, high-return investments. The rest of the deposits should be invested in liquid projects, in order to satisfy possible demands of withdrawals of deposits. By this function the banks offer liquidity to the savers while simultaneously they offer capital for long-run, growth-promoting investments. Finally, an alternative form of liquidity risk diversification involves firm access to credit. The production of the firms is long-run and as a result some firms may face some temporary demands of liquidity. In the presence of informational asymmetries, financial institutions may provide the option of an open credit line together with the initial financing. As a consequence, firms could continue their production even if emergency liquidity demands rise. Although this type of liquidity is not formally connected to models of economic growth, it may improve the capital allocation and eventually the economic development.

Furthermore, financial systems provide the function of pooling savings from disparate agents and channel these funds to investments. This function involves two main implications: (a) the reduction of transactions costs of collecting funds from different individuals, through economies of scale and (b) overcoming the informational asymmetries which are associated with making the savers feel safe to release the control of their savings. Only organized financial institutions with the appropriate economies of scale would overcome the aforesaid two implications. Financial systems that pool savings more effectively can improve capital allocation, technological innovation and eventually enhance economic development, because without assess to multiple investors many production projects would be constrained due to inefficient economies of scale. (Sirri and Tuffano, 1995). In addition, Acemoglu and Zilibotti (1997) showed that with large projects that are indivisible, financial institutions which pool savings from many diverse agents and invest in a diversified portfolio of risky projects, facilitate the reallocation of investment toward higher return activities, affecting positively economic development.

Finally, the last main function of financial systems is the facilitation of the exchange of goods and services. Through this function, financial systems provide other sectors of the economy with the ability to specialize their operations. Specialization enhances

productivity, innovation and eventually growth. In addition, the fixed costs which are associated with the establishment of financial markets become less burdensome relative to income, resulting in the enhancement of the financial development. (Greenwood and Smith, 1996).

2.3. Financial Development and Growth: The Theory

A large number of theoretical works tried to underpin the nexus between the financial development and economic growth. Most of them were introduced during the last twenty years, following the development of the endogenous growth models and the development of the notion of conditional convergence.

Schumpeter (1911) was among the first economists who highlighted the role of the financial sector, and more especially the banking sector, to the economic development. According to him, the providing functions by the financial institutions (we have mentioned analytically these functions before) facilitate economic growth.

Gurley and Shaw (1955) considered financial sector as an inextricable part of economic development, because of the transmission of loanable funds between spending units.

According to Goldsmith (1969), the financial system of a country may accelerate and improve economic performance, as it facilitates the transfer of funds to investments that yield the highest social return.

Patrick (1966) proposed a theoretical approach for the nexus of financial development and economic development. According to Patrick, the relationship between financial development and economic development may be explained by two different types of patterns, the supply-leading and the demand following pattern. More specifically the supply- leading pattern occurs when the financial development provides the necessary tools to facilitate the economic growth. This implies that financial development precedes economic development. On the other hand, the demand-following pattern occurs when economic development leads to financial development and due to the increased economic activity the demand for financial services raises. Patrick developed the idea that the supply-leading pattern may be the fact in the initial stages of economic development, but as economic activity rises, creates a feedback effect to the financial sector through increased demand for financial services. The demand-following pattern may dominate the supply-leading pattern, as the course of economic development proceeds.

Greenwood and Jovanovic (1990) developed a growth model where the financial institutions arise endogenously, in order to facilitate the trade in the economy. Institutions operate their functions in two ways. Firstly, by gathering and analyzing information through a research-type process. This information would be available for the investors that choose to invest through financial intermediaries. These investors gain aggregate information and eventually channel their savings to the most profitable use. Secondly,

financial institutions pool and diversify risks across a large number of investors. As a result, savers channel their money to both higher and safer investments and consequently, they are more willing to place their money to most profitable projects, even if these projects are more risky, resulting in the enhancement of growth. Feedback effects would occur by the aforesaid procedure. Higher-income economies have the opportunity to develop more efficient financial systems that in turn offer higher returns on capital, resulting in even more economic development.

Bencivenga and Smith (1991) also developed an endogenous growth model. In their model there are two different assets. The one is liquid but low-returning and the other is illiquid by high-returning. Investors face liquidity risk and hence they keep at least a larger fraction of their money into the liquid asset. Financial intermediaries provide to the savers a shield for the liquidity risk, and hence savers may choose to invest a larger friction of their money into the high-yielding illiquid asset. By this way, financial intermediaries promote growth. In addition, when an unexpected liquidity need appears financial intermediaries offer the needed liquidity and prevent from unnecessary capital liquidation. The latter function of intermediaries, also promotes the economic growth. Bencivenga and Smith also provided a list of the activities of a type of financial intermediary, the bank. According to them, banks accept deposits by a large number of savers and due to the law of the large numbers predict the possible withdrawals and do not need to keep the funds in an unproductive liquid form. Also, banks issue liabilities which are more liquid than their primary assets and furthermore they reduce the need for self-financing and eventually allow for the realization of investments which need high initially investment. If this function would not be offered by banks, an individual could not afford to finance by himself a promising investment project, resulting in the rejection of high-returning investments and eventually slowing down the economic growth. Finally, as we mentioned before, banks reduce the unnecessary liquidations and by this way allow firms to continue their productive processes, even if unexpected liquidity needs appear.

Levine (1991) developed an endogenous growth model where a stock market emerges, to improve the allocation of the risk. In addition, Levine examined the channels through which the stock market changes steady state growth rates. A stock market facilitates growth in two ways. It allows for changes in the ownership without any disruption in the operations of the firm and additionally it gives the investors the ability to invest in many firms and consequently to diversify their risks. In the specific growth model, steady state

per capita growth occurs only if the investors invest to projects that yield sufficiently high rates of human capital accumulation and technological progress. Human capital and technology combined in the framework of the enterprises where people participate in a long-run progress. Consequently, with the emergence of stock markets, agents are more willing to participate in high-return investments, promoting the economic development.

The importance of the financial innovation, which must be accompanied by the analogous infrastructure and monitoring mechanisms, was highlighted by Merton (1992). Merton viewed financial innovation as an engine that leads finance towards the improvement of the economic performance. The basic functions of the financial sector, i.e. payment system, diversification of risks and mitigation of informational asymmetries, could improve through financial innovations. These innovations are created by the technological advance of specific sectors, like communications and informatics. If new technological improvements were incorporated into the financial systems, the transactions costs would be decreased, the speed of the transactions would be raised and new financial instruments would appear. Of course under the aforesaid process there is the assumption that economic development gives the necessary boost to the financial sector, which in turn enhances the economic development. Merton spotted that financial innovation must be accompanied by the proper infrastructure and regulation, in order to avoid possible break-downs of the financial systems, which would affect in negative manner the economic development.

King and Levine (1993) constructed an endogenous growth model in which financial systems facilitate innovation and thus accelerate economic growth, through a number of financial services. Furthermore they examined the ways through which the financial systems affect the economic growth. According to their model there is demand for four financial services:

1. The evaluation of entrepreneurs. Economic agents wish to invest in the more promising projects. To achieve this they must first find the projects and thereafter evaluate them. This procedure incorporates large fixed costs and additionally demands a lot of time. Consequently there are incentives for specialized institutions to arise and perform this task, saving valuable scarce sources through economies of scale.
2. Pooling resources. Large investment projects, in order to be realized, demand large amounts of capital. Developed financial systems are in position to pool funds from many small savers and in this way mobilize sufficient resources for projects.

3. Diversifying the risks. The innovations incorporate a large amount of risk. This risk is not desired by investors, either individuals or enterprises. Specialized institutions diversify a part of these risks, making the economic agents more willing to take part into a new innovative investment project.
4. Valuing the expected profits from innovative activities. Productivity enhancement requires that economic agents would choose to engage the risks of an innovative project rather than to participate in the production of an existing good with the existing methods. The motive to invest in innovations is the expected stream of profits. It is very important for an investor to have a quantitative expression of these expected profits. Financial system would accurately reveal the expected discounted value of these profits.

Although King and Levine (1993) did not focus on the precise form of the financial institutions or the financial products which can provide these services, they reported that financial intermediaries, as integrated institutions, could provide these services and additionally a developed stock market could reveal the discounted expected values of profits from engaging in innovative investment projects. They argued that financial system can act as a "lubricant" for the economic growth. Given that there are new innovative ideas in an economy, a developed financial system could permit the realization of a larger number of them, with less costs, faster, eventually resulting in the acceleration of the economic growth. On the other hand, a repressed financial system impedes innovative activity and as a consequence slows down the economic growth.

Pagano (1993) emphasized the fact that financial intermediation has positive effect on growth, although there are some exceptions. Positive effects stem from the increase of the saving rate, the channeling of funds to the investments and the increase of the social margin productivity of investment. On the other hand, improvements in risk-sharing and in household credit market, may also decrease the saving rate and hence the growth rate.

According to Bekaert and Harvey (1997), efficient stock markets play a key role for the economic growth. An efficient stock market could offer the following functions to individual investors and enterprises:

1. Diversification of risks. An efficient stock market allows individual investors to diversify their risks, making the investment to firms more attractive. In the case where stock markets are not efficient, firms may undertake low-return projects (which many times are irrelevant to their specific field), in order to make their shares

attractive for the investors, and pool the necessary funds. Thus, efficient stock markets contribute to the economic development.

2. Mitigation of Moral Hazard. The problem of moral hazard can be reduced with the use of debt. Debt holdings decrease the incentives for actions by the management, which may hurt the interests of the providers of finance. Dept holdings increase the fraction of equity ownership held by managers and simultaneously increase the possibility of bankruptcy after imprudent actions. Consequently the interests of the managers and the interests of shareholders coincide. Another possible solution to the problem of moral hazard is the binding of the managerial fee to long-term performance. In order to realize this, an unbiased performance measure must be applied. An efficient stock market offers a price which incorporates all the available information, contributing to the solution of moral hazard. The decrease of this problem, in turn, enhances the productivity and the growth.
3. Easy Change of the Ownership. This is another way of improving the productivity of a firm. If the stock market is liquid and efficient, there is always the possibility of a takeover, if the price of the firm falls below its fundamental value. The new owners may replace the managers and thereafter the stock price of the firm would rise again to reasonable levels. Thus, the existence of efficient stock markets is another way to control the managers and exert corporate governance, resulting in more efficient and productive firms and eventually enhances the economy.
4. Innovation. Successive innovations reward the innovators not only by the profits of the realization of the successive idea, but also with a possible lump sum in the future, when the innovator may sell his ownership to an already mature firm and thereafter move to another promising firm. The ability to sell his shares to the stock market, acts as a motivation for innovation and consequently boosts the economic development.

All the above functions could be provided by liquid markets with low transaction costs. Besides, high transaction costs and illiquidity are symptoms of an inefficient stock market while the initial assumption was that the stock markets should be efficient.

Blackburn and Hung (1998) constructed another endogenous growth model in which the main idea is that the costs to monitor a new investment project are absorbed by the research and development process. If individuals finance the project, these costs would be prohibitively large and eventually the research and the realization of new ideas would be canceled. Under this situation the whole economy would be trapped into zero growth. With the introduction of financial intermediaries the costs of monitoring may be reduced

due to economies of scale and consequently enhance the growth process. From the other hand, as economy grows, the intermediary can engage in greater diversification and reduce by this way its costs. This means that the economy would have more efficient and less costly financial intermediaries, which could provide even better means for the facilitation of growth. Furthermore, Blackburn and Hung shown the way that trade liberalization can enhance product development by expanding the demand for new goods, and to the extent that an economy has underdeveloped financial system, how the economy may have even greater growth by accelerating financial development.

According to Rajan and Zingales (1998) industry growth can be decomposed into the growth of the number of new establishments and into the growth of the average size of existing establishments. New establishments which are more likely to be new firms depend more on external finance than the already established firms, because the latter usually accumulate capital by their profits. Consequently, at least one basic component of growth should be particularly sensitive to financial development.

Rousseau and Wachtel (1999) highlighted that stock markets play an important role to the economic development. They indicated four functions of the stock markets that explain their importance to the economic development:

1. Stock markets transfer an exit mechanism. There is more powerful motivation to engage into innovative ventures, when an exit mechanism exists, through an organized, liquid and efficient stock market. Consequently more capital could be channeled to innovative activities, enhancing economic growth.
2. A very important source of investment funds, for emerging markets and transition economies, are the capital inflows (both direct investments and portfolio investments). In order to enjoy the benefits of international diversification investors channel their funds internationally. More liquid and organized markets attract more capital. As a result more capital is available for production activities, contributing in economic development.
3. The provision of liquidity through organized stock markets encourages the channeling of funds to long-time commitment investments which in turn provides the firms with the ability to finance large, indivisible projects that enjoy substantive scale economies.
4. The existence of organised, efficient and liquid stock markets, also contributes to better monitoring of the managers, to unbiased prices for the stocks of firms that are traded, and generally improves the flow of information.

Demetriades and Andrianova (2003) criticized the view that financial sector does not contribute to the economic growth. According to them the reason for the underestimation of the role of finance to economic development, is that finance was taken for granted. More specifically, in the neoclassical static models, households make their decisions for the maximization of their utility, based on the funds that already have. The same occurs for the firms, which make their investment decisions for the maximization of their profits, based on the funds that have already accumulated. When inter-temporal models are used there is the main assumption of the existence of the perfect capital market. In such a market, individuals and firms can borrow as much capital as they need for consumption and investments. Additionally, there is only one interest rate, common for all the borrowers, independently of their financial situation. The same interest rate is used for the discounting and valuation of all the future streams. But if we relax the assumption of the perfect capital market, the allocation decisions may change. Consumers that are refused credit, they will reduce their consumption, affecting in a negative manner the firms. Also, if a firm can not raise the necessary capital, an investment idea may go unexploited, or a competitor may exploit the same idea before the local firm accumulates the necessary capital, resulting in a technological advantage for the country of the competitor. Of course this may be an explanation for the different growth rates across countries.

Other problems that rise with the relaxation of the assumption of the perfect capital market, is the existence of transaction costs, the time which agents must spend in order to find finance or investment opportunities and the informational asymmetries. Informational asymmetries give rise to adverse selection problem and moral hazard problem. The first occurs before transaction takes place and refers to the selection of bad credit risks, while the second occurs after a loan is granted and refers to the incentives of the borrower to act in a manner that may hurt the interests of the lender. All the aforementioned reasons create the incentives for the rise of financial systems that facilitate the transactions and the finance of households and firms, either they are lenders or borrowers. Put it different, the absence of such systems place impediments for the realization of new ideas, for the production and for the consumption, and eventually distorts the functions of an economy. As a result, taking into account the degree of the financial development in an economy gives us more precise results. Demetriades and Andrianova also criticized the empirical studies which inference the existence of causality in the Granger notion, as real causality. The financial systems are not the

ultimate source of growth but they are facilitators of it. The real sources of growth are the creation of new ideas, the realization of these new ideas, the discovery of new natural resources, the discovery of new ways to use the existing resources, etc. Finally, they referred to the bi-directionality of causality between finance and growth, because on the one hand finance facilitates growth and on the other hand when economy grows, more savings and more demand for financial services rise leading to the expansion of the financial sector.

According to Aghion, Howitt and Mayer-Foulkes (2004), technology is the central factor underlying divergence. Technology can easily be transferred worldwide while economies that had fallen behind world's technology leaders, normally can achieve technological advantage easier, simply implementing the technologies discovered elsewhere. A possible explanation for the divergence across economies seems to be the financial constraints of poorest countries which prevent them from following the technological advantaged countries. Due to the facts that:

i) technology transfer is costly,

ii) as the global technology frontier advances, the size of required investment rises in proportion and

iii) agency problem limits an innovator's access to external finance,

theory predicts that countries above some threshold of financial development will all convergence to the same long-run growth rate and those below this threshold will have strictly lower long-run growth rates. In addition the possibility of a country to converge to the frontier growth rate, increased with the level of financial development. Moreover, the theory suggests that the main channel through which financial development affects convergence is productivity growth rather than capital accumulation.

Harrison, Sussman and Zeira (2004) developed a model where the financial development and the economic development are interrelated. Financial sector, through a number of functions, facilitate economic growth, but economic growth also affects financial development. In their model they reported two possible effects, the deepening effect and the labor effect. The deepening effect tends to decrease the costs of financial intermediation, because as an economy grows, bank profits increase and new entries into the industry are promoted. Thus, through the increased specialization, a decrease of the financial intermediation costs is feasible. On the other hand, the labor effect is negatively related to the financial intermediation. When an economy grows, labor costs increase and as a result the costs of the labor intensive financial operations also increase.

2.4. Financial Development and Growth: The Empirical Evidence

Except from the theoretical approaches of the relationship between financial development and economic growth, there are a lot of empirical studies that examine this relationship. A vast number of econometric methods (cross-country, time-series and panels) were enrolled by literature. Furthermore, the aforementioned methodologies were applied to various datasets, in order to capture every possible aspect of the relationship between finance and growth.

Goldsmith (1969) examined whether financial development affects economic growth. As a measure of financial development, he used the ratio of the value of financial intermediary assets to GNP. Under the use of this measure, lies the assumption that the size of financial system is positively correlated with the provision and the quality of financial services. His sample consisted with data from 35 countries, for the period between 1860 and 1963. His results indicated that financial development and economic development are connected and co-moved. Although he concluded that indeed there is a relationship between these two variables, he did not conclude about the direction of the causality.

Fry (1978) examined whether financial conditions affect saving and growth, in seven Asian less developed countries, for the period between 1962 and 1972. His data consisted of the real money stock (M2), real GNP, the ratio of investment to GNP and the real deposit interest rate. His results indicated that indeed the financial conditions influence savings and growth.

Jung (1986) investigated international evidence on the causal relationship between financial development and economic growth. His methodology based on the Granger's notion of causality between two series. As a measure of economic development he used the per capita GDP or GNP, and as proxies of financial development he used the ratio of currency to the narrow definition of money (M1) (currency ratio) and the ratio of M2 (a broader definition of money) to nominal GDP (or to GNP). The first financial measure is a proxy of the complexity of the financial structure. When the economy grows, this variable is expected to decrease, because of the increased diversification of financial assets and in addition more transactions would be carried out in a non-currency form. The second measure shows the real size of the financial sector of a growing economy. This variable is expected to increase when the financial sector grows faster than the real sector, while when the opposite takes place, it is expected to decrease. Data are derived

from 56 countries for which at least 15 annual observations are available for every variable. His results indicate that less developed countries have a supply-leading causality pattern than a demand-following pattern (Patrick, 1966), at most of the cases. More specifically, when the currency ratio was used as a financial measure, lower development countries are characterized by the causal direction from financial to economic development while developed countries are characterized by the reverse causal direction. When the monetization variable was used as a financial measure there was no difference between less developed and developed countries in terms of causality direction. Overall, his results provide a moderate empirical underpin to the theory of Patrick, that in less developed economies the supply-leading causality patterns dominate over the demand-following causality patterns.

King and Levine (1993) used data on 80 countries for the period between 1960 and 1989, to examine whether higher level of financial development promotes economic growth. More specifically they investigated whether higher levels of financial development are significantly correlated with faster current and future rates of economic growth, of physical capital accumulation and of economic efficiency improvements. In order to measure the services provided by financial intermediaries, they constructed four different variables. The first variable of financial intermediation is the measure of "financial depth", which equals the currency outside the banking system plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries to GDP. King and Levine pointed that this variable does not capture significant aspects of financial intermediation, as the risk management and the information processing, and for this reason they constructed a second variable of financial intermediation, the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets. The intuition underlying the use of this variable is that private banks are more likely to provide the financial services that facilitate economic growth, than central banks. A possible pitfall of this variable is that it does not take into account other financial institutions that may also provide the aforesaid services, except banks. Nonetheless, this measure is a useful proxy of the financial intermediation. The third variable equals the ratio of claims on the nonfinancial private sector to total domestic credit (excluding credit to money banks) and the fourth variable equals the ratio of claims on the nonfinancial private sector to GDP. These two variables measure the domestic asset distribution. The intuition behind the use of them as financial intermediation measures is that when a financial system allocates funds to the government or to state-

owned enterprises than to the private sector, it may not provide effectively the financial services through which it facilitates the economic growth. (evaluation of managers, selection of the most promising investment projects, pooling of risks, etc). King and Levine used two different econometric methodologies in order to examine the relationship between the financial and the economic development, a cross-country analysis and a pooled cross-country time-series analysis. Their results indicate that financial development-as it is measured by the specific variables-is strongly and positively correlated with economic growth. In addition, they found that financial development is also strongly and positively correlated with the rate of physical capital accumulation and the improvements in the efficiency of capital allocation (two possible channels through which financial development affects economic development). Furthermore, they concluded that the predetermined component of financial development is a good-predictor of the long-run growth over the next 10 to 30 years. In the same result they also concluded for the future rates of physical capital accumulation and the future improvements in the efficiency that economies use capital. Their results indicated that financial development does not simply have a positive relationship with economic growth, but instead affects and determines the level of economic growth.

Atje and Jovanovic (1993), using cross-country analysis, examined whether the financial development influences the level and/or the growth rate of economic development. They used two measures of financial development, the first measure captures the banking development and equals the ratio of credit extended by private and government banks to GDP, while the second measure captures the stock market development and equals the ratio of annual value of all stock market trades to GDP. They did not use the market capitalization because they believed that this measure does not provide accurate information about the facilitation of stock markets to the economic development. More specifically, in a large number of economies only a small number of transactions take place in the stock markets. This fact indicates that these stock markets have little contribution to the economic growth, independently of the magnitude of the market capitalization. Their results indicated that stock markets have a large effect in the economic development, whereas an analogous result was not found for banking lending.

Levine and Zervos (1996) used data from 49 countries from 1976 to 1993, in order to examine whether financial development has significant positive impact to the economic development and to the rates of capital accumulation, productivity growth and private saving. In order to capture as many functions of the financial systems they could, they

used various representative variables of financial development. The first of these variables is the market capitalization ratio which equals the value of listed domestic shares to GDP. This variable measures the size of a stock market in respect to the size of the economy. The second variable is the turnover ratio and it equals the total value of domestic shares traded to market capitalization. This variable measures the trading of domestic equities on domestic exchanges in relation to the size of the market. A high turnover ratio may be indicator of low transaction costs. The third variable is the value traded ratio which equals the total value of domestic shares traded on the stock market exchange to the GDP. This variable measures the significance of the stock market liquidity in relation to the size of the economy. Value traded ratio may differ significantly from the turnover ratio, because a small liquid market would have a high turnover ratio, but a small value traded ratio, indicating that the magnitude of the existed liquidity would not have significant value for the economy. In other words, a small liquid market may not provide to the investors the ability for cheap, fast and confidential trade of ownership. Taking the value traded ratio, we receive information about the aggregate provision of liquidity. But the value traded ratio has a potential pitfall. Due to the fact that stock markets are forward looking, when large corporate profits are anticipated, stock prices would rise in the present. This increase in the price would also increase the value of the stock transactions and eventually would raise the value traded ratio, without an analogous rise in the number of transactions or a fall in the transactions costs. This would be a false signal about the existence of liquidity. A possible solution to isolate the influence of the price effect is to take into account the market capitalization which also be affected by a rise of the prices. The price effect influences both indicators, but only the value traded ratio is related to trading. With the inclusion of both indicators in the regressions, if the value traded ratio remains significantly correlated with the growth, while controlling for the market capitalization ratio, then the price effect is not dominating the relationship between the value traded ratio and the growth. Another way to isolate the price effect to the value traded ratio is to examine the turnover ratio, too. A rise in the stock prices does not affect the turnover ratio because stock prices enter both to the numerator and the denominator of it. If the turnover ratio is positively and significantly associated with economic growth, price effect is not dominating over the relationship between liquidity and economic growth. The fourth and the fifth variables measure the capital market integration. They are constructed, the one by the CAPM and the other by the APT and more specifically, under the assumption that these models are valid, they consider the

absolute value of the intercept terms as measures of market integration. If these terms are equal across countries it means that there is capital integration, otherwise there is not. The sixth variable is the volatility of stock returns which equals the twelve-month rolling standard deviation estimation that is based on market returns. The seventh variable is the value of loans made by banks to private enterprises to GDP. This variable measures the credit issued by banks as opposed to that issued by the central banks and at the same time it also measures the credit to private firms, as opposed to credit issued to governments. Levine and Zervos considered that this variable gives more precise information about the banking development in terms of facilitation of growth. Their results indicated that stock market liquidity – as measured by stock trading relative to the size of the market and the economy- and banking development – as measured by bank loans to private firms divided by GDP- are both positively and robustly correlated with present and future rates of economic growth, capital accumulation and productivity growth. The fact that both the aforesaid variables entered the growth regression significantly indicated that banks and stock markets provide different financial services. Furthermore they found that stock market liquidity, international capital market integration or stock return volatility do not reduce private saving rates or hinder long-run growth. Finally, they found that stock market capitalization, stock market volatility and capital market integration have insignificant impact on economic growth.

Demetriades and Hussein (1996) used time series techniques to examine the causality between financial development and real GDP. They pointed that the main problem for the conduction of causality tests is the scarcity of sufficiently long time series of data for the developing countries. They also criticized the inferences for causality made by King and Levine (1993). Demetriades and Hussein believe that financial development measures in a given country are correlated across time, making them inappropriate for prediction inferences and furthermore they believe that cross-section analysis cannot allow different countries to exhibit different patterns of causality. This means that the evidence of causality exists on average and maybe some individual countries have no causality pattern or have reverse causality. Demetriades and Hussein used data from 16 countries for which at least 27 annual observations are available. They used two different measures of financial development. The first measure is the ratio of bank deposit liabilities to nominal GDP. This measure is better than the measure of broad money to GDP, because the latter includes the currency. The inclusion of currency may lead to misleading results about the financial deepening because in developing countries a large number of

transactions take place in currency. As a result a rising ratio of broad money to GDP may reflect more extensive use of currency than an increase in the volume of bank deposits. Consequently the use of the ratio of bank liabilities to nominal GDP is more representative for financial development. The second measure they used it was the ratio of bank claims on the private sector to nominal GDP. This measure is not affected by the magnitude of reserve requirements and more clearly indicates the funneling of savings to investment. Their results provided little support to the view that financial development leads to economic development. In addition they demonstrated that in few countries there is a reverse causality pattern, i.e. from economic development to financial development. Generally, their results indicated that the relationship between financial development and economic development is bi-directional. Furthermore they highlighted that the results for causality are country-specific and that there are dangers from lumping together in cross-sectional analysis countries with different characteristics.

Rajan and Zingales (1998) examined whether financial development has a positive impact on industrial growth. They used data from 55 countries from 1980 to 1993. Two different measures of financial development were employed. The first measure is the ratio of domestic credit plus market capitalization to GDP and the second is the accounting standards of every country. The second measure reflects the potential finance that could be raised than the actual finance rose. Their results indicated that financial development affects in a positive way the economic growth, mainly by reducing the costs of external finance to financially dependent enterprises. They pointed that financial sector enhance economic development only when there are already new ideas and investment opportunities. Additionally, financial development plays a beneficial role to the creation of new firms. A second conclusion drawn by their results is that market imperfections indeed play a negative role in the economic development. Finally, a third conclusion of Rajan and Zingales was that financial development, through the enhancement of external finance, allows for specialization to industry sectors in which a specific economy has comparative advantage and consequently boosts economic growth.

Levine, Loayza and Beck (1999) examined the issue of causality between economic and financial development and additionally examined possible factors that differentiate the degree of financial development across countries. For the purposes of their study they used two different econometric methodologies, a pure cross-country and a panel data methodology (Generalized Method of Moments, GMM). They used data from 71 countries for the period between 1960 and 1995 and 3 different representative variables

of financial development. All of these variables were also used by King and Levine (1993). The first variable of financial intermediation is the measure of "financial depth", which equals the currency outside the banking system plus the demand and the interest-bearing liabilities of banks and nonbank financial intermediaries to GDP. Due to the fact that this measure reflects only the size of financial intermediary sector and not the allocation of capital, it leads them to use another variable that reflects more accurate the provision of financial services to the economy. The second variable is the ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets. The intuition underlying this variable is that private banks are more likely to provide the financial services that facilitate economic growth, than central banks are. The third measure of financial development equals the ratio of claims on the nonfinancial private sector to GDP. The intuition behind the use of this variable as a financial intermediation measure is twofold. First, it distinguishes between private banks and central banks and second it distinguishes the direction of capital allocation (between financing the government and private firms). A financial system based on private banks and providing finance to private firms is more likely to facilitate economic growth, than a system based on the central bank and providing finance to state-owned enterprises. The results from both the two employed methods indicated the same which is that financial development exerts a significant impact on economic growth.

Rousseau and Wachtel (1999) examined the impact of stock market to economic growth. Their sample consisted of data from 47 countries for the period between 1980 and 1995. They employed panel data vector autoregressive techniques in order to have more reliable results as for the direction of causality between financial and economic development. Three different variables were employed in order to capture the different forms of financial development. The first variable is the market capitalization which equals the product of the share prices and the number of shares outstanding for all stocks traded on the stock market of a given country. According to Rousseau and Wachtel, this variable indicates the significance of a stock market in the capital mobility and resource allocation processes. The second variable they used was the total value traded, which equals the product of market prices and the number of shares traded, indicating both the notions of size and liquidity. Greater liquidity raises confidence of the potential investors because it improves the information asymmetries amelioration and the risk diversification. Through these functions, investors are more willing to finance new firms and innovative projects and eventually economic development. In order to isolate price effects on the above two

variables, they deflated them with share price indices. In addition to the two stock market variables, they used a variable which is related to the financial intermediation. This variable is the ratio of the stock of liquid liabilities (M3) divided by GDP and captures the significance of financial intermediates relative to the size of a given economy. Their results indicated that the intensity of the financial intermediaries and the stock market liquidity have a strong effect on output, while market capitalization has a weaker effect.

Beck, Levine and Loayza (1999) examined the causal impact of financial development on real per capita GDP growth, on capital per capita growth, on productivity per capita growth and on private saving rates. They employed two different econometric methods for their study. The first method is a cross-county analysis of a sample consisted of data from 63 countries averaged for the period between 1960 and 1995. By this method they tried to assess the long-run impact of the exogenous component of financial development to economic growth, using the legal origins of the countries as instrumental variables. The second method is the Generalized Method of Moments employed in a dataset again consisted of 63 countries but averaged over each of the seven 5-years periods between 1960 and 1995. By this method they tried to exploit the time-series nature of the data. In addition, with the use of this method they controlled for the country specific effect and the possible endogeneity of the regressors. They focus their investigation on the financial intermediation and thus they examined 3 variables related to the banking development. Their basic variable is the private credit issued by financial intermediaries divided by the GDP. Its interpretation is almost the same with the interpretation of Levine and Zervos (1998), but broader because of the inclusion of all the financial intermediaries and not only of the banks. They also used two other financial intermediation variables to check the robustness of their results. These two other variables were the liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by the GDP, and the ratio of the commercial bank domestic assets divided by the commercial bank plus the central bank domestic assets. Their results indicated that financial development (in terms of financial intermediation development) has a positive and robust causal impact to the real per capita growth and to the productivity per capita growth. Their results were ambiguous for the causality patterns of financial intermediation to the physical per capita growth and to the savings. More specifically, although it seems that financial development has a positive causal impact to them, this result is not robust to alterations on estimation techniques and measures of financial intermediation development. Their general result is that better

functioning of the financial intermediates improves the asset allocation procedure and accelerates total productivity growth and eventually long-run economic growth.

Xu (2000) used a multivariate vector autoregressive approach to examine whether financial development affects domestic investment and output. The specific approach gives results consistent with the long-run cumulative effects of financial development to growth, because it allows for dynamic interactions between the variables. His sample consisted of data from 41 countries between 1960 and 1993. As a measure of financial development he used the sum of money and quasi money less currency (because currency is not intermediated through the financial system). His results indicated that financial development is important to growth and additionally that investment is an important channel through which financial development affects economic growth.

Rousseau and Vuthipadadorn (2002) employed vector autoregressive models and vector error correction models in order to examine whether the intensity of financial intermediation promoted investment and economic development in 10 Asian economies over the period between 1950 and 2000. As a measure for the financial development they used the difference between broad money and narrow money (M2-M1). Subtracting the currency component they isolated the magnitude of money that intermediated through the financial sector. Their results indicated that in most of the cases financial development leads to investment, but has a weak effect to the output. In addition, the cases where reverse causality patterns exists, are rare. According to them, their results are consistent with the hypothesis that the main channel through which finance affects growth is investment.

Luintel, Khan, Arestis and Theodoridis (2007) employed time series techniques and Dynamic Heterogeneous Panel methods to examine the significance of financial structure to economic development. Their sample consisted of 14 countries for the period between 1979 and 2005. As proxies of financial development they used the Stock Market Capitalization Ratio which equals the value of listed shares divided by the GDP, the Stock Market Total Value Traded Ratio which equals the total shares traded on stock market exchange divided by GDP, the Stock Market Turnover Ratio which equals the value of total shares traded divided by the average real market capitalization and the Credit by Deposit Money Banks and Other Institutions divided by the GDP. Luintel et al. criticized the pre-existing empirical studies because of the econometric methodologies that had been employed. More specifically they stated that cross-country and panel data methodologies cannot address the cross-country heterogeneity and consequently the

cross-country differences in the relationship between finance and growth. Additionally the country-specific and the panel estimations may not be equivalent, resulting in limitation of the economic value of panel estimations. Furthermore various countries in a panel are unlikely to be on the average growth path, raising concern on pooled regressions. The results of their empirical estimation indicated that there is significant cross-country heterogeneity in the relationship between financial development, financial structure and economic growth. In addition financial development and financial structure have a significant impact on economic growth.

Fung (2008) incorporated the interaction of financial sector and real economic sector, into a traditional test for convergence, in order to examine whether the financial development and the economic development of a country converge or diverge. He used a dataset consisted of 57 countries for the period between 1967 and 2001. Fung employed two different variables as proxies of financial development. The first is the credit which is allocated to the private sector and the second is the quasi-money. His results indicated that middle-income and high-income countries conditionally converge in terms of both economic and financial development. Additionally, he found that the relationship between financial development and economic growth is stronger in the early stage of economic development, but diminishes as sustained economic growth takes place. Furthermore, he concluded that low-income countries which have a relatively well-developed financial system are more likely to converge, in terms of per capita GDP, than the middle-income and high-income countries.

Aghion, Howitt and Mayer-Foulkes (2004) examined empirically the hypothesis that when a country surpasses a critical level of financial development, will converge to the growth rate of the world technological frontier and that financial development has a positive but gradually vanishing effect on steady-state per capita GDP in relation to the frontier. They used the private credit issued by financial intermediaries divided by the GDP, as a measure of financial development. (which also used by Levine, Loayza and Beck, 1999). They also used two alternative measures of financial development in order to check for robustness of their results. These two measures are the liquid liabilities of financial system (currency plus demand and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by the GDP, and the ratio of commercial bank domestic assets divided by the commercial bank plus the central bank domestic assets. (which also used by Levine, Loayza and Beck, 1999). Their dataset consisted of 71 countries for the period between 1960 and 1995. Their results suggested that indeed the

likelihood to converge to U.S. growth rate (which was used as a benchmark) increases as the financial development increases. Furthermore the direct effect of financial intermediation is not significant, implying that the effect of financial development to economic growth is diminishing. They concluded that financial development is a significant explaining factor of the divergence across countries in terms of real per capita GDP growth.

Harrison, Sussman and Zeira (2004) examined whether economic growth tends to decrease the costs of financial intermediation. Their dataset consisted of data for the U.S. states for the period between 1982 and 1994. They used per capita gross state product as a measure of economic development and the cost per dollar of finance as a measure of bank costs. Their results suggested that indeed economic development decreases the costs of financial intermediation because "deepening" effects are stronger than the wage effects.

3. Purpose of the Study

The aim of the present work is to detect possible commonalities between the converging behavior of the economic development and the converging behavior of financial development. As we have already mentioned, there are two different approaches of the mechanisms that lead to economic growth. The first approach is the neoclassical growth framework, according to which the per capita income must converge instantly, across the countries. However the per capita income across countries, rather diverge than converge, as the neoclassical growth theory predicts. The notion of conditional convergence developed in order to correct the predictions of the neoclassical growth theory. According to this notion, the per capita income growth rate converges across countries, only if a number of factors are kept constant. From the other hand, the absolute value of the per capita income converges in different steady state levels for every country and as a result the absolute convergence occurs only when the steady states of the countries also converge. Consequently, in order to identify the reasons of the divergence in the per capita income, we should detect the determinant factors of the steady state of each country. A possible determinant factor of the steady state is the financial development which may enter into the Cobb-Douglas production function at the term A(0).

The second approach of the mechanisms that lead to economic growth is the endogenous growth framework. According to this, the income inequality across countries could persist if a number of factors remain different, across the countries. A large number of endogenous growth models which employed directly the financial development in various forms, were developed. According to them, a possible impediment of the convergence in the per capita income is the different degrees of the financial development across the countries.

Consequently, either the neoclassical framework is the appropriate one to explain the economic development either the endogenous framework is the appropriate one, the financial development is at least one of the possible determinant factors of economic growth. Very likely is also the existence of feedback effects by the side of real economic sector to the financial sector, when economic development takes place, resulting in bi-directional effects.

The main functions of the financial sector, that facilitate the process of growth, are the pooling of funds of a large number of disparate savers, the risk diversification, the amelioration of informational asymmetries, the provision of liquidity, the valuation of the investments and the reduction of the transaction costs.

The main question that arises is whether the convergence of the financial development across the countries seems to be accompanied with convergence in the levels or/and the growth rates of the per capita income. Possible coexistence of convergence in both economic and financial development would be new evidence towards the direction in which financial development has a key role to the economic development.

The present work examines the possibility of the common converging behavior between the per capita GDP and the financial development. Two are the main problems of our effort, the first is the choice of the most representative variables of financial development and the second is the need to take into account the heterogeneity across the countries.

In order to overcome the first problem, we are going to use 5 different financial measures which capture most of the functions of a financial system. By this way we can distinguish between financial functions that facilitate economic growth and financial functions that do not affect it. In addition we use 5 different datasets with different combinations of financial variables in order to have more comparable results of the different variables. We present analytically the variables, the data and the composition of the datasets, in a following chapter.

With the appliance of the new econometric test for convergence, developed by Phillips and Sul, we will overcome the second problem, of possible heterogeneity across the countries. Furthermore, this test allows detecting converging subgroups, which is very useful characteristic for the purposes of our work, because it facilitates the comparison between the subgroups of the per capita GDP and the subgroups of financial variables. We present analytically the convergence test in a following chapter.

What we are going to do is first estimate whether there is convergence both in the levels and in the rates of the per capita GDP, in each dataset. If there is not convergence we will proceed to the next step that is the formation of converging subgroups. Furthermore we will apply the same procedure for the levels of the financial variables, in each dataset. Finally, we examine separately for every dataset, whether there is coincidence in the convergence of the levels or/and the growth rates of the per capita income with the convergence in the levels of the corresponding financial variable/s of the dataset.

We do not expect to find convergence in the full sample of any variable, as there is not such case in the empirical literature. Instead we expect to find converging subgroups. Moreover we expect to find some coincidence between the converging subgroups of the per capita income and the converging subgroups of some of the financial variables, a result that it would be in accordance with the empirical literature which estimated that certain indicators of the financial development are positively correlated with the economic growth.

4. Econometric Methodology

A new methodology developed by Phillips and Sul (2006) is applied in order to test for convergence within a panel. Three characteristics of this methodology make its use identical for the purposes of our study.

The first characteristic is that the model has not linear form and for that it is sufficiently general to include a wide range of possible time paths and individual heterogeneity. Consequently we can detect specific countries that may diverge even if there is overall convergence.

The second useful characteristic is that the test does not rely on specific assumptions about trend stationarity or stochastic non stationarity, allowing us to apply the test in a broad spectrum of variables, independently of their nature and without the need for testing for unit roots.

The third characteristic of the new methodology is that in the case of not convergence within the whole sample, a clustering algorithm provides us with the ability to detect converging subgroups. The detection of converging subgroups gives us significant information about possible commonalities between the converging countries.

In what follows we present the methodology of Phillips and Sul:

Consider that we can decompose panel data in the form:

(1) $X_{it} = g_{it} + a_{it}$

where g_{it} and a_{it}, represent the systematic and the transitory components, respectively. Both g_{it} and a_{it} include common and idiosyncratic components. Due to the fact that the idiosyncratic component is of particular interest, it is useful to isolate it. We can transform the (1) to the below form:

(2) $X_{it} = \left(\frac{g_{it} + a_{it}}{\mu_t} \right) \mu_t = \delta_{it} \mu_t$, for all i and t

where μ_t and δ_{it} are, a single common component and an idiosyncratic time varying component, respectively. Phillips and Sul give to the δ_{it}, the meaning of the idiosyncratic distance between some common factor μ_t and the systematic part of X_{it} (the panel). The idiosyncratic component δ_{it} is modeled in the following semi-parametric form:

$$(3) \quad \delta_{it} = \delta_i + \sigma_i \xi_{it} L(t)^{-1} t^{-a}$$

where δ_i is a fixed component for every country (not time dependable), ξ_{it} is iid(0,1) across the countries, but has weakly dependence over the time dimension, $L(t)$ is a slowly varying function ($L(t) \to \infty$ as $t \to \infty$), t is the time, a is the decay rate and σ_i is the fixed variance for every i. The above formulation ensures the convergence of δ_{it} to δ_i for all $a \geq 0$, which become the null hypothesis of interest.

In order to separate the idiosyncratic component from the common component we remove μ_t by scaling and construct the h_{it}, a transition parameter. h_{it} is constructed directly from the data (X_{it}) and it is a functional of δ_{it}, providing information for the transition path of the economy i in relation to the other economies in the panel:

$$(4) \quad h_{it} = \frac{X_{it}}{\frac{1}{N}\sum_{i=1}^{N} X_{it}} = \frac{\delta_{it}}{\frac{1}{N}\sum_{i=1}^{N} \delta_{it}}$$

The relative transition parameter has two very useful properties. First, the cross sectional mean of h_{it} is unity by construction. Second, while δ_{it} converge to δ_i the relative transition parameter converge to unity and the cross sectional variance of h_{it} converges to zero:

$$(5) \quad \sigma_t^2 = \frac{1}{N}\sum_{i=1}^{N} (h_{it} - 1)^2 \to 0 \quad as \quad t \to \infty$$

Phillips and Sul developed a regression t- test of the null hypothesis of convergence, against the alternative of not convergence:

(6) $H_0 : \delta_i = \delta \quad \text{for all } i, \quad and \quad a \geq 0 \qquad H_1 : \delta_i \neq \delta \quad \text{for all } i, \quad \text{or } a < 0$

The regression is a simple time series linear regression of the cross sectional variance ratio of h_{it}, on the $\log t$.

First, we construct the transitional parameter h_{it}, directly from our data,

(7) $$h_{it} = \frac{X_{it}}{\frac{1}{N}\sum_{i=1}^{N} X_{it}}$$

and after we construct the cross sectional ratio of the variance:

(8) $$H_t = \frac{1}{N}\sum_{i=1}^{N}(h_{it} - 1)^2$$

Having the cross sectional ratio we run the following regression:

(9) $$\log\left(\frac{H_1}{H_t}\right) - 2\log L(t) = \hat{C} + \hat{b}\log t + \hat{u}_t \text{ for } t = [rT], [rT]+1, ..., T \text{ with } r > 0$$

where $L(t)$ is the $\log(t+1)$ (following Phillips and Sul), $\hat{C}$ is the constant of the regression and $\hat{b}$ is the fitted coefficient of $\log t$. $\hat{b}$ equals $2\hat{a}$ where a is the speed of convergence and the under testing variable in the H_0.

The data for the regression started at $t = [rT]$, the integer part of rT. We use $r = 0.3$, as recommended from Phillips and Sul.

Using the residuals of the regression we estimate the HAC standard error by the following formula:

(10) $$s_{\hat{b}}^2 = l\,\hat{\text{var}}(\hat{u}_t)\left[\sum_{t=[Tr]}^{T}\left(\log t - \frac{1}{T-[Tr]+1}\sum_{t=[Tr]}^{T}\log t\right)^2\right]^{-1}$$

where $l\,\mathrm{var}(u_t)$ is the long run variance of the residuals and is estimated by the following formula of Quadratic spectral kernel:

(11) $$l\,\mathrm{var}(u_t) = \hat{G} + 2\hat{\Lambda}$$

(12) $$\hat{G} = \left(\frac{1}{T-1}\right)\sum_{t=2}^{T} \hat{u}_t \hat{u}_t^T$$

(13) $$\hat{\Lambda} = \sum_{j=1}^{T-2} k\left(\frac{j}{S_T}\right)\hat{\Gamma}(j)$$

(14) $$\hat{\Gamma}(j) = \left(\frac{1}{T-1}\right)\sum_{t=2}^{T-j} \hat{u}_t \hat{u}_{t+j}^T \text{ for } j > 0$$

(15) $$k_Q(x) = \frac{25}{12\pi^2 x^2}\left(\frac{\sin(6\pi x/5)}{6\pi x/5}\right) - \cos(6\pi x/5)$$

We employed the bandwidth that is provided by Andrews (1991):

(16) $$S_T^+ = 1.322[\mathrm{a}(2)T]^{1/5}$$

(17) $$\hat{\mathrm{a}}(2) = \frac{4\hat{\rho}_i}{(1-\hat{\rho}_i)^4}$$

Finally we estimated the t statistic:

(18) $$t_{\hat{b}} = \frac{\hat{b} - b}{s_{\hat{b}}} \sim N(0.1)$$

and apply a one-sided t- test of the null hypothesis, $a \geq 0$. We employed a 5% level of statistical significance that means that the critical value is $t_c = -1.65$. If $t_{\hat{b}} < -1.65$, we reject the null hypothesis of convergence.

The specific null hypothesis tests for relative convergence rather than absolute convergence. In order to test for absolute convergence we can change the null hypothesis to $a \geq 1$ which equals to $b \geq 2$.

Even if there is not convergence in the whole sample of countries, the methodology of Phillips and Sul provides us the ability to test for converging subgroups. The clustering procedure is based on the assumption that indeed there is a "Core Group" that is consisted of a number K of countries. ($K < N$, where N is the number of all the countries of the sample).

In what follows we present the algorithm of the clustering procedure, developed by Phillips and Sul:

Step 1: Due to the fact that the evidence for multiple club convergence is usually apparent in the final time series observations, it is recommended by Phillips and Sul to initially cluster the panel according to the final observations. In case of substantial volatility in X_{it}, the ordering may be done according to an average of a fraction f of the final observations. (f =1/3 or 1/2 of the total observations).

Step 2: Choosing the first k^* highest individuals and run the $\log t$ regression to calculate the t-statistic of the test. The choice of k must be done accordance to the maximization of t_k, subject to the restriction: $t_k > -1.65 \quad \forall \quad k < k^*$. By this way we ensure that the null hypothesis is supported by every k. The possibility for type II error is reduced by the selection of k that maximizes the t-statistic. If the restriction $t_k > -1.65$ does not hold at least for $k = 2$, the highest individual must be dropped out. The procedure continues until the satisfaction of the two arguments. The group that satisfies these arguments is the Core Group. If the arguments are not satisfied for any k, that means that there is not any converging subgroup in the panel.

Step 3: Adding one individual country each time to the Core Group and estimate the t-statistic. If $t > c$, where c is a critical value been set by us, adding this individual to the core group. Following a conservative choice we initially set $c = 0$. The above procedure must be repeated for any individual country. For the formed subgroup must hold that

$t > -1.65$, otherwise the critical value have to be raised in order to increase the discriminatory power of the test.

Step 4: Another subgroup is formed by the remaining individuals that are not concluded in the first subgroup. If for this subgroup holds that $t > -1.65$, we conclude that there are two converging subgroups through the panel. Otherwise steps 1-3 must be repeated to determine whether smaller subgroups exist in the panel. If there is not any k for which $t > -1.65$ holds, the conclusion is that the remaining individuals diverge.

* In order to remove cycle component where there is such need, we employ the Hodrick – Prescot filter, with the smoothing variable λ equals 100, as we use data with annual frequency.

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5. The Variables

One of the main problems of our study is the inclusion of variables which are representative of the aspects of financial development that facilitate economic growth.
In this part we present the variables that we are going to use and furthermore we report information about the data and the datasets that we constructed.
As an indicator of the economic activity we used the real per capita Gross Domestic Product (GDP). We received the data from the Penn World Tables 6.2. (in dollars, constant prices of 2000, Laspeyres series). Our data have annual frequency and as a result we have 34 observations for every country.
In order to capture the major functions of the financial system we used 5 different measures. Every different measure captures a different function of the financial sector and a more specialized part of the financial development.
A very fundamental measure of the financial development relies on the magnitude of the money in circulation as a ratio to the base money or as a ratio to the GDP. There are slightly differences in these measures but the intuition is the same. More money circulated through the banking system means that the financial system is more developed and has a more active role in the production (King and Levine, 1993 a, b; Levine, Loayza and Beck, 1999; Xu, 2000; Rousseau and Vuthipadadorn, 2002; Fung, 2008; Levine, 1996; Federici and Caprioli, 2008; Jung, 1986). Besides, we expect that as the developing countries grow, a greater number of transactions would take place through the financial system. (Jung, 1986). For the purposes of the present work, we used the variable **"Currency outside the banking system/ Base money" (COBS/BM)** (World Bank's Financial Development and Structure Database), instead of the widely used measure "M2-M1/GDP", due to the availability of the data. Because of the nature of our variable, a lower level of the ratio means more funds circulating through the banking system. The data for this variable are available for the period between 1970 and 2005 for every country. (36 annual observations).
The question is whether such a measure gives accurate results about the financial development. Our purpose is to examine whether the financial system facilitates the economic growth and for our purposes it is essential to know the distribution of funds between commercial banks and central bank and additionally the distribution of funds

between private sector (except from financial sector) and government sector (King and Levine, 1993 a,b).

For this reason, we will apply 4 more sophisticated variables. All of these variables were received by the "World Bank's Financial Development and Structure Database". The first variable is the **"Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK)**. This variable contains information about the allocation of the funds inside the financial system. More funds to the commercial banks relative to the central bank, means that the financial system is more efficient and facilitates in a better way the economic development. (King and Levine, 1993 a, b). The data for this variable are available for the period between 1970 and 2006 for every country. (37 annual observations). (Other authors that used this variable are the: Grier and Grier, 2007; Federici and Caprioli, 2008; Levine, Loayza and Beck, 1999).

The second variable is the variable **"Private"**, which is constructed from King and Levine (1993, a) and contains even more precise information. More specifically this variable measures the funds which are allocated only to the private sector (not to the government sector) through the financial intermediaries. More funds allocated to the private sector, means that the financial system indeed facilitates the economic development. (King and Levine, 1993 a, b). The data for this variable are available for the period between 1970 and 2006 for every country. (37 annual observations). (Other authors that used this variable are the: Baltagi, B.H. et al., 2008; Luintel et al., 2008; Demetriades and Hussein, 1996; Federici and Caprioli, 2008; Fung, 2008; Rousseau and Vuthipadadorn, 2003; Levine, Loayza and Beck, 1999).

Finally, the two last variables are the **"Stock Market Turnover Ratio"** (**SMTOR**) and the **"Stock Market Total Value Traded"** (**SMTVT**). The Stock Market Turnover Ratio equals with the total value of domestic shares traded divided by market capitalization, while the Stock Market Total Value Traded equals with the total value of domestic shares traded divided by GDP. These variables contain information about the liquidity of the stock markets, the former relative to the market capitalization and the latter relative to the GDP. These two variables are each other complimentary, due to their different nature which stems from the difference in their denominators. The former variable is a more pure measure of the stock market liquidity because it is not affected from the rises or the falls of the stock prices, something that happens with the latter variable. From the other hand the Stock Market Turnover Ratio does not secure that the stock market liquidity is significant in relation to the size of the economy, while Stock Market Total Value Traded

secures this. We included the above two stock market liquidity variables in accordance with Levine and Zervos who found that only the stock market liquidity is significant for the economic development, whereas stock market capitalization, volatility and integration seem to be insignificant (Levine and Zervos, 1996). The data for the variable Stock Market Turnover Ratio are available for the period between 1989 and 2007 (19 annual observations) and for the variable Stock Market Total Value Traded are available for the period between 1988 and 2007 (20 annual observations). (Other authors that used this variable are the: Luintel et al., 2008; Federici and Caprioli, 2008).

We constructed five different datasets in order to maximize the number of countries that are included in the sample for each financial development variable, because the data of each financial variable are available for different countries. As a result, if we had one common dataset we will limit the number of countries that included in the sample. Due to the fact that the convergence test is employed every time for a different panel, the existence of different datasets does not affect our ability to extract results. Below we present information about the 5 different datasets. The full composition of each dataset is reported at the Appendix.

Dataset 1

With the use of this dataset we will examine the correlation between the convergence in the per capita GDP and the variable Private. In the dataset are included data from 57 countries. The time periods are not necessary the same between the variables, because as we aforesaid every panel is tested alone. The time period for every variable was reported above.

Dataset 2

With the use of this dataset we will examine the correlation between the convergence in the per capita GDP and the liquidity variables Stock Market Turnover Ratio and Stock Market Total Value Traded. In the dataset are included data from 48 countries. The time periods are not necessary the same among the variables, because as we aforesaid every panel is tested alone. The time period for every variable was reported above.

Dataset 3

With the use of this dataset we will examine the correlation among the convergence in the per capita GDP, the variable Private and the liquidity variables Stock Market Turnover Ratio and Stock Market Total Value Traded. We included together these three variables in the same dataset in order to have more comparable results, if this is possible. Due to the fact that data for all of the three variables are available for fewer countries, in this dataset are included data from 26 countries. The time periods are not necessary the same among the variables, because as we aforesaid every panel is tested alone. The time period for every variable was reported above.

Dataset 4

With the use of this dataset we will examine the correlation among the convergence in the per capita GDP, the variable Private, the liquidity variables Stock Market Turnover Ratio and Stock Market Total Value Traded, the variable "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK) and the variable "Currency outside the banking system/ Base money" (COBS/BM). We included together these five variables in the same dataset in order to have more comparable results, if this is possible. Due to the fact that data for all of the five variables are available for even fewer countries, in this dataset are included data from only 21 countries. The time periods are not necessary the same among the variables, because as we aforesaid every panel is tested alone. The time period for every variable was reported above.

Dataset 5

With the use of this dataset we will examine the correlation between the convergence in the per capita GDP and the variable "Currency outside the banking system/ Base money" (COBS/BM). In the dataset are included data from 83 countries. The time periods are not necessary the same between the variables, because as we aforesaid every panel is tested alone. The time period for every variable was reported above.

6. Results

At this part we present the results from the econometric analysis. We briefly report the main characteristics of each dataset and furthermore we present their main results.
After the short discussion we present the results concentrated in a table. At the appendix B there are the diagrams of each subgroup for every variable. Finally, in each dataset we present a diagram with the relative transition curves of the formed subgroups of each variable.

1st dataset: GDP and Private

With the use of the first dataset, we try to examine whether convergence in the income or/and convergence in the growth rate of the income, occurs simultaneously with convergence in the variable Private, across the countries of the sample. The GDP sample consists of 57 countries for the period between 1970 and 2003, whereas the Private sample consists of 57 countries for the period between 1970 and 2006. Below we present the results of the convergence tests.

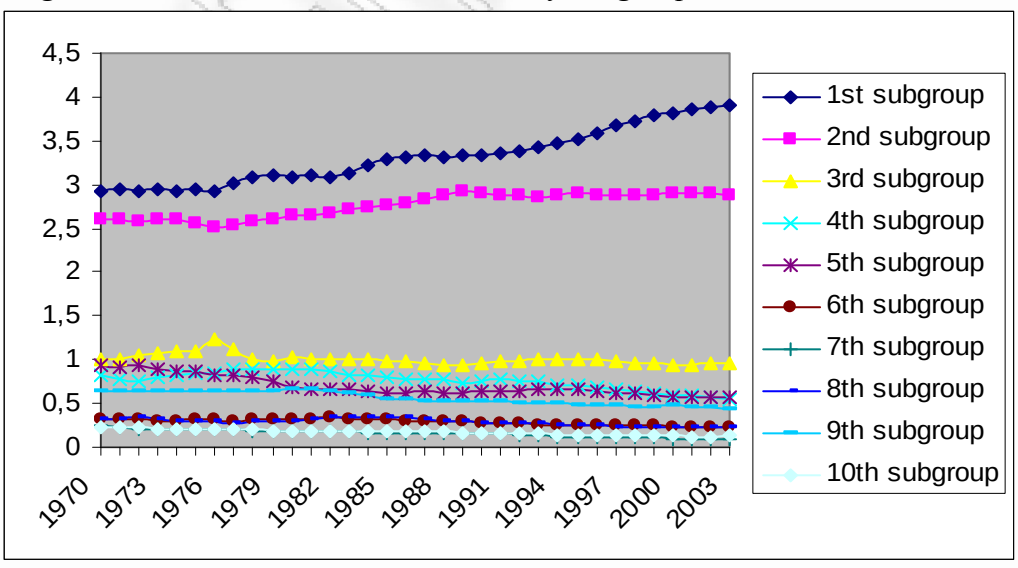
Convergence in the growth rates of GDP

The result of the convergence test across the full sample, b, equals -0.7484 and its t-statistic equals -2165.9, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 10 different subgroups whereas 3 countries are not converging with any other country of the sample. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.1 GDP Growth Rate

Subgroup	Countries	t-stat	b coefficient
Full sample	…	-2165.9	-0.7484
1st subgroup	Ireland, Norway, United States	-1.072	-0.1246
2nd subgroup	Mauritius, New Zealand, Australia, Cyprus, United Kingdom, Finland, Canada, Sweden, Italy, Denmark, Japan, Portugal, Switzerland, Malta, Singapore	1.2357	0.37727
3rd subgroup	India, Greece, Thailand, Malaysia, Dominican Republic, Sri Lanka, Egypt, Panama, Costa Rica, Gabon	1.2636	0.67789
4th subgroup	Fiji, Pakistan, Ecuador, Paraguay, Venezuela	1.1827	0.10255
5th subgroup	Jamaica, El Salvador	1.2424	0.82564
6th subgroup	Syria, Barbados, Cote d`Ivoire	0.90997	1.0505
7th subgroup	Burundi, Niger, Gambia, Madagascar	0.47134	0.62064
8th subgroup	Cameroon, Ghana, Honduras, Nepal	0.86739	0.64653
9th subgroup	Guatemala, Philippines	≈ 0	1.9182
10th subgroup	Burkina Faso, Nigeria, Sierra Leone, Kenya, Ethiopia, Senegal	-0.26057	-0.93233
non-converging	Suriname, Trinidad & Tobago, Mexico	-	-

Diagram 6.1 - Relative Transition Curves of Subgroups



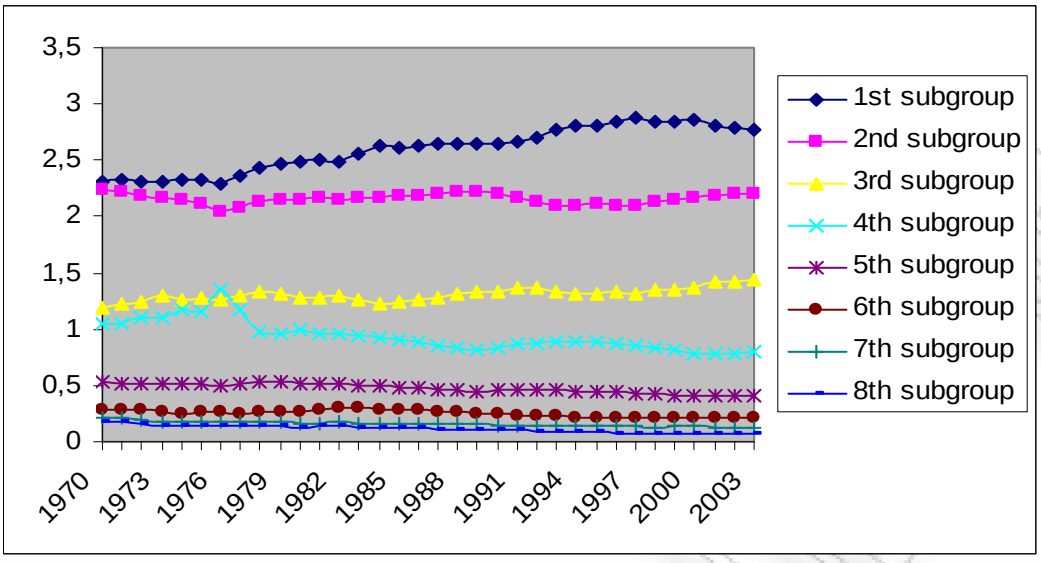
Convergence in the levels of GDP

The result of the convergence test across the full sample, b, equals -0.7484 and its t-statistic equals -5788.4, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulted in 8 different subgroups and 11 countries that are not converging with any other country. In the table below we present the synthesis of the subgroups and both the b coefficient and its t-statistic.

Table 6.2 GDP Levels

Subgroup	Countries	t-stat	b coefficient
Full sample	…	-5788.4	-0.74846
1st subgroup	United States, Norway, Singapore	0.69245	1.6715
2nd subgroup	Switzerland, Ireland, Denmark, Australia, Canada, Sweden, United Kingdom, Japan, Finland, Italy, Cyprus, Malta	-0.37673	1.2576
3rd subgroup	Portugal, Mauritius, Greece	0.6129	1.7966
4th subgroup	Malaysia, Gabon, Costa Rica, Panama, Thailand	0.17197	1.6118
5th subgroup	Fiji, Egypt, El Salvador, Paraguay, Jamaica, Ecuador, Sri Lanka	1.8053	2.4243
6th subgroup	India, Cameroon, Pakistan, Honduras, Cote d`Ivoire, Syria	0.80047	1.6745
7th subgroup	Barbados, Nepal, Senegal	2.1533	2.6792
8th subgroup	Burkina Faso, Gambia, Niger, Burundi, Madagascar, Sierra Leone, Ethiopia	0.39565	0.066003
non-converging	New Zealand, Trinidad &Tobago, Mexico, Suriname, Dominican Republic, Venezuela, Guatemala, Philippines, Ghana, Nigeria, Kenya	-	-

Diagram 6.2 - Relative Transition Curves of Subgroups



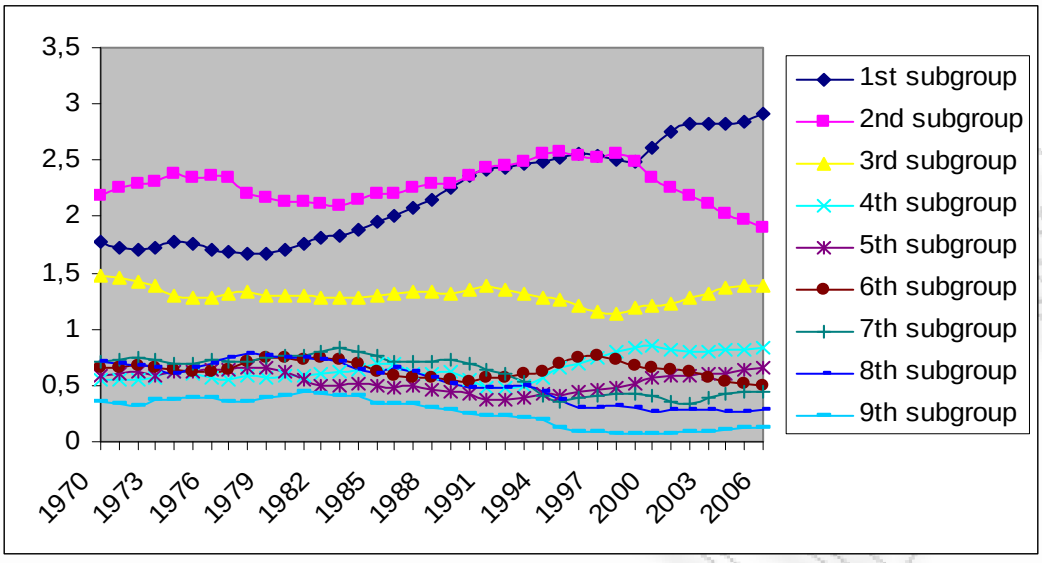
Convergence in the levels of the variable Private

The result of the convergence test across the full sample, b, equals -0.935 and its t-statistic equals -147.41, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulted in 9 different subgroups and 6 countries that are not converging with any other country. In the table below we present the synthesis of the subgroups and both the b coefficient and its t-statistic.

Table 6.3 Private Levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-147.41	-0.93574
1st subgroup	Denmark, Switzerland, Ireland, United Kingdom, Portugal, New Zealand, Canada, Cyprus, Malaysia, Malta, Australia	0.41205	1.5751
2nd subgroup	Sweden, Japan, Singapore, Italy, Thailand, Norway, Panama	-0.16848	1.2018
3rd subgroup	Greece, Finland, Mauritius, Barbados, United States, Egypt	1.2848	2.0155
4th subgroup	El Salvador, Honduras, Nepal	1.0791	2.0263
5th subgroup	India, Costa Rica, Ethiopia	1.217	1.9268
6th subgroup	Sri Lanka, Trinidad and Tobago, Philippines, Kenya, Burundi, Paraguay	-0.88814	0.87487
7th subgroup	Guatemala, Jamaica, Senegal, Suriname, Ghana	-0.39357	1.2176
8th subgroup	Mexico, Burkina Faso, Syria, Côte d'Ivoire, Gambia, Venezuela, Nigeria, Gabon	-0.65628	1.0433
9th subgroup	Niger, Sierra Leone	-1.0186	0.67219
non-converging	Fiji, Pakistan, Ecuador, Dominican Republic, Madagascar, Cameroon	-	-

Diagram 6.3 - Relative Transition Curves of Subgroups



2nd dataset: GDP, Stock Market Total Value Traded/GDP and Stock Market Turnover Ratio

With the use of the second dataset, we try to examine whether convergence in the income or/and convergence in the growth rate of the income, occurs simultaneously with convergence in the variables STOCK MARKET TURNOVER RATIO and SMTVT, across the countries of the sample. The GDP sample consists of 48 countries for the period between 1970 and 2003, whereas both the STOCK MARKET TURNOVER RATIO and the SMTVT samples consist of data from 48 countries for the period between 1989 and 2007. Below we present the results of the convergence tests.

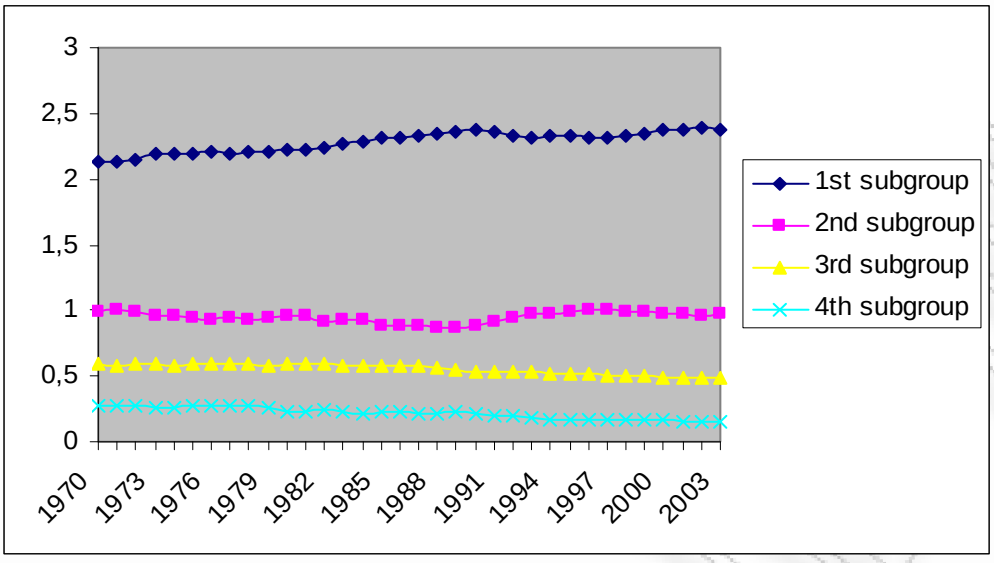
Convergence in the growth rates of GDP

The result of the convergence test across the full sample, b, equals -0.75549 and the t-statistic equals -2687, indicating that the countries of the sample as a whole do not converge. The further analysis for the existence of converging sub-groups resulting in 4 different subgroups and 4 countries that are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.4 GDP Growth Rate

Subgroup	Countries	t-stat	b coefficient
Full sample		-2687	-0.75549
1st subgroup	Korea, Taiwan, Singapore, Trinidad &Tobago, Hong Kong, Portugal, Spain, United Kingdom, Norway, Australia, United States, Austria, Netherlands, Belgium, Israel, Japan, France, Canada, Greece, Germany, Finland, Italy, Sweden, Denmark, New Zealand	-1.5328	-0.1743
2nd subgroup	Thailand, Malaysia, Chile, South Africa, Argentina	1.0715	0.81357
3rd subgroup	Indonesia, Sri Lanka, Egypt, Turkey, Jamaica, Colombia, Morocco, Philippines, Mexico, Brazil, Peru, Jordan	0.93457	0.14445
4th subgroup	Nigeria, Cote d`Ivoire	-1.0481	-0.15542
non-converging	Luxembourg, India, Tunisia, Pakistan	-	-

Diagram 6.4 - Relative Transition Curves of Subgroups



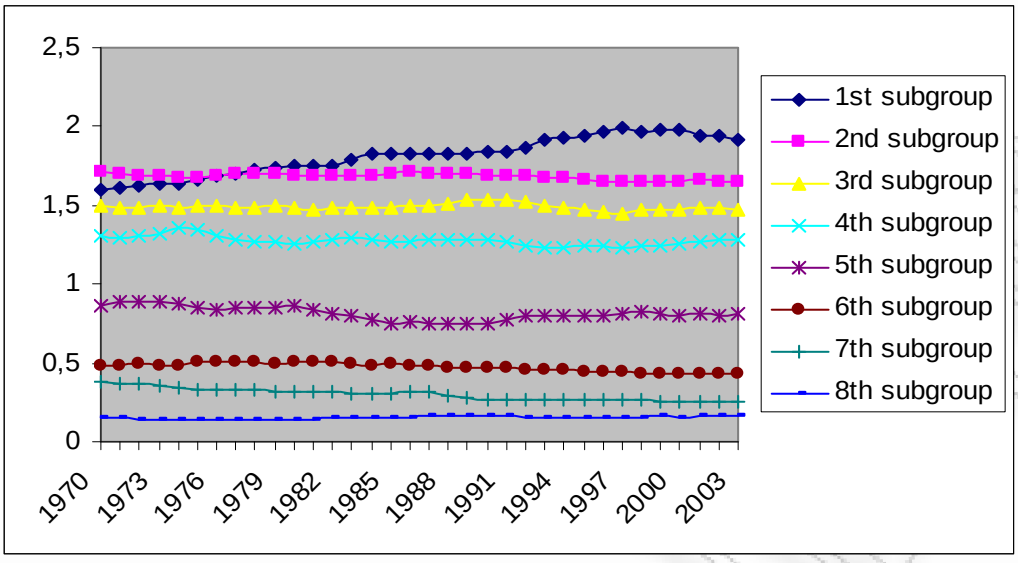
Convergence in the levels of GDP

The result of the convergence test across the full sample, b, equals -0.75549 and its t-statistic equals -7114, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 8 different subgroups, whereas 6 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.5 GDP Levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-7114	-0.75549
1st subgroup	United States, Norway, Singapore	0.69245	1.6715
2nd subgroup	Denmark, Australia, Canada, Hong Kong, Austria, Netherlands	0.17962	1.9413
3rd subgroup	Sweden, United Kingdom, France, Belgium, Germany, Japan, Taiwan	0.60723	1.6869
4th subgroup	Finland, Italy, New Zealand, Israel, Spain, Korea Rep.	0.40352	1.6599
5th subgroup	Portugal, Greece, Chile, Malaysia, Argentina	1.1022	1.8983
6th subgroup	South Africa, Mexico, Tunisia, Thailand, Brazil, Colombia, Turkey	0.61396	1.6021
7th subgroup	Egypt, Jamaica, Peru, Sri Lanka, Indonesia, Jordan	2.4365	2.9386
8th subgroup	India, Pakistan	-0.36198	1.1202
non-converging	Luxembourg, Trinidad &Tobago, Morocco, Philippines, Cote d`Ivoire, Nigeria	-	-

Diagram 6.5 - Relative Transition Curves of Subgroups



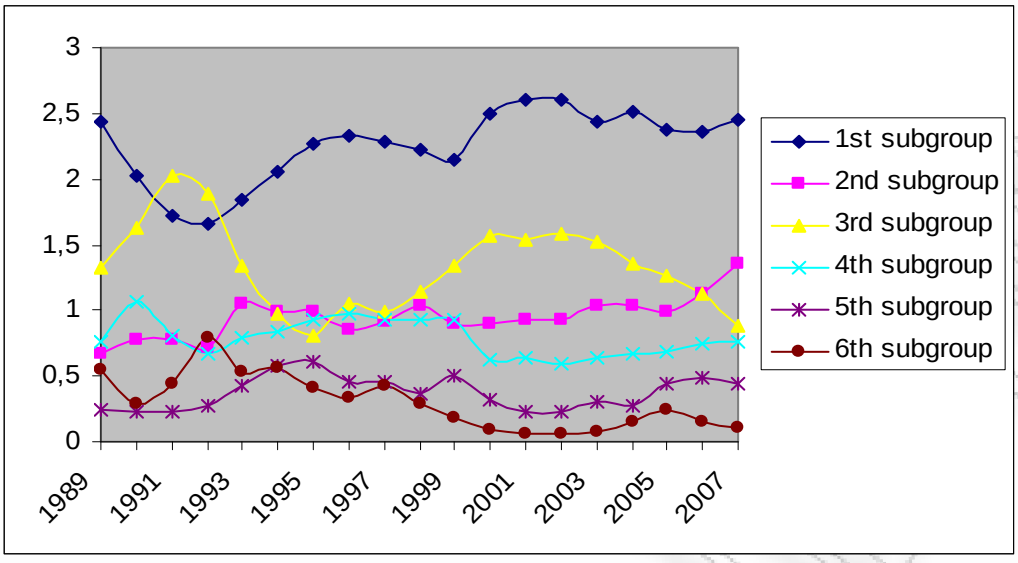
Convergence in the levels of the variable Stock Market Turnover Ratio

The result of the convergence test across the full sample, b, equals -0.42696 and its t-statistic equals -19161, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 8 different subgroups, whereas 10 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.6 Stock Market Turnover Ratio levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-19161	-0.42696
1st subgroup	United Kingdom, Italy, United States, Netherlands, Korea Rep., Spain, Taiwan, Germany, Finland, Sweden, Norway, Japan, Turkey	2.0082	2.7765
2nd subgroup	France, Portugal, Singapore, Australia, Nigeria	0.22094	-0.046206
3rd subgroup	Canada, India, Thailand, Israel, Jordan	0.85349	1.7833
4th subgroup	Belgium, Indonesia, Greece, Austria, Brazil, South Africa, New Zealand	-0.03035	2.5108
5th subgroup	Egypt, Morocco, Philippines, Sri Lanka	0.55992	0.30973
6th subgroup	Colombia, Argentina, Peru, Côte d'Ivoire	1.3424	0.030289
non-converging	Pakistan, Denmark, Hong Kong, Malaysia, Mexico, Chile, Tunisia, Jamaica, Trinidad & Tobago, Luxembourg	-	-

Diagram 6.6 - Relative Transition Curves of Subgroups



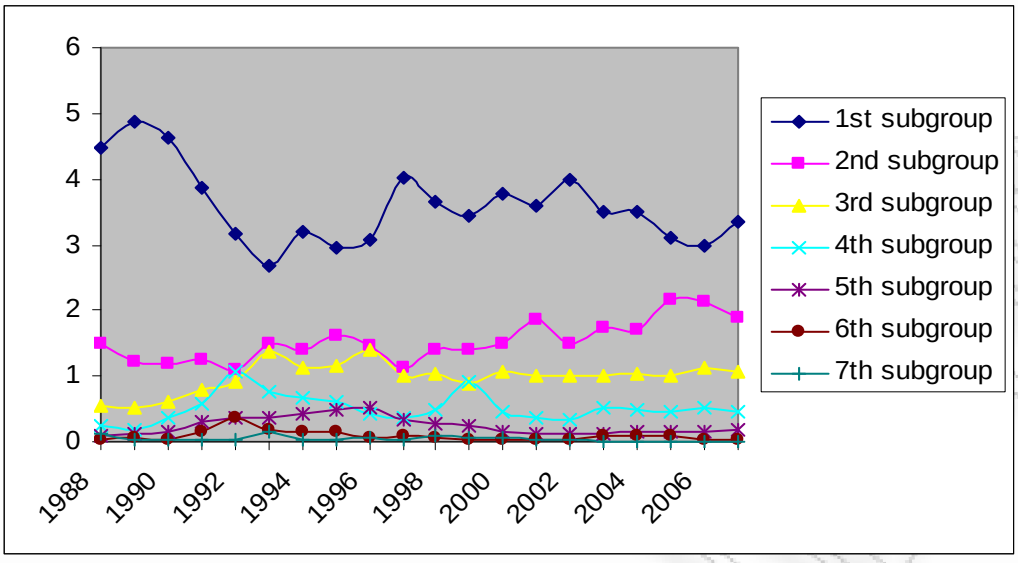
Convergence in the levels of the variable Stock Market Total Value Traded

The result of the convergence test across the full sample, b, equals 0.17743 and its t-statistic equals -27.611, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 7 different subgroups, whereas 4 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.7 Stock Market Total Value Traded levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-27.611	0.17743
1st subgroup	Hong Kong, United Kingdom, Taiwan, United States, Finland, Spain, Korea Rep.	0.52749	2.3332
2nd subgroup	Netherlands, Singapore, Sweden, South Africa, Japan, Jordan, Pakistan	0.10334	1.9127
3rd subgroup	Australia, France, Canada, Norway, Italy, Germany, India, Malaysia, Denmark, Israel, Portugal, Belgium, Turkey	0.306	2.1307
4th subgroup	Brazil, Thailand, Greece, Egypt, Morocco	0.053142	1.6824
5th subgroup	Indonesia, Philippines, New Zealand, Mexico, Nigeria, Colombia	0.27374	1.619
6th subgroup	Jamaica, Argentina, Sri Lanka, Trinidad & Tobago	0.50107	1.6858
7th subgroup	Côte d'Ivoire, Luxembourg	0.21606	1.7515
non-converging	Austria, Chile, Peru,Tunisia	-	-

Diagram 6.7 - Relative Transition Curves of Subgroups



3rd dataset: GDP, Private, Stock Market Total Value Traded and Stock Market Turnover Ratio

With the use of the third dataset, we try to examine whether convergence in the income or/and convergence in the growth rate of the income, occurs simultaneously with the convergence in the variable Private, the variable Stock Market Turnover Ratio and the variable Stock Market Total Value Traded, across the countries of the sample. The GDP sample consists of 26 countries for the period between 1970 and 2003, the Private sample consists of 26 countries for the period between 1970 and 2006 and both the Stock Market Turnover Ratio and the Stock Market Total Value Traded samples consist of data from 26 countries for the period between 1989 and 2007. This dataset includes fewer countries than the two first datasets, because we chose only the countries for which data are available for all of the three financial development variables. In this way we try to indicate commonalities in the converging behavior across the sample. Below we present the results of the convergence tests.

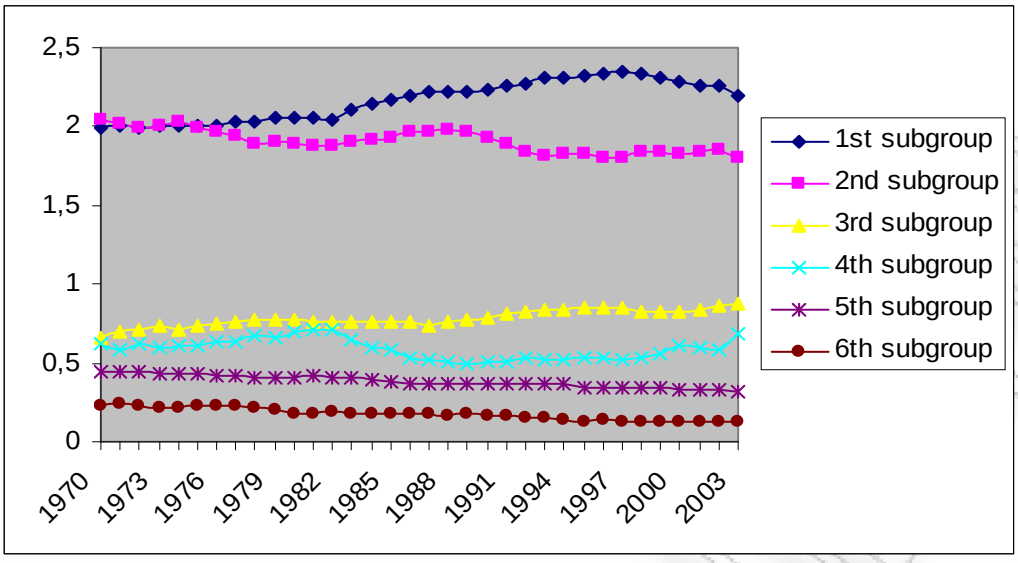
Convergence in the GDP growth rates

The result of the convergence test across the full sample, b, equals -0.65198 and its t-statistic equals -167.87, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 6 different subgroups. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.8 GDP Growth Rate

Subgroup	Countries	t-stat	b coefficient
Full sample		-167.87	-0.65198
1st subgroup	Singapore, Norway, Australia, United States, Japan	0.44038	0.13406
2nd subgroup	Portugal, United Kingdom, Canada, Finland, Italy, Sweden, Denmark, New Zealand	-0.81815	-0.10479
3rd subgroup	Thailand, Malaysia, Greece	0.14992	0.034937
4th subgroup	Sri Lanka, Trinidad &Tobago, Egypt	0.92477	0.97443
5th subgroup	India, Pakistan, Jamaica, Philippines, Mexico	-0.46921	-0.042838
6th subgroup	Nigeria, Cote d`Ivoire	-1.0481	-0.15542

Diagram 6.8 - Relative Transition Curves of Subgroups



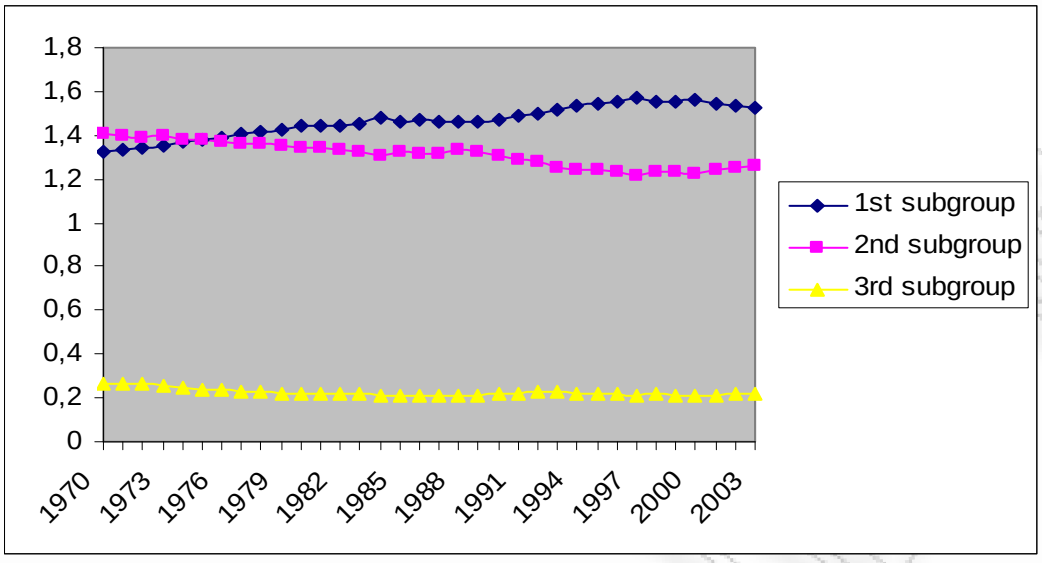
Convergence in the levels of GDP

The result of the convergence test across the full sample, b, equals -0.65198 and its t-statistic equals -515.61, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 3 different subgroups, whereas 16 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient. In this point we note that a number of countries that included to a same subgroup in the previous datasets, seem to non-converge in this dataset. Taking into account the relativity of the test, the different grouping may happen due to the different and smaller sample that we use in this case. The fact that the 16 of 26 countries do not converge with any other country, make it difficult to distinct whether the financial variables converge simultaneously with the income across the sample.

Table 6.9 GDP Levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-515.61	-0.65198
1st subgroup	United States, Norway, Singapore	0.69245	1.6715
2nd subgroup	Australia, Canada, United Kingdom, Japan	-1.5141	0.76858
3rd subgroup	Egypt, Jamaica, Sri Lanka	1.6476	2.3498
non-converging	Denmark, Sweden, Finland, Italy, New Zealand, Trinidad &Tobago, Portugal, Greece, Malaysia, Mexico, Thailand, Philippines, India, Pakistan, Cote d`Ivoire, Nigeria	-	-

Diagram 6.9 - Relative Transition Curves of Subgroups



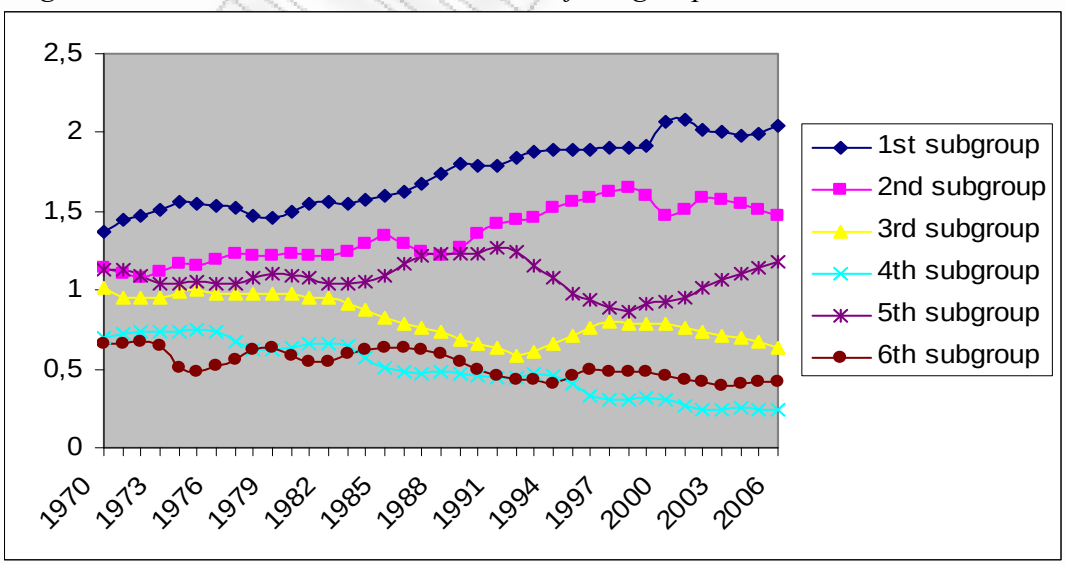
Convergence in the Private levels

The result of the convergence test across the full sample, b, equals -0.7161 and its t-statistic equals -696.72, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 6 different subgroups, whereas 2 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.10 Private Levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-696.72	-0.7161
1st subgroup	Denmark, United Kingdom, Portugal, New Zealand, Canada, Malaysia, Japan	0.68153	1.8109
2nd subgroup	Sweden, Australia, Singapore, Thailand	0.33617	1.5621
3rd subgroup	United States, Egypt, Philippines	0.00882	1.3725
4th subgroup	Jamaica, Mexico, Côte d'Ivoire, Nigeria	0.03314	1.5051
5th subgroup	Greece, Norway, Finland	-1.4446	0.72657
6th subgroup	Sri Lanka, Trinidad & Tobago,Pakistan	-0.39164	0.39067
non-converging	Italy, India	-	-

Diagram 6.10 - Relative Transition Curves of Subgroups



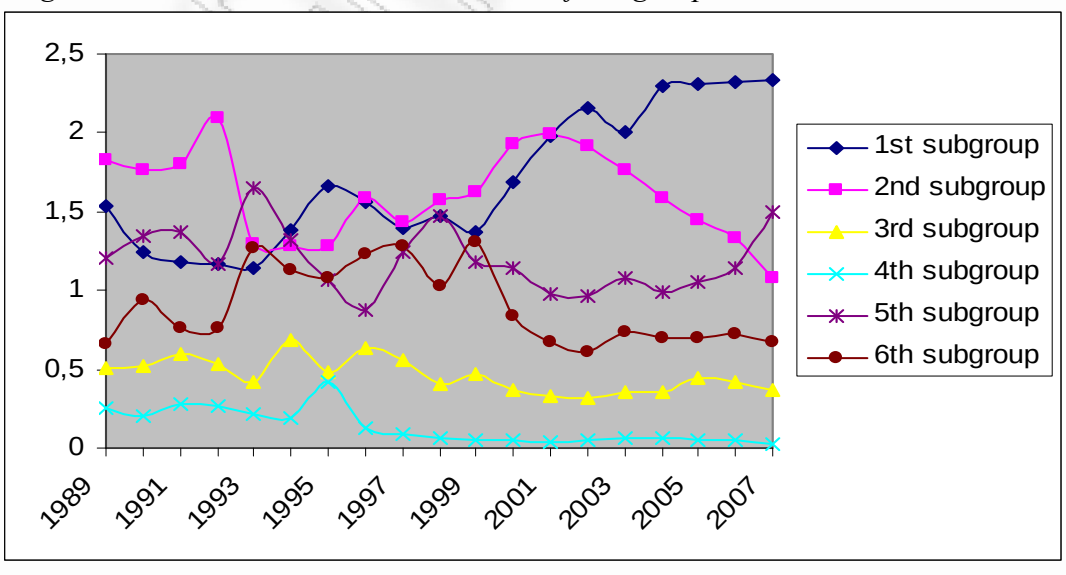
Convergence in the levels of the variable Stock Market Turnover Ratio

The result of the convergence test across the full sample, b, equals -1.7094 and its t-statistic equals -7.1548, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 6 different subgroups, whereas 1 country is not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.11 Stock Market Turnover Ratio

Subgroup	Countries	t-stat	b coefficient
Full sample		-7.1548	-1.7094
1st subgroup	United Kingdom, Italy, United States, Finland, Sweden, Norway, Japan	0.36801	1.6056
2nd subgroup	Australia, Denmark, Canada, India,Thailand	0.06072	1.0903
3rd subgroup	Egypt, Philippines, Mexico, Nigeria, Sri Lanka	0.39053	0.45867
4th subgroup	Jamaica, Côte d'Ivoire,Trinidad & Tobago	1.9431	2.1121
5th subgroup	Portugal, Singapore	4.5588	4.5599
6th subgroup	Greece, Malaysia, New Zealand	-0.51322	0.70399
non-converging	Pakistan	-	-

Diagram 6.11 - Relative Transition Curves of Subgroups



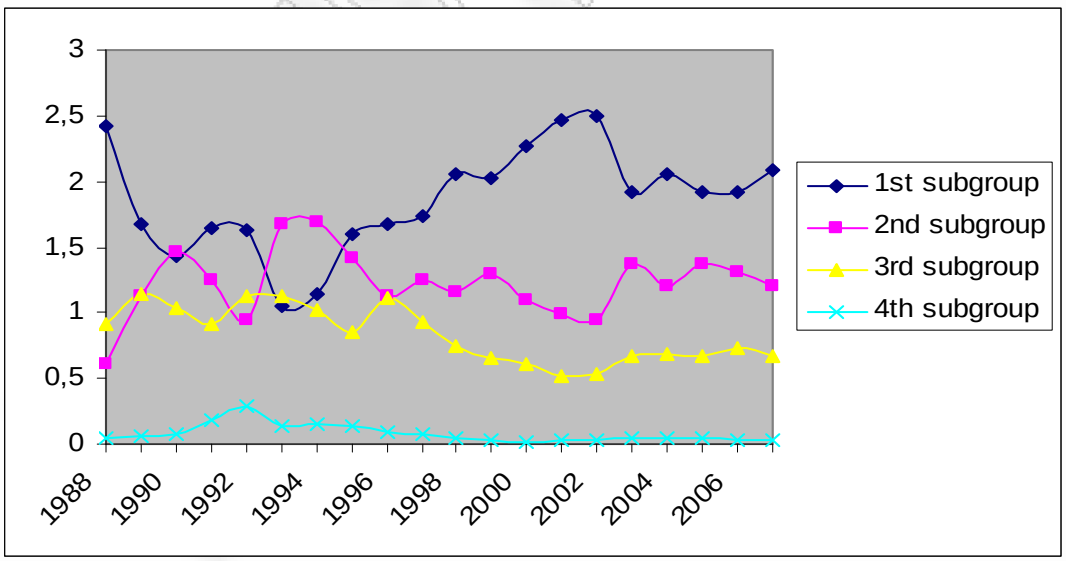
Convergence in the levels of the variable Stock Market Total Value Traded

The result of the convergence test across the full sample, b, equals -0.14451 and its t-statistic equals -42.395, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 4 different subgroups, whereas 3 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.12 Stock Market Turnover Ratio levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-42.395	-0.14451
1st subgroup	Unites Kingdom, United States, Finland	0.95972	2.002
2nd subgroup	Singapore, Sweden, Pakistan	0.91173	2.1952
3rd subgroup	Australia, Japan, Canada, Norway, Italy, India, Malaysia, Denmark, Portugal, Thailand, Egypt	-0.45802	1.6667
4th subgroup	Mexico, Nigeria, Jamaica, Sri Lanka, Trinidad & Tobago, Côte d'Ivoire	-1.3283	1.059
non-converging	Greece, Philippines, New Zealand	-	-

Diagram 6.12 - Relative Transition Curves of Subgroups



4th dataset: GDP, Private, Stock Market Total Value Traded, Stock Market Turnover Ratio, Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets (BANK), Currency Outside Banking System to Base Money (COBS/BM).

With the use of the fourth dataset, we try to examine whether convergence in the income or/and convergence in the growth rate of the income, occurs simultaneously with the convergence in any of the variables Private, Stock Market Turnover Ratio, Stock Market Total Value Traded, "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK) and "Currency outside the banking system/ Base money" (COBS/BM), across the countries of the sample. The GDP sample consists of 21 countries for the period between 1970 and 2003, the Private sample consists of 21 countries for the period between 1970 and 2006, both the Stock Market Turnover Ratio and the Stock Market Total Value Traded samples consist of data from 21 countries for the period between 1989 and 2007, the "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK) sample consists of 21 countries for the period between 1970 and 2006 and the "Currency outside the banking system/ Base money" (COBS/BM) sample consists of 21 countries for the period between 1970 and 2005. This dataset includes even fewer countries than the third first datasets, because we chose only the countries for which data are available for all of the five financial development variables. In this way we try to indicate commonalities in the converging behavior across the sample. Below we present the results of the convergence tests.

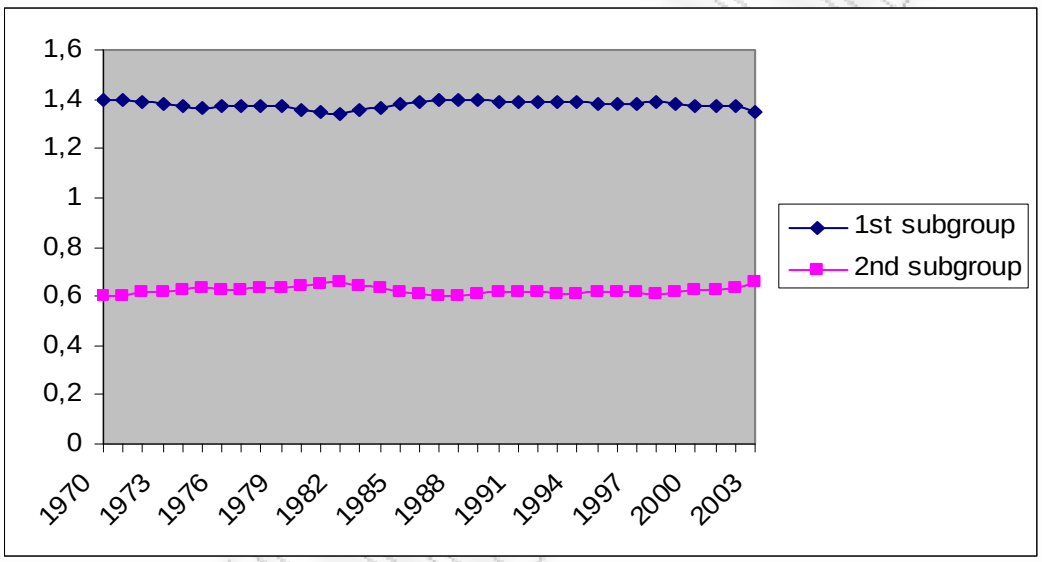
Converging subgroups of the growth rates of GDP

The result of the convergence test across the full sample, b, equals -0.57187 and its t-statistic equals -48.683, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 2 different subgroups, whereas 9 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.13 GDP Growth Rate

Subgroup	Countries	t-stat	b coefficient
Full sample		-48.683	-0.57187
1st subgroup	United Kingdom, Australia, Canada, Denmark	1.8122	0.88014
2nd subgroup	Thailand, Malaysia, Sri Lanka, India, Trinidad &Tobago, Greece, Finland, New Zealand	-1.2057	-0.1295
non-converging	Portugal, Egypt, United States, Japan, Pakistan, Italy, Jamaica, Philippines, Nigeria	-	-

Diagram 6.13 - Relative Transition Curves of Subgroups



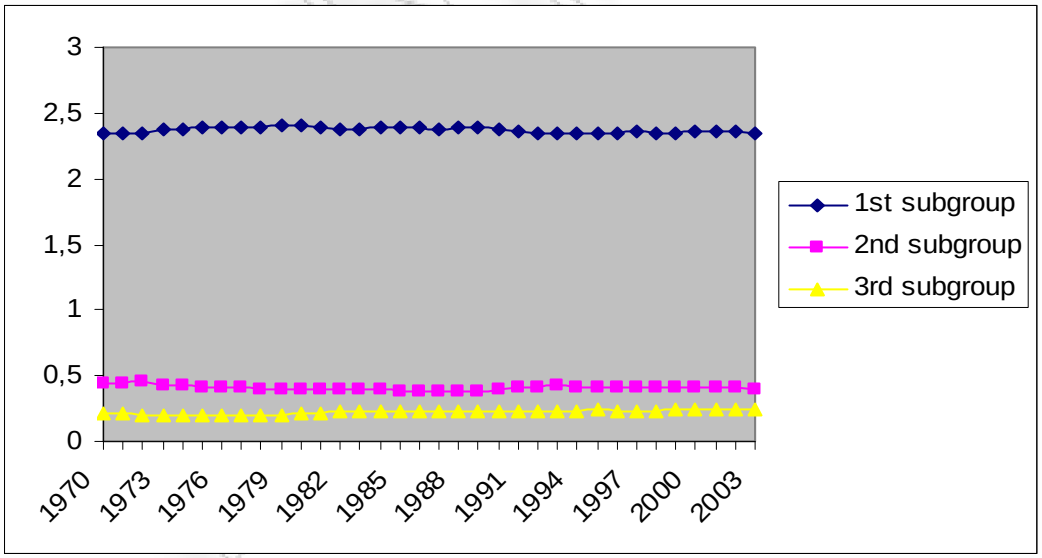
Convergence in the GDP levels

The result of the convergence test across the full sample, b, equals --0.57187 and its t-statistic equals -170.83, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 8 different subgroups, whereas 6 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.14 GDP Levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-170.83	-0.57187
1st subgroup	Australia, Canada, United Kingdom, Japan	-1.5141	0.76858
2nd subgroup	Egypt, Jamaica, Sri Lanka	1.6476	2.3498
3rd subgroup	India, Pakistan	-0.36198	1.1202
non-converging	United States, Denmark, Finland, Italy, New Zealand, Trinidad &Tobago, Portugal, Greece, Malaysia, Thailand, Philippines, Nigeria	-	-

Diagram 6.14 - Relative Transition Curves of Subgroups



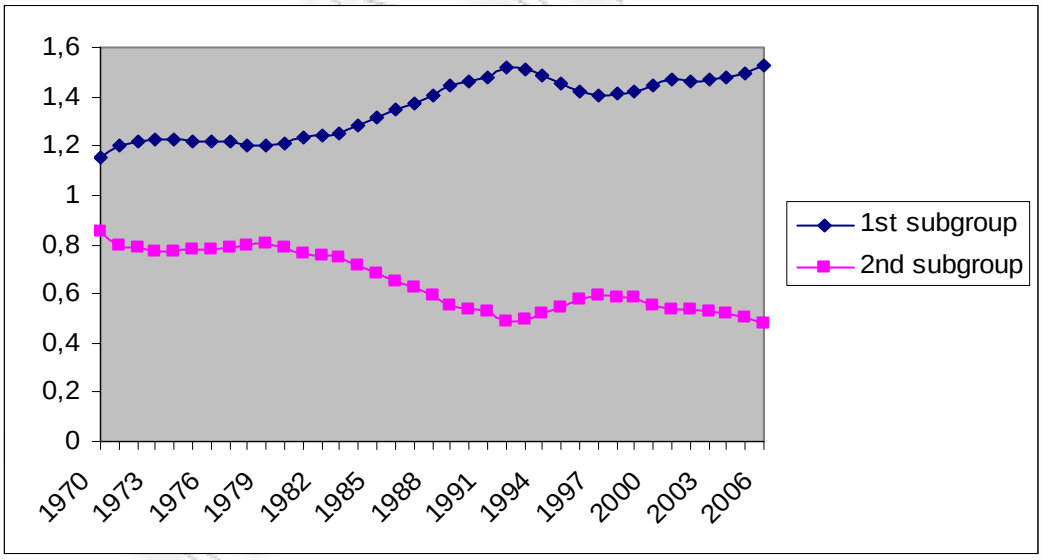
Convergence in the Private levels

The result of the convergence test across the full sample, b, equals -0.5882 and its t-statistic equals -184.83, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 2 different subgroups, whereas 11 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.15 Private levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-184.83	-0.5882
1st subgroup	Denmark, United Kingdom, Portugal, New Zealand, Canada, Malaysia, Japan	0.68153	1.8109
2nd subgroup	United States, Egypt, Philippines	0.08820	1.3725
non-converging	Australia, Italy, Thailand, Greece, Finland, India, Sri Lanka, Trinidad & Tobago, Pakistan, Jamaica, Nigeria	-	-

Diagram 6.15 - Relative Transition Curves of Subgroups



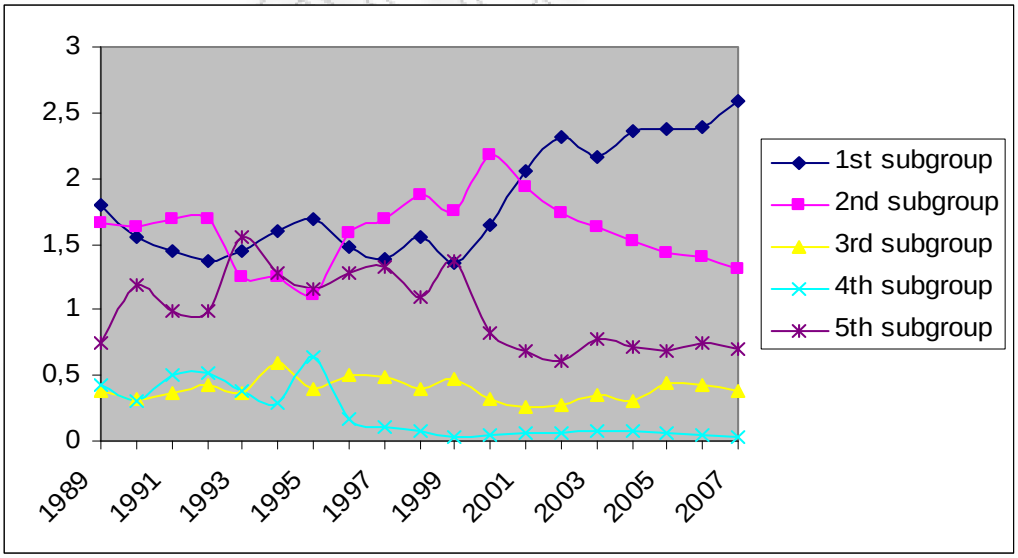
Convergence in the levels of the variable Stock Market Turnover Ratio

The result of the convergence test across the full sample, b, equals -1.7512 and its t-statistic equals -6.848, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 5 different subgroups, whereas 3 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.16 Stock Market Turnover Ratio levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-6.848	-1.7512
1st subgroup	United Kingdom, Italy, United States, Finland, Japan	1.2074	2.1058
2nd subgroup	Portugal, Australia, Denmark, India	0.65204	1.438
3rd subgroup	Egypt, Philippines, Nigeria, Sri Lanka	0.91068	0.95354
4th subgroup	Jamaica, Trinidad & Tobago	3.2411	3.2209
5th subgroup	Greece, Malaysia, New Zealand	-0.5132	0.70399
non-converging	Pakistan, Canada, Thailand	-	-

Diagram 6.16 - Relative Transition Curves of Subgroups



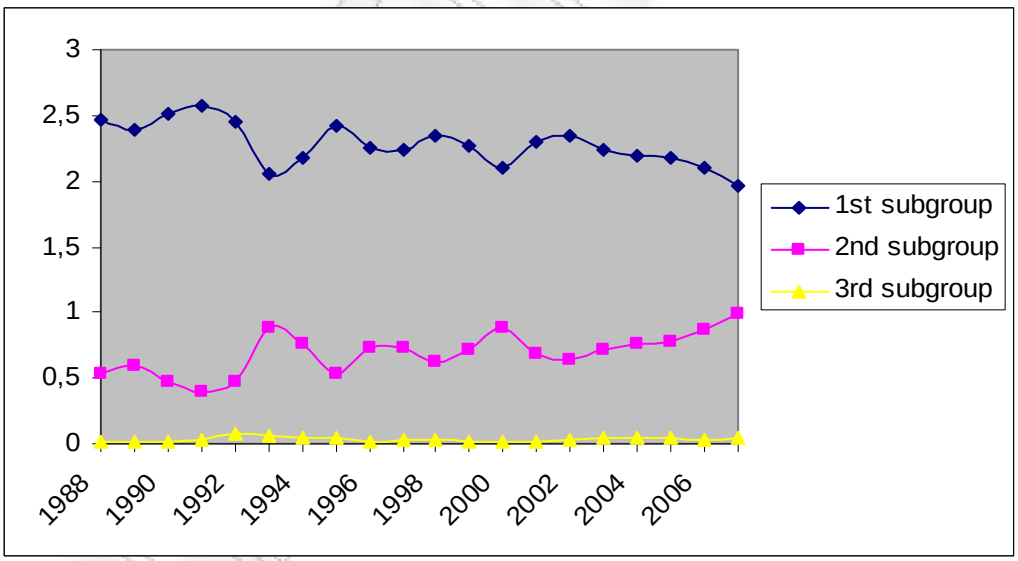
Convergence in the levels of the variable Stock Market Total Value Traded

The result of the convergence test across the full sample, b, equals -0.07319 and its t-statistic equals -35.866, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 3 different subgroups, whereas 5 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.17 Stock Market Total Value Traded levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-35.866	-0.07319
1st subgroup	United States, Finland, Pakistan	0.5209	1.9014
2nd subgroup	Australia, Japan, Canada, Italy, India, Malaysia, Denmark, Portugal, Thailand	0.33997	1.6978
3rd subgroup	Nigeria, Jamaica, Sri Lanka, Trinidad & Tobago	1.4735	1.5068
non-converging	United Kingdom, Greece, Egypt, Philippines, New Zealand	-	-

Diagram 6.17 - Relative Transition Curves of Subgroups



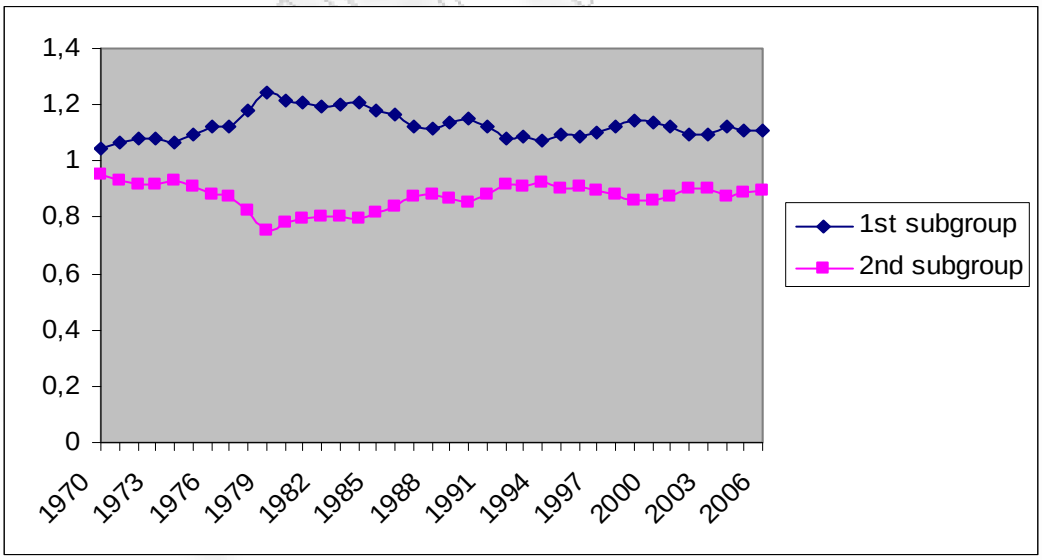
Convergence in the levels of the variable "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK)

The result of the convergence test across the full sample, b, equals 0.84371 and its t-statistic equals -1.8387, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 2 different subgroups, whereas 1 country is not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.18 "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK) levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-1.8387	0.84371
1st subgroup	Trinidad & Tobago, Portugal, Finland, Denmark, Malaysia, United Kingdom, Thailand, New Zealand, Canada, Australia, India, Italy, Greece, Sri Lanka, United States, Philippines, Japan	1.3984	2.1573
2nd subgroup	Pakistan, Jamaica, Egypt	-1.3676	0.65105
non-converging	Nigeria	-	-

Diagram 6.18 - Relative Transition Curves of Subgroups



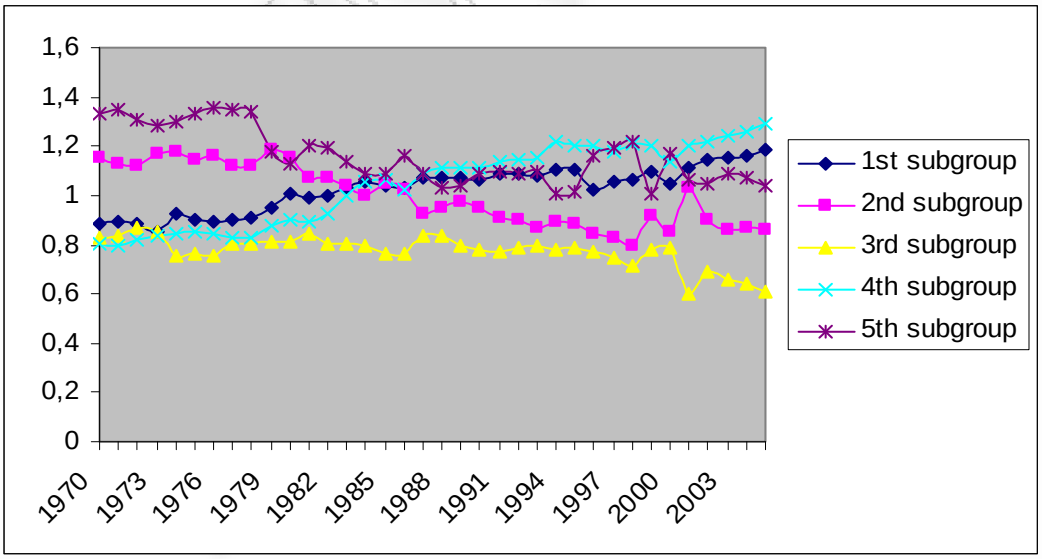
Convergence in the levels of the variable "Currency Outside Banking System / Base Money" (COBS/BM)

The result of the convergence test across the full sample, b, equals -1.3973 and its t-statistic equals -12.72, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 5 different subgroups, whereas 6 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.19 "Currency Outside Banking System / Base Money" (COBS/BM) levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-12.72	-1.3973
1st subgroup	Australia, United Kingdom, India	1.4174	2.3276
2nd subgroup	Sri Lanka, Philippines, Thailand, Greece	-0.83117	1.7134
3rd subgroup	Egypt, Jamaica, Trinidad & Tobago	0.26944	1.4092
4th subgroup	United States, Canada	0.1605	0.89508
5th subgroup	Finland, Japan, New Zealand	-0.9349	1.569
non-converging	Portugal, Pakistan, Nigeria, Denmark, Italy, Malaysia	-	-

Diagram 6.19 - Relative Transition Curves of Subgroups



5th dataset: GDP, Currency Outside Banking System to Base Money.

With the use of the fifth dataset, we try to examine whether convergence in the income or/and convergence in the growth rate of the income, occurs simultaneously with the convergence in the variable "Currency Outside Banking System / Base Money" (COBS/BM), across the countries of the sample. The GDP sample consists of 83 countries for the period between 1970 and 2003 and the "Currency Outside Banking System / Base Money" (COBS/BM) sample consists of 83 countries for the period between 1970 and 2005. Below we present the results of the convergence tests.

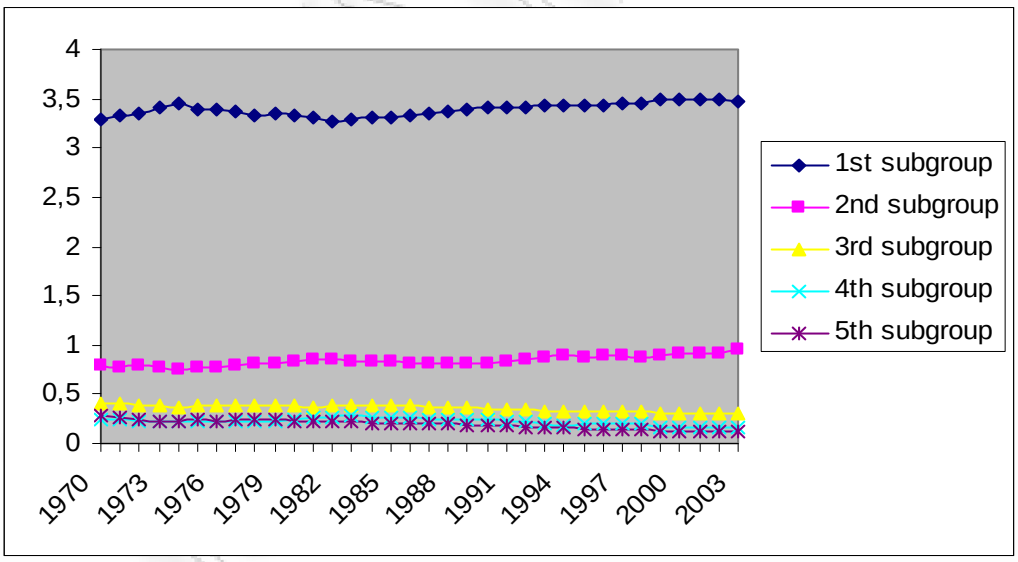
Convergence in the growth rates of GDP

The result of the convergence test across the full sample, b, equals -0.47788 and its t-statistic equals -18.895, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 5 different subgroups, whereas 18 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.20 GDP Growth Rate

Subgroup	Countries	t-stat	b coefficient
Full sample		-18.895	-0.47788
1st subgroup	Finland, Italy, Iceland, Sweden, Denmark, New Zealand, Bahrain, Switzerland, Qatar, Saudi Arabia, Gabon	0.92982	0.76274
2nd subgroup	Thailand, Malaysia, India, Tanzania, Sri Lanka, Trinidad &Tobago, Egypt, Dominican Republic, Tunisia, Nepal, Costa Rica, Turkey, Pakistan, El Salvador, Jamaica, South Africa, Mexico	-0.94067	-0.14172
3rd subgroup	Morocco, Philippines, Sudan, Barbados, Benin, Samoa, Gambia, Cote d`Ivoire, Madagascar	≈ 0	-0.84609
4th subgroup	Rwanda, Kenya, Malawi, Chad, Congo	1.1618	0.76688
5th subgroup	Central African Republic, Togo, Burundi, Niger, Sierra Leone	0.97764	0.71145
non-converging	Mali, Ethiopia, Suriname, Ghana, Burkina Faso, Uruguay, Nigeria, Algeria, Fiji, Syria, Guatemala, Honduras, Senegal, Paraguay, Ecuador, Cameroon, Jordan	-	-

Diagram 6.20 - Relative Transition Curves of Subgroups



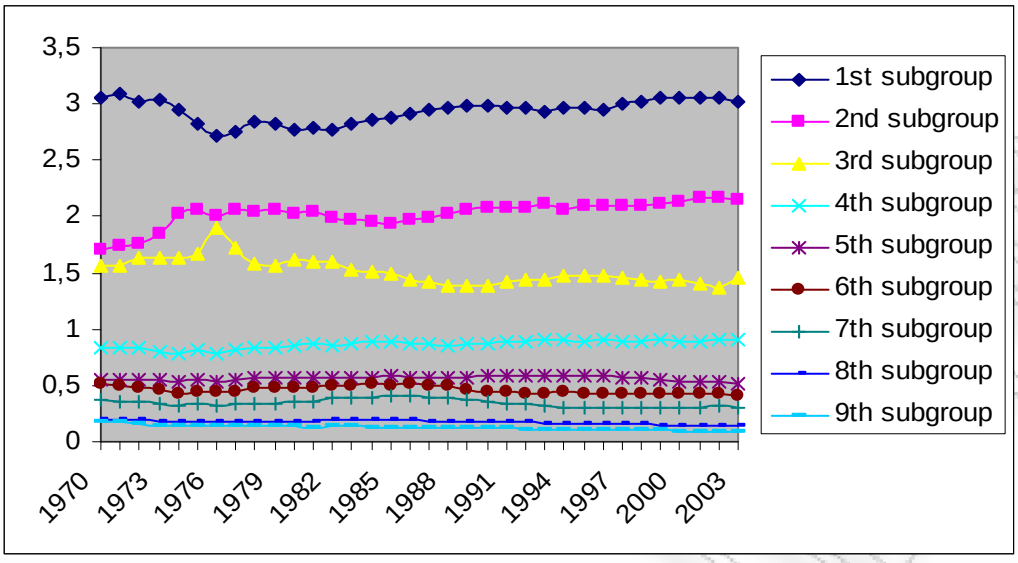
Convergence in the levels of GDP

The result of the convergence test across the full sample, b, equals -0.47788 and its t-statistic equals -79.554, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 9 different subgroups, whereas 5 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.21 GDP

Subgroup	Countries	t-stat	b coefficient
Full sample		-79.554	-0.47788
1st subgroup	United States, Switzerland, Ireland, Denmark, Australia, Canada, Singapore, Iceland, Netherlands, Sweden, United Kingdom, France, Belgium, Germany, Japan, Italy, Cyprus, Israel	0.95747	1.8656
2nd subgroup	Finland, New Zealand, Spain, Bahrain, Malta, Korea, Portugal, Mauritius, Saudi Arabia	1.707	2.3341
3rd subgroup	Trinidad &Tobago, Greece, Malaysia, Gabon, Uruguay	0.095232	1.3521
4th subgroup	South Africa, Costa Rica, Mexico, Tunisia, Thailand	2.0072	2.5688
5th subgroup	Fiji, Egypt, El Salvador, Paraguay, Jamaica, Ecuador, Sri Lanka	1.8053	2.4243
6th subgroup	Morocco, Guatemala, Jordan, Philippines, India	0.23192	1.4977
7th subgroup	Samoa, Cameroon, Pakistan, Honduras	0.11268	1.3305
8th subgroup	Barbados, Nepal, Ghana, Congo, Senegal, Benin, Rwanda, Nigeria, Kenya, Mali, Sudan, Burkina Faso	-0.43459	1.1084
9th subgroup	Gambia, Tanzania, Central African Republic, Chad, Niger, Togo, Malawi, Burundi, Madagascar, Sierra Leone, Ethiopia, Algeria	0.023874	1.4783
non-converging	Suriname, Dominican Republic, Turkey, Cote d`Ivoire, Syria	-	-

Diagram 6.21 - Relative Transition Curves of Subgroups



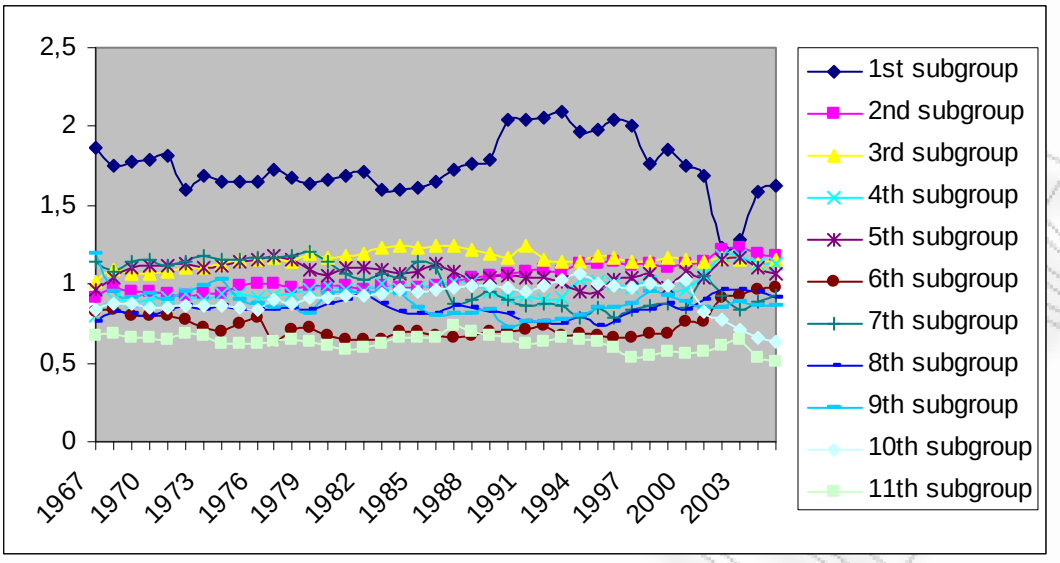
Convergence in the levels of the variable "Currency Outside Banking System / Base Money" (COBS/BM)

The result of the convergence test across the full sample, b, equals -0.65703 and its t-statistic equals -77.114, indicating that the countries of the sample as a whole, do not converge. The further analysis for the existence of converging sub-groups resulting in 11 different subgroups, whereas 28 countries are not converging with any other country. In the table below we present the synthesis of the subgroups, their b coefficient and the t-statistic of the b coefficient.

Table 6.22 "Currency Outside Banking System / Base Money" (COBS/BM) levels

Subgroup	Countries	t-stat	b coefficient
Full sample		-77.114	-0.65703
1st subgroup	Belgium, Malta, Spain	0.066524	0.84757
2nd subgroup	Central African Republic, United States, Sweden, Canada, Switzerland, France, Sierra Leone, Burkina Faso, Syria, Pakistan, Togo, Burundi, Mexico	-0.29968	1.3149
3rd subgroup	Chad, Cote d'Ivoire, Australia, Niger, India, Netherlands	0.71063	1.8628
4th subgroup	United Kingdom, Mali, Nepal, Sudan	0.89559	2.2257
5th subgroup	Saudi Arabia, Tanzania, Finland, Morocco, New Zealand	-0.83415	2.0555
6th subgroup	Gambia, Kenya, Malawi, Israel	0.34762	1.6054
7th subgroup	Barbados, Gabon, Greece	1.0198	1.0198
8th subgroup	Jordan, Suriname, Korea, Philippines	0.7998	1.5002
9th subgroup	Samoa, Algeria, Cyprus	0.19914	0.90253
10th subgroup	Bahrain, Egypt, Germany, Paraguay, Jamaica	0.010311	1.0724
11th subgroup	Honduras, Trinidad & Tobago, Iceland, Dominican Republic, Costa Rica	-0.29771	1.1203
non-converging	Tunisia, Portugal, Ghana, Nigeria, Senegal, Denmark, Benin, Madagascar, Singapore, Japan, Congo, Sri Lanka, Fiji, South Africa, Mauritius, Rwanda, Thailand, Italy, Cameroon, Ethiopia, Guatemala, Qatar, Turkey, Ireland, Uruguay, Malaysia, Ecuador, El Salvador	-	-

Diagram 6.22 - Relative Transition Curves of Subgroups



7. Analysis of Results

The question that we try to answer is whether convergence in the per capita income coexists with convergence in the financial development, across the countries. Because the nature of the convergence test that we have applied does not allow indicating whether the converging behavior of two or more variables is similar, we have to apply an additional procedure in order to answer our question. Unfortunately there is not any known test which may help us to overcome this problem and as a consequence we developed an empirical procedure to indicate possible common behavior between any financial variable and the per capita income. Below we describe this methodology.

The convergence test for each variable gave us a number of converging subgroups. In each subgroup, a different number of countries are included. It is very possible, if not certain, that the formed subgroups between any two variables would not be exactly the same, in terms of the included countries. Consequently it is impossible to detect absolute coincidence in the convergence between per capita GDP and any financial development variable. As a result we try to detect at least a relative similarity between the convergence behavior between per capita income and financial development. More specifically, we examine which proportion of the countries that form a specific converging subgroup of a financial development indicator, also coexist in the same converging subgroup of per capita income.

In what follows we present the comparison tables. Every table has pairs of columns. The left column of each pair reports the countries that form a specific converging subgroup of a financial development variable. At the top of the left column is reported the number of the specific subgroup of the financial development variable. The right column of the pair reports the number of the income subgroup that each country included to. In this way, we can detect if there is a main stream of income convergence across a converging subgroup of a financial indicator. The letter “n” symbolize the non-convergence situation.

1st Dataset

Comparison of the Private levels subgroups with the GDP levels subgroups

1		2		3		4	
Denmark	2	Singapore	1	United States	1	El Salvador	5
Switzerland	2	Norway	1	Finland	2	Honduras	6
Ireland	2	Sweden	2	Greece	3	Nepal	7
United Kingdom	2	Japan	2	Mauritius	3		
Canada	2	Italy	2	Egypt	5		
Cyprus	2	Thailand	4	Barbados	7		
Malta	2	Panama	4				
Australia	2						
Portugal	3						
Malaysia	4						
New Zealand	n						
5		**6**		**7**		**8**	
Costa Rica	4	Sri Lanka	5	Jamaica	5	Gabon	4
India	6	Paraguay	5	Senegal	7	Syria	6
Ethiopia	8	Burundi	8	Suriname	n	Côte d'Ivoire	6
		Trinidad and Tobago	n	Ghana	n	Burkina Faso	8
		Philippines	n	Guatemala	n	Gambia	8
		Kenya	n			Venezuela	n
						Nigeria	n
						Mexico	n
9		**n**					
Niger	8	Fiji	5				
Sierra Leone	8	Ecuador	5				
		Pakistan	6				
		Cameroon	6				
		Madagascar	8				
		Dominican Republic	n				

In the above table we can see that the large majority of the countries that form the first two converging subgroups of the variable Private, also included at the first two converging subgroups of the levels of the per capita GDP. More specifically, the 73% of the countries which included at the two first subgroups of the Private also included at the two first subgroups of the levels of the per capita GDP. Furthermore, we can notice that as we move to the next converging subgroups of the Private, the countries that form these subgroups are progressively included at the subgroups 3 – 8 of GDP. As a result we can detect a weak relation between the convergence in the levels of the variable Private and in the levels of the per capita GDP, a relation that seems more strong and obvious at the two first subgroups of both the variables. Interestingly these two subgroups of the levels of GDP include the richest countries of the sample. A possible explanation of what leads

the rest of the subgroups (except the two first) to have unclear results, is that the means of these subgroups are very close, especially for the subgroups 5 – 8, as we can also see at the 6.2 diagram.

Comparison of the Private levels subgroups with the GDP growth rates subgroups

1		2		3		4	
Ireland	1	Norway	1	United States	1	El Salvador	5
Denmark	2	Sweden	2	Finland	2	Honduras	8
Switzerland	2	Japan	2	Mauritius	2	Nepal	8
United Kingdom	2	Singapore	2	Greece	3		
Portugal	2	Italy	2	Egypt	3		
New Zealand	2	Thailand	3	Barbados	6		
Canada	2	Panama	3				
Cyprus	2						
Malta	2						
Australia	2						
Malaysia	3						
5		**6**		**7**		**8**	
India	3	Sri Lanka	3	Jamaica	5	Gabon	3
Costa Rica	3	Paraguay	4	Ghana	8	Venezuela	4
Ethiopia	10	Burundi	7	Guatemala	9	Syria	6
		Philippines	9	Senegal	10	Côte d'Ivoire	6
		Kenya	10	Suriname	n	Gambia	7
		Trinidad and Tobago	n			Burkina Faso	10
						Nigeria	10
						Mexico	n
9		**n**					
Niger	7	Dominican Republic	3				
Sierra Leone	10	Fiji	4				
		Pakistan	4				
		Ecuador	4				
		Madagascar	7				
		Cameroon	8				

In the above table we examine the relation between the convergence in the growth rates of the per capita GDP and the convergence in the variable Private. As in the previous case, in this case we can see that the large majority of the countries that form the first two converging subgroups of the variable Private also included at the first two converging subgroups of the growth rates of the per capita GDP. We also detect that the countries that form the rest of the Private subgroups do not follow a clear pattern as for their inclusion in the GDP rate subgroups. The results are more confusing than the results of the comparison between the subgroups of the Private and the subgroups of the levels of the GDP. The only clear result that we can extract from this comparison is that the variable Private converges across the richer countries in which the GDP growth rate also converges, but as for the rest of the subgroups we do not have a clear result we can not extract an overall conclusion of this comparison.

2nd Dataset

Comparison of the Stock Market Turnover Ratio levels subgroups with the GDP levels subgroups

1		2		3		4	
United States	1	Singapore	1	Canada	2	Austria	2
Norway	1	Australia	2	Israel	4	Belgium	3
Netherlands	2	France	3	Thailand	6	New Zealand	4
United Kingdom	3	Portugal	5	Jordan	7	Greece	5
Taiwan	3	Nigeria	n	India	8	Brazil	6
Germany	3					South Africa	6
Sweden	3					Indonesia	7
Japan	3						
Italy	4						
Korea	4						
Spain	4						
Finland	4						
Turkey	6						

5		6		n	
Egypt	7	Argentina	5	Denmark	2
Sri Lanka	7	Colombia	6	Hong Kong	2
Morocco	n	Peru	7	Malaysia	5
Philippines	n	Côte d'Ivoire	n	Chile	5
				Mexico	6
				Tunisia	6
				Jamaica	7
				Pakistan	8
				Trinidad and Tobago	n
				Luxembourg	n

In the above table we present a comparison between the converging subgroups of the variable Stock Market Turnover Ratio and the converging subgroups of the levels of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the Stock Market Turnover Ratio levels subgroups with the GDP growth rates subgroups

1		2		3		4	
United Kingdom	1	France	1	Canada	1	Belgium	1
Italy	1	Portugal	1	Israel	1	Greece	1
United States	1	Singapore	1	Thailand	2	Austria	1
Netherlands	1	Australia	1	Jordan	3	New Zealand	1
Korea.	1	Nigeria	4	India	n	South Africa	2
Spain	1					Indonesia	3
Taiwan	1					Brazil	3
Germany	1						
Finland	1						
Sweden	1						
Norway	1						
Japan	1						
Turkey	3						

5		6		n	
Egypt	3	Argentina	2	Denmark	1
Morocco	3	Colombia	3	Hong Kong	1
Philippines	3	Peru	3	Trinidad and Tobago	1
Sri Lanka	3	Côte d'Ivoire	4	Malaysia	2
				Chile	2
				Mexico	3
				Jamaica	3
				Tunisia	n
				Luxembourg	n
				Pakistan	n

In the above table we can see that the large majority of the countries that form the first two converging subgroups of the variable Stock Market Turnover Ratio, also included at the first two converging subgroups of the growth rate of the per capita GDP. More specifically, the 89% of the countries which included at the two first subgroups of the Stock Market Turnover Ratio also included at the two first subgroups of the growth rate of the per capita GDP. Furthermore, we can spot that as we move to the next converging subgroups of the Stock Market Turnover Ratio, the countries that form these subgroups are progressively included at the subgroups 2 – 4 of GDP. These results indicate that convergence in the GDP growth rates occurs simultaneously with convergence in the levels of the Stock Market Turnover Ratio, or in other words, countries which converge at a higher Stock Market Turnover Ratio level also converge at a higher GDP growth rate. We must note that the test for convergence does not examine for the existence of

causality and the interpretation of our result is just indicating the coexistence of convergence of these two variables.

Comparison of the Stock Market Total Value Traded levels subgroups with the GDP levels subgroups

1		2		3		4	
United States	1	Singapore	1	Norway	1	Greece	5
Hong Kong	2	Netherlands	2	Australia	2	Brazil	6
United Kingdom	3	Sweden	3	Canada	2	Thailand	6
Taiwan	3	Japan	3	Denmark	2	Egypt	7
Finland	4	South Africa	6	France	3	Morocco	n
Spain	4	Jordan	7	Germany	3		
Korea	4	Pakistan	8	Belgium	3		
				Italy	4		
				Israel	4		
				Malaysia	5		
				Portugal	5		
				Turkey	6		
				India	8		
5		6		7		n	
New Zealand	4	Argentina	5	Côte d'Ivoire	n	Austria	2
Mexico	6	Jamaica	7	Luxembourg	n	Chile	5
Colombia	6	Sri Lanka	7			Tunisia	6
Indonesia	7	Trinidad and Tobago	e			Peru	7
Nigeria	n						
Philippines	n						

In the above table we present a comparison between the converging subgroups of the variable Stock Market Total Value Traded and the converging subgroups of the levels of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the Stock Market Total Value Traded levels subgroups with the GDP growth rates subgroups

1		2		3		4	
Hong Kong	1	Netherlands	1	Australia	1	Greece	1
United Kingdom	1	Singapore	1	France	1	Thailand	2
Taiwan	1	Sweden	1	Canada	1	Brazil	3
United States	1	Japan	1	Norway	1	Egypt	3
Finland	1	South Africa	2	Italy	1	Morocco	3
Spain	1	Jordan	3	Germany	1		
Korea	1	Pakistan	n	Denmark	1		
				Israel	1		
				Portugal	1		
				Belgium	1		
				Malaysia	2		
				Turkey	3		
				India	n		
5		6		7		n	
New Zealand	1	Trinidad and Tobago	1	Côte d'Ivoire	4	Austria	1
Indonesia	3	Argentina	2	Luxembourg	n	Chile	2
Philippines	3	Jamaica	3			Peru	3
Mexico	3	Sri Lanka	3			Tunisia	n
Colombia	3						
Nigeria	4						

In the above table we can see that the large majority of the countries that form the first three converging subgroups of the variable Stock Market Total Value Traded are included at the first converging subgroup of the growth rate of the per capita GDP. More specifically, the 78% of the countries which included at the three first subgroups of the Stock Market Total Value Traded also included at the first subgroup of the growth rate of the per capita GDP. Furthermore, we can spot that as we move to the next converging subgroups of the Stock Market Total Value Traded, the countries that form these subgroups are progressively included at the subgroups 2 – 4 of GDP. These results indicate that convergence in the GDP growth rates occurs simultaneously with convergence in the levels of the Stock Market Total Value Traded, or in other words, countries which converge at a higher Stock Market Total Value Traded level also converge at a higher GDP growth rate. We must note that the test for convergence does not examine for the existence of causality and the interpretation of our result is just indicating the coexistence of convergence between the two variables.

3rd Dataset

Comparison of the Private levels subgroups with the GDP levels subgroups

1		2		3		4	
United Kingdom	2	Singapore	1	United States	1	Jamaica	3
Canada	2	Australia	2	Egypt	3	Mexico	n
Japan	2	Thailand	n	Philippines	n	Côte d'Ivoire	n
Malaysia	n	Sweden	n			Nigeria	n
Denmark	n						
Portugal	n						
New Zealand	n						

5		6		n	
Norway	1	Sri Lanka	3	Italy	n
Finland	n	Trinidad and Tobago	n	India	n
Greece	n	Pakistan	n		

Due to the fact that in a large number of countries there is not convergence in terms of the GDP levels, we can detect a safe result from the above comparison.

Comparison of the Private levels subgroups with the GDP growth rates subgroups

1		2		3		4	
Japan	1	Australia	1	United States	1	Jamaica	5
Denmark	2	Singapore	1	Egypt	4	Mexico	5
United Kingdom	2	Sweden	2	Philippines	5	Côte d'Ivoire	6
Portugal	2	Thailand	3			Nigeria	6
New Zealand	2						
Canada	2						
Malaysia	3						

5		6		n	
Norway	1	Sri Lanka	4	Italy	2
Finland	2	Trinidad and Tobago	4	India	5
Greece	3	Pakistan	5		

In the above table we present a comparison between the converging subgroups of the variable Private and the converging subgroups of the growth rates of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the Stock Market Turnover Ratio levels subgroups with the GDP levels subgroups

1		2		3		4	
United States	1	Australia	2	Egypt	3	Jamaica	3
Norway	1	Canada	2	Sri Lanka	3	Côte d'Ivoire	n
United Kingdom	2	India	n	Philippines	n	Trinidad and Tobago	n
Japan	2	Thailand	n	Mexico	n		
Finland	n	Denmark	n	Nigeria	n		
Sweden	n						
Italy	n						

5		6		n	
Singapore	1	Greece	n	Pakistan	n
Portugal	n	Malaysia	n		
		New Zealand	n		

Due to the fact that in a large number of countries there is not convergence in terms of the GDP levels, we can detect a safe result from the above comparison.

Comparison of the Stock Market Turnover Ratio levels subgroups with the GDP growth rates subgroups

1		2		3		4	
United States	1	Australia	1	Egypt	4	Trinidad & Tobago	4
Norway	1	Denmark	2	Sri Lanka	4	Jamaica	5
Japan	1	Canada	2	Philippines	5	Côte d'Ivoire	6
United Kingdom	2	Thailand	3	Mexico	5		
Italy	2	India	5	Nigeria	6		
Finland	2						
Sweden	2						

5		6		n	
Singapore	1	New Zealand	2	Pakistan	5
Portugal	2	Greece	3		
		Malaysia	3		

In the above table we present a comparison between the converging subgroups of the variable Stock Market Turnover Ratio and the converging subgroups of the growth rates of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the Stock Market Total Value Traded levels subgroups with the GDP levels subgroups

1		2		3		4	
United States	1	Singapore	1	Norway	1	Jamaica	3
United Kingdom	2	Sweden	n	Australia	2	Sri Lanka	3
Finland	n	Pakistan	n	Japan	2	Trinidad and Tobago	n
				Canada	2	Côte d'Ivoire	n
				Egypt	3	Mexico	n
				Italy	n	Nigeria	n
				India	n		
				Malaysia	n		
				Denmark	n		
				Portugal	n		
				Thailand	n		

n	
Greece	n
Philippines	n
New Zealand	n

Due to the fact that in a large number of countries there is not convergence in terms of the GDP levels, we can detect a safe result from the above comparison.

Comparison of the Stock Market Total Value Traded levels subgroups with the GDP growth rates subgroups

1		2		3		4	
United States	1	Singapore	1	Australia	1	Sri Lanka	4
United Kingdom	2	Sweden	2	Japan	1	Trinidad and Tobago	4
Finland	2	Pakistan	5	Norway	1	Mexico	5
				Canada	2	Jamaica	5
				Italy	2	Nigeria	6
				Denmark	2	Côte d'Ivoire	6
				Portugal	2		
				Malaysia	3		
				Thailand	3		
				Egypt	4		
				India	5		

n	
New Zealand	2
Greece	3
Philippines	5

In the above table we present a comparison between the converging subgroups of the variable Stock Market Total Value Traded and the converging subgroups of the growth rates of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

4th Dataset

Comparison of the Private levels subgroups with the GDP levels subgroups

1		2		n	
United Kingdom	1	Egypt	2	Australia	1
Canada	1	Philippines	n	Sri Lanka	2
Japan	1	United States	n	Jamaica	2
Malaysia	n			India	3
Denmark	n			Pakistan	3
				Trinidad and	
Portugal	n			Tobago	n
New Zealand	n			Nigeria	n
				Italy	n
				Thailand	n
				Greece	n
				Finland	n

Due to the fact that in a large number of countries there is not convergence in terms of the GDP levels, we can detect a safe result from the above comparison.

Comparison of the Private levels subgroups with the GDP growth rates subgroups

1		2		n	
Denmark	1	United States	n	Australia	1
United Kingdom	1	Egypt	n	Thailand	2
Canada	1	Philippines	n	Greece	2
New Zealand	2			Finland	2
Malaysia	2			India	2
Portugal	n			Sri Lanka	2
				Trinidad and	
Japan	n			Tobago	2
				Pakistan	n
				Jamaica	n
				Nigeria	n
				Italy	n

In the above table we present a comparison between the converging subgroups of the variable Private and the converging subgroups of the growth rates of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the Stock Market Turnover Ratio levels subgroups with the GDP levels subgroups

1		2		3		4	
United Kingdom	1	Australia	1	Egypt	2	Jamaica	2
Japan	1	India	3	Sri Lanka	2	Trinidad and Tobago	n
Italy	n	Portugal	n	Philippines	n		
United States	n	Denmark	n	Nigeria	n		
Finland	n						

5		n	
Greece	n	Canada	1
Malaysia	n	Pakistan	3
New Zealand	n	Thailand	n

Due to the fact that in a large number of countries there is not convergence in terms of the GDP levels, we can detect a safe result from the above comparison.

Comparison of the Stock Market Turnover Ratio levels subgroups with the GDP growth rates subgroups

1		2		3		4	
United Kingdom	1	Australia	1	Sri Lanka	2	Trinidad and Tobago	2
Finland	2	Denmark	1	Egypt	n	Jamaica	n
Japan	n	India	2	Philippines	n		
Italy	n	Portugal	n	Nigeria	n		
United States	n						

5		e	
Greece	2	Canada	1
Malaysia	2	Thailand	2
New Zealand	2	Pakistan	n

In the above table we present a comparison between the converging subgroups of the variable Stock Market Turnover Ratio and the converging subgroups of the growth rates of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the Stock Market Total Value Traded levels subgroups with the GDP levels subgroups

1		2		3		n	
Pakistan	3	Australia	1	Jamaica	2	United Kingdom	1
United States	n	Japan	1	Sri Lanka	2	Egypt	2
Finland	n	Canada	1	Trinidad and Tobago	n	Philippines	n
		India	3	Nigeria	n	New Zealand	n
		Italy	n			Greece	n
		Malaysia	n				
		Denmark	n				
		Portugal	n				
		Thailand	n				

Due to the fact that in a large number of countries there is not convergence in terms of the GDP levels, we can detect a safe result from the above comparison.

Comparison of the Stock Market Total Value Traded levels subgroups with the GDP growth rates subgroups

1		2		3		n	
Finland	2	Australia	1	Sri Lanka	2	United Kingdom	1
Pakistan	n	Canada	1	Trinidad and Tobago	2	Greece	2
United States	n	Denmark	1	Nigeria	n	New Zealand	2
		India	2	Jamaica	n	Egypt	n
		Malaysia	2			Philippines	n
		Thailand	2				
		Italy	n				
		Portugal	n				
		Japan	n				

In the above table we present a comparison between the converging subgroups of the variable Stock Market Total Value Traded and the converging subgroups of the growth rates of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK) levels subgroups with the GDP levels subgroups

1		2		n	
United Kingdom	1	Jamaica	2	Nigeria	n
Canada	1	Egypt	2		
Australia	1	Pakistan	3		
Japan	1				
Sri Lanka	2				
India	3				
Italy	n				
Greece	n				
United States	n				
Philippines	n				
Trinidad and Tobago	n				
Portugal	n				
Finland	n				
Denmark	n				
Malaysia	n				
Thailand	n				
New Zealand	n				

Due to the fact that in a large number of countries there is not convergence in terms of the GDP levels, we can detect a safe result from the above comparison.

Comparison of the "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK) levels subgroups with the GDP growth rates subgroups

1		2		n	
Denmark	1	Pakistan	n	Nigeria	n
United Kingdom	1	Jamaica	n		
Canada	1	Egypt	n		
Australia	1				
Trinidad and Tobago	2				
Finland	2				
Malaysia	2				
Thailand	2				
New Zealand	2				
India	2				
Greece	2				
Sri Lanka	2				
Italy	n				
United States	n				
Philippines	n				
Japan	n				
Portugal	n				

In the above table we present a comparison between the converging subgroups of the variable "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK) and the converging subgroups of the growth rates of the per capita GDP. The

correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the "Currency Outside Banking System / Base Money" (COBS/BM) levels subgroups with the GDP levels subgroups

1		2		3		4	
Australia	1	Sri Lanka	2	Egypt	2	Canada	1
United Kingdom	1	Philippines	n	Jamaica	2	United States	n
India	3	Thailand	n	Trinidad and Tobago	n		
		Greece	n				

5		n	
Japan	1	Pakistan	3
New Zealand	n	Nigeria	n
Finland	n	Denmark	n
		Italy	n
		Malaysia	n
		Portugal	n

Due to the fact that in a large number of countries there is not convergence in terms of the GDP levels, we can detect a safe result from the above comparison.

Comparison of the "Currency Outside Banking System / Base Money" (COBS/BM) levels subgroups with the GDP growth rates subgroups

1		2		3		4	
Australia	1	Sri Lanka	2	Trinidad and Tobago	2	Canada	1
United Kingdom	1	Thailand	2	Egypt, Arab Rep.	n	United States	n
India	2	Greece	2	Jamaica	n		
		Philippines	n				

5		n	
Finland	2	Denmark	1
New Zealand	2	Malaysia	2
Japan	n	Portugal	n
		Pakistan	n
		Nigeria	n
		Italy	n

In the above table we present a comparison between the converging subgroups of the variable "Currency Outside Banking System / Base Money" (COBS/BM) and the converging subgroups of the growth rates of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

5th Dataset

Comparison of the "Currency Outside Banking System / Base Money" (COBS/BM) levels subgroups with the GDP growth rates subgroups

1		2		3		4	
Belgium	1	United States	1	Australia	1	Un. Kingdom	1
Malta	1	Sweden	1	Netherlands	1	Nepal	2
Spain	1	Canada	1	India	2	Sudan	3
		Switzerland	1	Côte d'Ivoire	3	Mali	n
		France	1	Chad	4		
		Pakistan	2	Niger	5		
		Mexico	2				
		Central African Republic	5				
		Sierra Leone	5				
		Togo	5				
		Burundi	5				
		Burkina Faso	n				
		Syria	n				

5		6		7		8	
S. Arabia	1	Israel	1	Gabon	1	Korea	1
Finland	1	Gambia	3	Greece	1	Philippines	3
N. Zealand	1	Kenya	4	Barbados	3	Jordan	n
Tanzania	2	Malawi	4			Suriname	n
Morocco	3						

9		10		11		n	
Cyprus	1	Bahrain	1	Iceland	1	Portugal	1
Samoa	3	Germany	1	Trinidad & Tobago	2	Denmark	1
Algeria	n	Egypt	2	Dominican Rep.	2	Singapore	1
		Jamaica	2	Costa Rica	2	Japan	1
		Paraguay	n	Honduras	n	Mauritius	1
						Italy	1
						Qatar	1
						Ireland	1
						Tunisia	2
						Sri Lanka	2
						South Africa	2
						Thailand	2
						Turkey	2
						Malaysia	2
						El Salvador	2
						Benin	3
						Madagascar	3
						Congo	4
						Rwanda	4
						Ghana	n
						Nigeria	n
						Senegal	n
						Fiji	n
						Cameroon	n
						Ethiopia	n
						Guatemala	n
						Uruguay	n
						Ecuador	n

In the above table we present a comparison between the converging subgroups of the variable "Currency Outside Banking System / Base Money" (COBS/BM) and the converging subgroups of the growth rates of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Comparison of the "Currency Outside Banking System / Base Money" (COBS/BM) levels subgroups with the GDP levels subgroups

1		2		3		4	
Belgium	1	United States	1	Australia	1	Un. Kingdom	1
Malta	2	Sweden	1	Netherlands	1	Mali	8
Spain	2	Canada	1	India	6	Nepal	8
		Switzerland	1	Chad	9	Sudan	8
		France	1	Niger	9		
		Mexico	4	Côte d'Ivoire	e		
		Pakistan	7				
		Burkina Faso	8				
		Central African Republic	9				
		Sierra Leone	9				
		Togo	9				
		Burundi	9				
		Syria	n				
5		6		7		8	
S. Arabia	2	Israel	1	Gabon	3	Korea	2
Finland	2	Kenya	8	Greece	3	Jordan	6
N. Zealand	2	Gambia	9	Barbados	8	Philippines	6
Morocco	6	Malawi	9			Suriname	n
Tanzania	9						
9		10		11		n	
Cyprus	1	Germany	1	Iceland	1	Denmark	1
Samoa	7	Bahrain	2	Trinidad & Tobago	3	Singapore	1
Algeria	9	Egypt	5	Costa Rica	4	Japan	1
		Paraguay	5	Honduras	7	Italy	1
		Jamaica	5	Dominican Rep.	n	Qatar	1
						Ireland	1
						Portugal	2
						Mauritius	2
						Uruguay	3
						Malaysia	3
						Tunisia	4
						South Africa	4
						Thailand	4
						Sri Lanka	5
						Fiji	5
						Ecuador	5
						El Salvador	5
						Guatemala	6
						Cameroon	7
						Ghana	8
						Nigeria	8
						Senegal	8
						Benin	8
						Congo	8
						Rwanda	8
						Madagascar	9
						Ethiopia	9
						Turkey	n

In the above table we present a comparison between the converging subgroups of the variable "Currency Outside Banking System / Base Money" (COBS/BM) and the converging subgroups of the levels of the per capita GDP. The correspondence between the subgroups of the two variables is not clear and as a result the extraction of any conclusion is not possible by this comparison.

Summary of Results

Summarizing the analysis of the results, we report the 5 main findings:

1. The convergence in the GDP levels and the convergence in the levels of the variable Private seem to occur simultaneously. This is more obvious at the richest countries, whereas for the less rich countries it is not so clear, possible due to the fact that the means of the per capita GDP of these countries are very close each other.

2. The convergence in the GDP growth rates and the convergence in the levels of the variable Private also seem to occur simultaneously, although in this case the results of the comparison are not so clear.

3. The convergence in the GDP growth rates and the convergence in the levels of the variable Stock Market Turnover Ratio seem to occur simultaneously.

4. Furthermore, the convergence in the GDP growth rates and the convergence in the levels of the variable Stock Market Total Value Traded also seem to occur simultaneously.

5. Finally, the convergence in the GDP levels and the convergence in both the levels of the variables Stock Market Turnover Ratio and Stock Market Total Value Traded do not have any common pattern. In addition, the convergence in the variable "Currency Outside Banking System / Base Money" (COBS/BM) does not seem to have any commonality with the convergence in both the rates and the levels of the per capita GDP. The results from the third and the fourth dataset are not so clear, probably due to the limited number of countries that are included in these datasets.

The above findings may have two different interpretations according to the literature. The first possible interpretation is that the magnitude of the private credit which allocated through the commercial banks in relation to the GDP and the liquidity of the stock markets, are some of the determinant factors of the economic development and as a result, when these variables converge across countries, the per capita income also tends to converge.

The second possible interpretation is that the per capita income, the magnitude of the private credit which allocated through commercial banks in relation to the GDP and the liquidity of the stock markets, are jointly determined and consequently these when we observe convergence in one of these variables across some countries, the rest of the variables also converge in the same countries.

The fact that the variables Private, Stock Market Turnover Ratio and Stock Market Total Value Traded seem to have same converging pattern with the per capita GDP, is in accordance with Levine and Zervos (1996) who find that these three variables are positively and robustly correlated with the rate of economic growth.

Furthermore, independently of which of the two above possible interpretations is valid, it is sure that there is a positive relation between the financial development, as it is represented by these three variables, and the economic development. This positive relationship leads the converging pattern of the variables to be similar.

8. Conclusion

As we have already mentioned, the economic growth literature suggests financial development as a possible determinant factor of the economic growth process. The financial systems, through a number of functions, facilitate and accelerate the economic development. In a large number of studies growth models that included the financial sector were developed and furthermore in a large number of empirical studies the positive and significant correlation between financial development and economic growth was confirmed.

As a consequence we should expect that across countries of which the per capita income converges (either in the levels either in the growth rates) the financial development (or at least some aspects of it) would also converges. The reverse case must also be valid.

What we did in the present study was to examine if the above assumption is valid or not. We employed the new methodology of Phillips and Sul, to test for the existence of convergence. This methodology works with a large variety of data, independently of their nature; it takes into account the possible heterogeneity across the sample and finally it allows for the detection of converging subgroups, if there is not convergence in the full sample. All the above characteristics of this method made it the appropriate method for the purposes of our study.

We used variables that capture a broad spectrum of the functions of a financial system. These variables were derived from the "World Bank's Financial Development and Structure Database" and were also used in other studies. Furthermore we created 5 different datasets in order to have more comparable results.

Our results confirm our expectation that there would not be convergence in the full sample of any variable, including the GDP. The countries were classified in a number of converging subgroups, whereas a number of countries do not converge at all.

The analysis of our results for the third, the fourth and the fifth datasets, did not lead to any conclusion about the coincidence of convergence between the income and the financial variables. However the analyses of the two first datasets lead to some worth mentioning conclusions.

The variable Private which equals the credit allocated through the commercial banks and other financial intermediaries to private firms, divided by the GDP, seems to converge

across countries for which both the levels and the growth rates of the per capita GDP, also converges. The evidence is stronger in the case of the levels of the per capita GDP. This result indicates that in countries that the private credit as a percentage of GDP is high in relation to that of other countries, the per capita GDP would also be higher of that of other countries. Of course this result is not absolute, but generally is valid.

The variables Stock Market Turnover Ratio and Stock Market Total Value Traded which equal the total value of domestic shares traded divided by market capitalization and the total value of domestic shares traded divided by the GDP, respectively, represent the stock market liquidity of a country. Both of them seem to converge across countries for which the growth rates of the per capita GDP, also converges. In contrast to the variable Private, in this case the coincidence of convergence seems to occur only with the GDP growth rates and not with the levels of the GDP. However, the higher levels of these variables are related with the growth rates of the richest countries of the sample and as a result it safe enough to connect the levels of the liquidity variables with the absolute value of the per capita GDP. Consequently, these results indicate that in countries that the stock market liquidity is high in relation to that of other countries, the per capita GDP would also be higher of that of other countries. As we have aforementioned, this result is not absolute, but generally is valid.

Further investigation of the issue of the convergence in income, could employ data of bond markets. We did not include this type of data due to limitations on the number of the available observations. Moreover the investigation could include other types of data related with political factors or institutional quality.

As a conclusion we can mention that our results are in accordance with the part of the literature which finds a positive and robustly connection between the financial development and the economic development.

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Appendix A

In this Appendix we report the countries that consist each of the five datasets.

1st Dataset

Ireland, Norway, United States, Mauritius, New Zealand, Australia, Cyprus, United Kingdom, Finland, Canada, Sweden, Italy, Denmark, Japan, Portugal, Switzerland, Malta, Singapore, India, Greece, Thailand, Malaysia, Dominican Republic, Sri Lanka, Egypt, Panama, Costa Rica, Gabon, Fiji, Pakistan, Ecuador, Paraguay, Venezuela, Jamaica, El Salvador, Syria, Barbados, Cote d`Ivoire, Burundi, Niger, Gambia, Madagascar, Cameroon, Ghana, Honduras, Nepal, Guatemala, Philippines, Burkina Faso, Nigeria, Sierra Leone, Kenya, Ethiopia, Senegal, Suriname, Trinidad & Tobago, Mexico.

2nd Dataset

Korea, Taiwan, Singapore, Trinidad &Tobago, Hong Kong, Portugal, Spain, United Kingdom, Norway, Australia, United States, Austria, Netherlands, Belgium, Israel, Japan, France, Canada, Greece, Germany, Finland, Italy, Sweden, Denmark, New Zealand, Thailand, Malaysia, Chile, South Africa, Argentina, Indonesia, Sri Lanka, Egypt, Turkey, Jamaica, Colombia, Morocco, Philippines, Mexico, Brazil, Peru, Jordan, Nigeria, Cote d`Ivoire, Luxembourg, India, Tunisia, Pakistan.

3rd Dataset

Singapore, Norway, Australia, United States, Japan, Portugal, United Kingdom, Canada, Finland, Italy, Sweden, Denmark, New Zealand, Thailand, Malaysia, Greece, Sri Lanka, Trinidad &Tobago, Egypt, India, Pakistan, Jamaica, Philippines, Mexico, Nigeria, Cote d`Ivoire.

4th Dataset

United Kingdom, Australia, Canada, Denmark, Thailand, Malaysia, Sri Lanka, India, Trinidad &Tobago, Greece, Finland, New Zealand, Portugal, Egypt, United States, Japan, Pakistan, Italy, Jamaica, Philippines, Nigeria.

5th Dataset

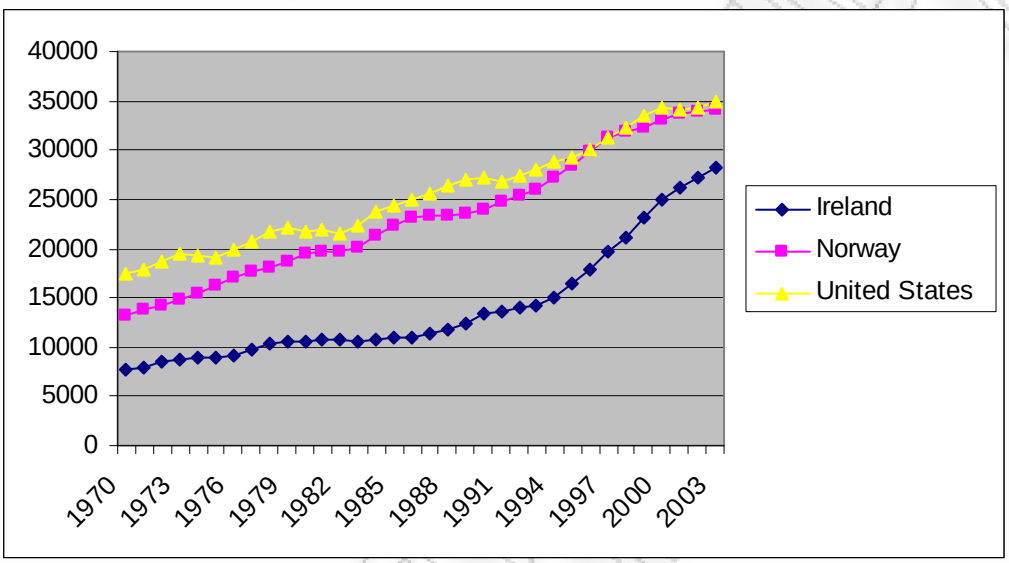
Finland, Italy, Iceland, Sweden, Denmark, New Zealand, Bahrain, Switzerland, Qatar, Saudi Arabia, Gabon, Thailand, Malaysia, India, Tanzania, Sri Lanka, Trinidad &Tobago, Egypt, Dominican Republic, Tunisia, Nepal, Costa Rica, Turkey, Pakistan, El Salvador, Jamaica, South Africa, Mexico, Morocco, Philippines, Sudan, Barbados, Benin, Samoa, Gambia, Cote d`Ivoire, Madagascar
Rwanda, Kenya, Malawi, Chad, Congo, Central African Republic, Togo, Burundi, Niger, Sierra Leone, Mali, Ethiopia, Suriname, Ghana, Burkina Faso, Uruguay, Nigeria, Algeria, Fiji, Syria, Guatemala, Honduras, Senegal, Paraguay, Ecuador, Cameroon, Jordan.

Appendix B

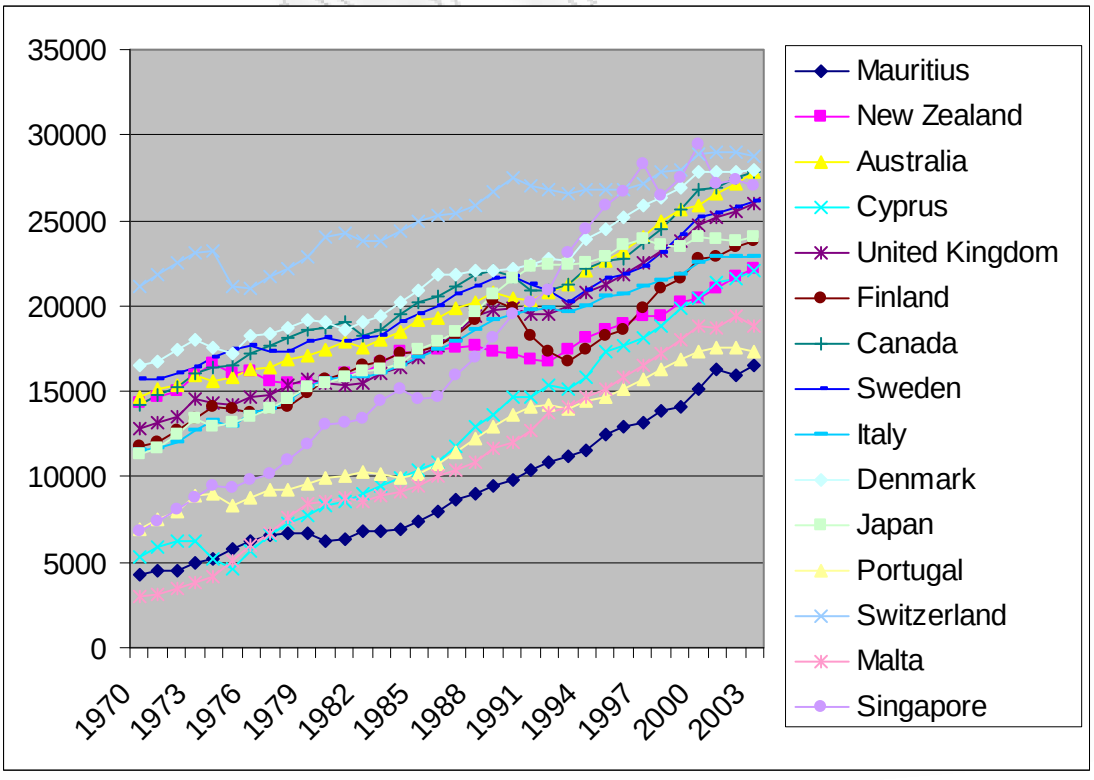
1st dataset: GDP and Private

Converging subgroups of the growth rates of GDP

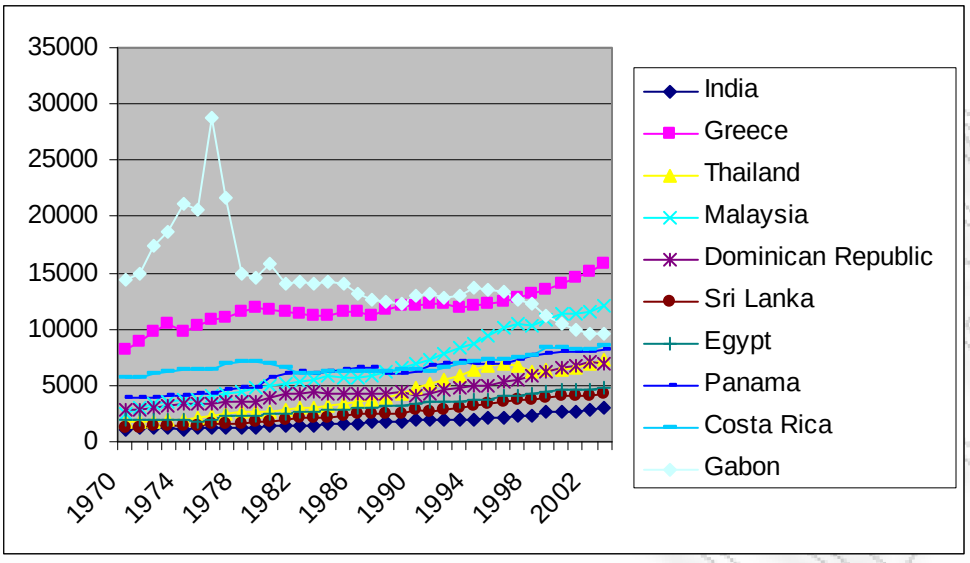
1st dataset - 1st subgroup - growth rates of GDP



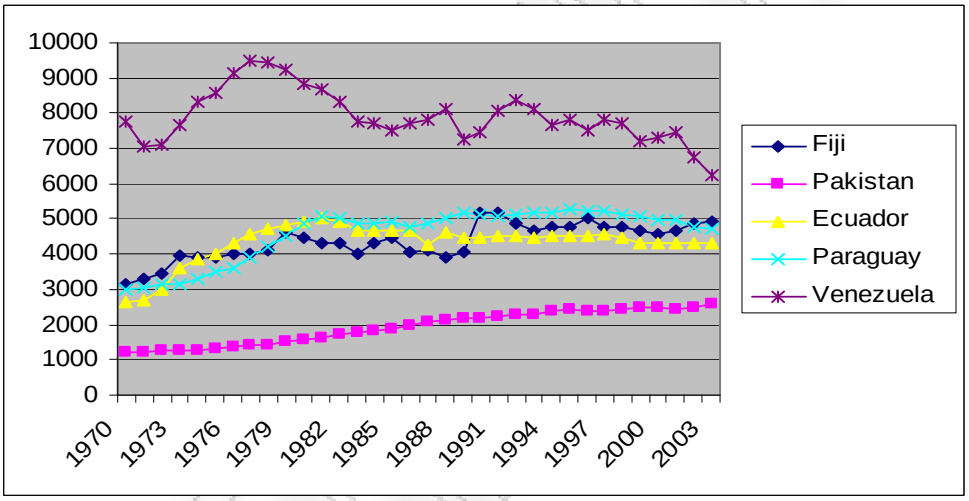
1st dataset - 2nd subgroup - growth rates of GDP



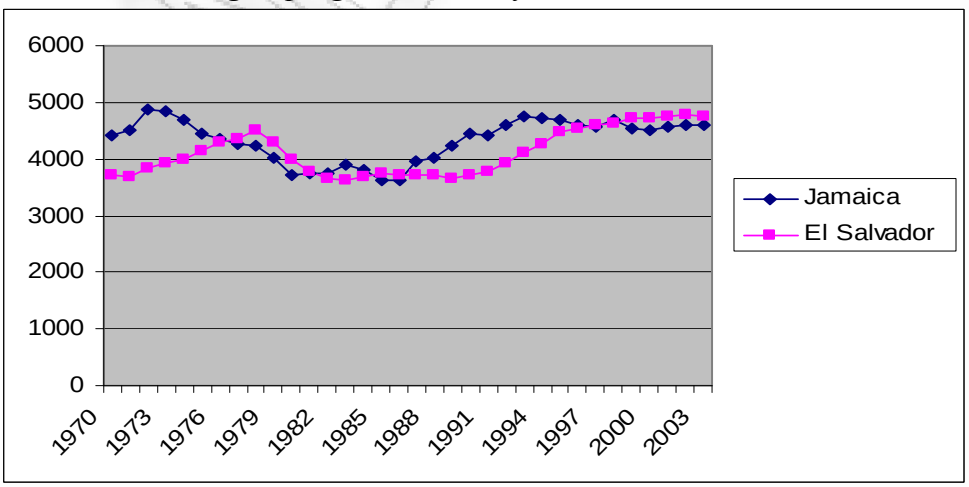
1st dataset - 3rd subgroup - growth rates of GDP



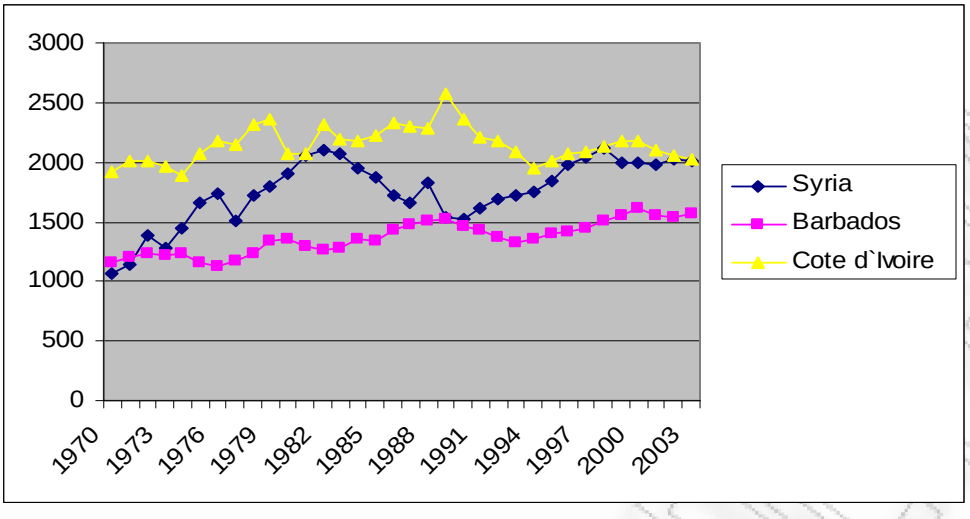
1st dataset - 4th subgroup - growth rates of GDP



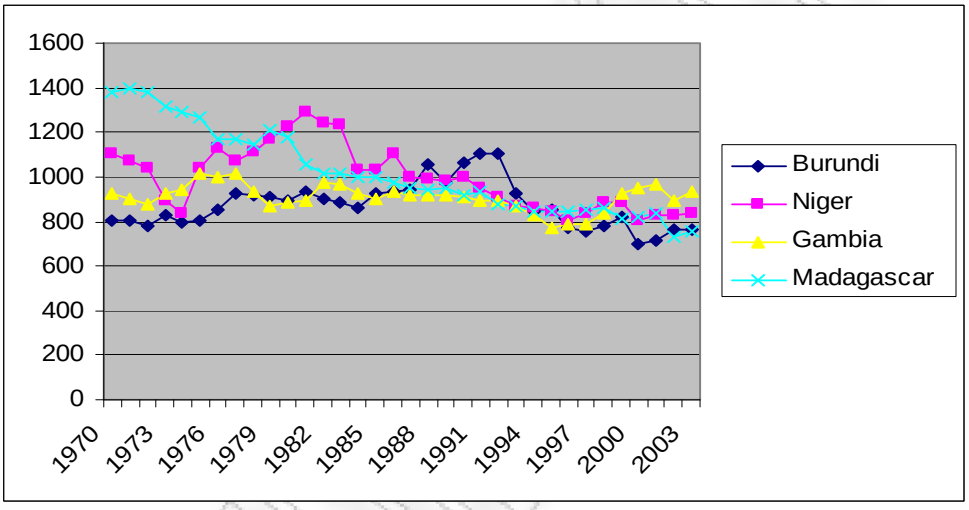
1st dataset -5th subgroup - growth rates of GDP



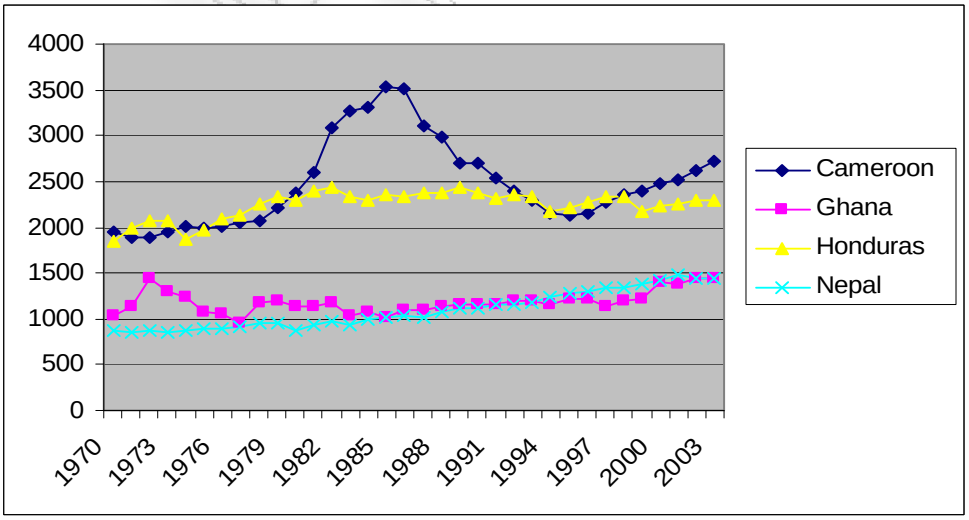
1st dataset - 6th subgroup - growth rates of GDP



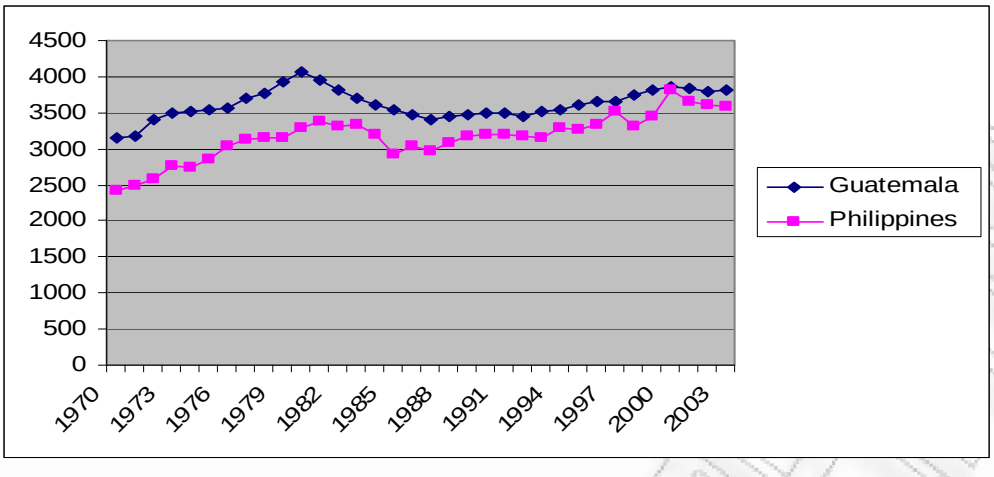
1st dataset - 7th subgroup - growth rates of GDP



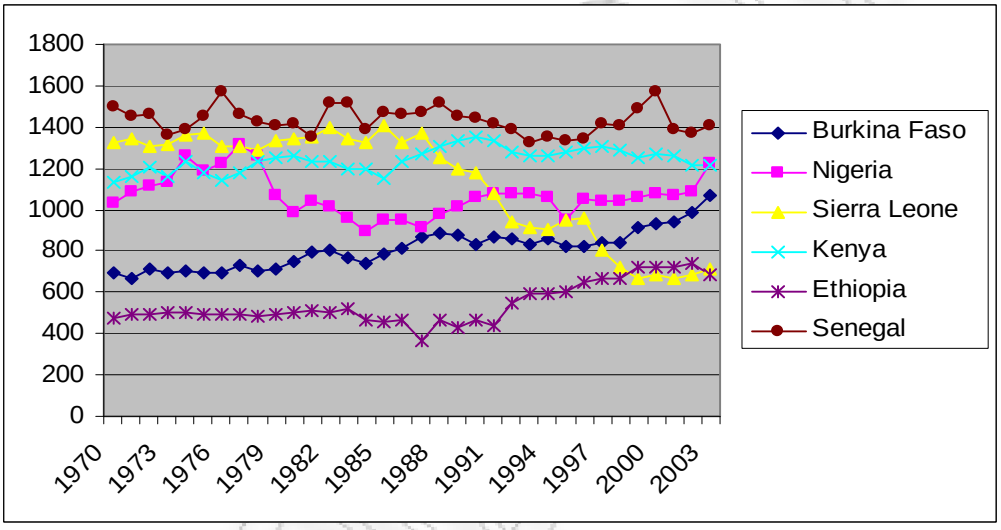
1st dataset - 8th subgroup - growth rates of GDP



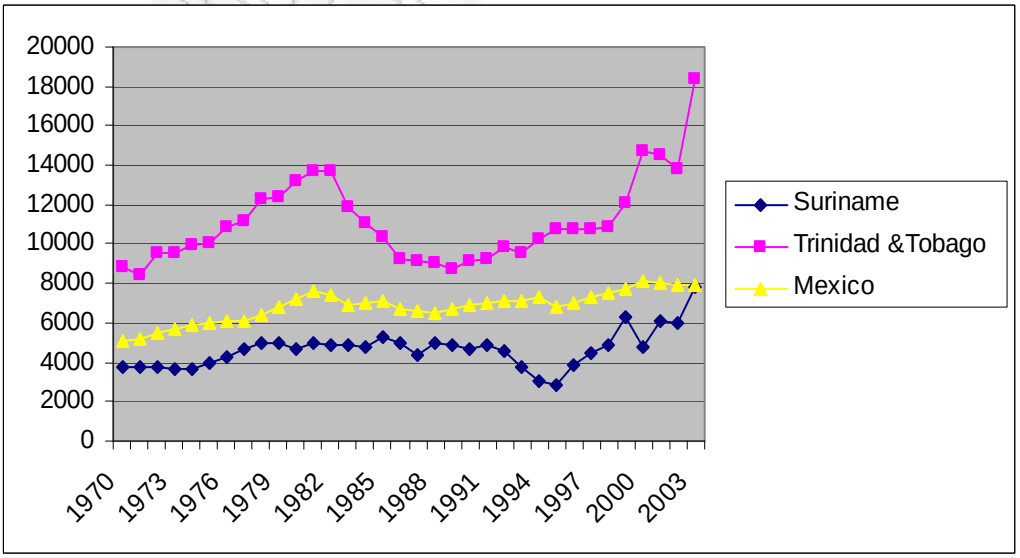
1st dataset - 9th subgroup - growth rates of GDP



1st dataset - 10th subgroup - growth rates of GDP

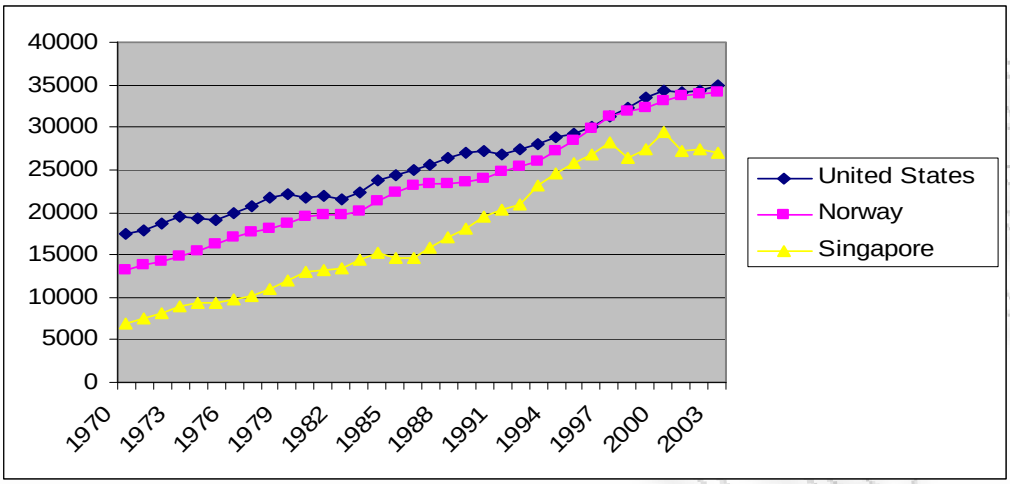


1st dataset – Non-converging countries - growth rates of GDP

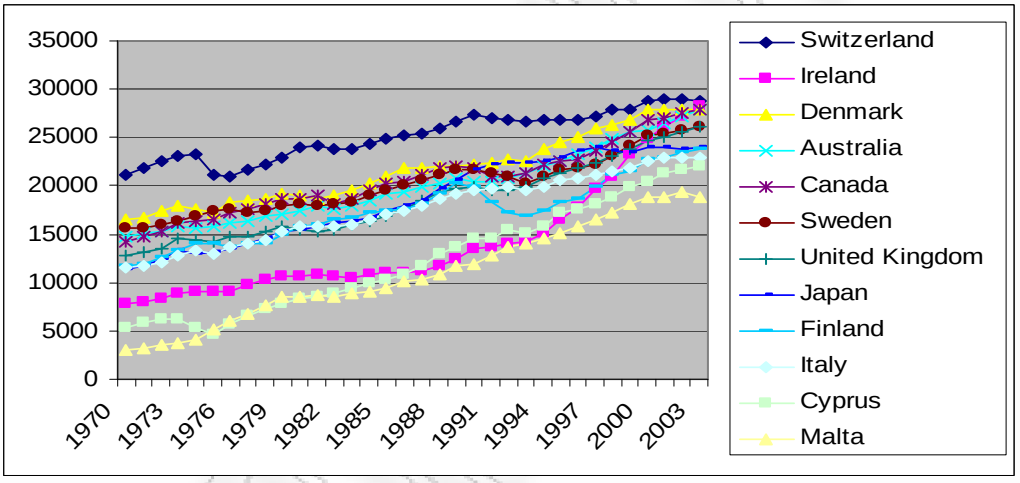


Converging subgroups of the levels of GDP

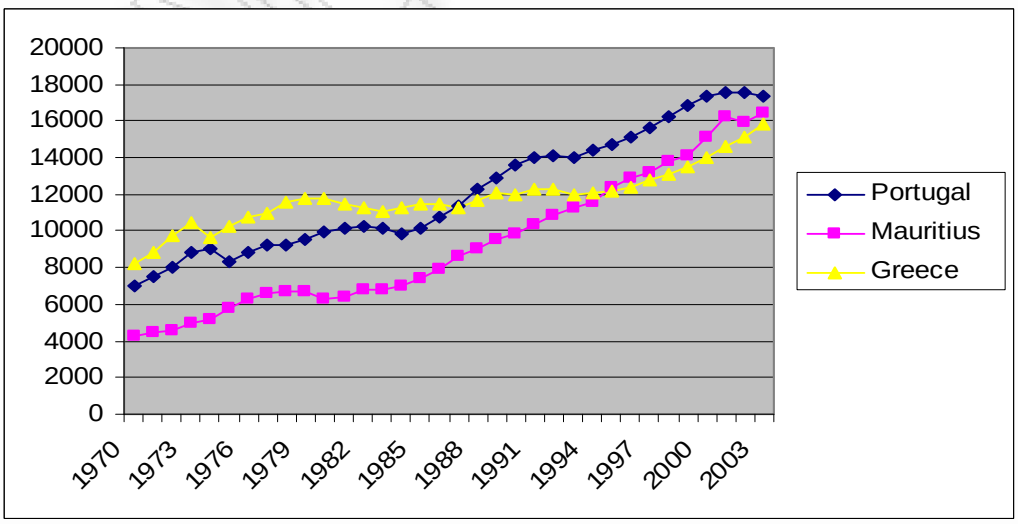
1st dataset - 1st subgroup - levels of GDP



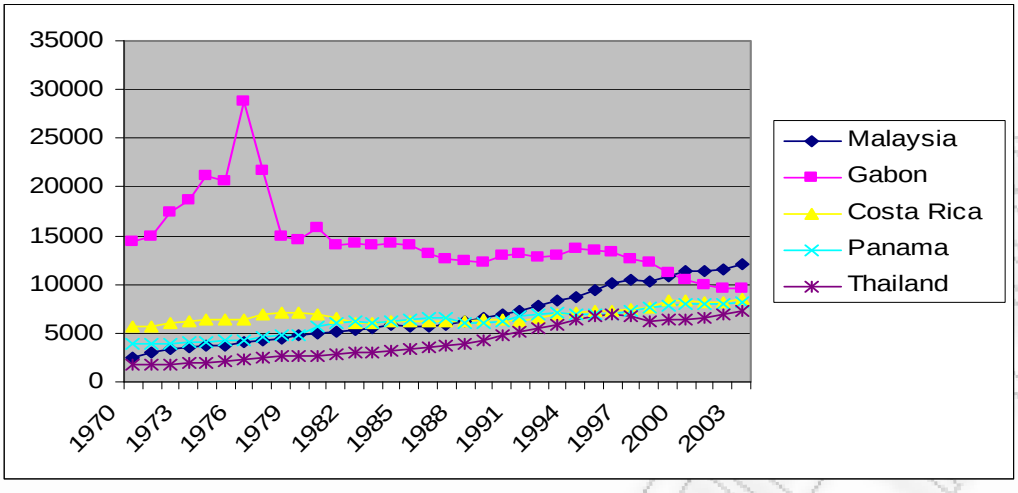
1st dataset – 2nd subgroup - levels of GDP



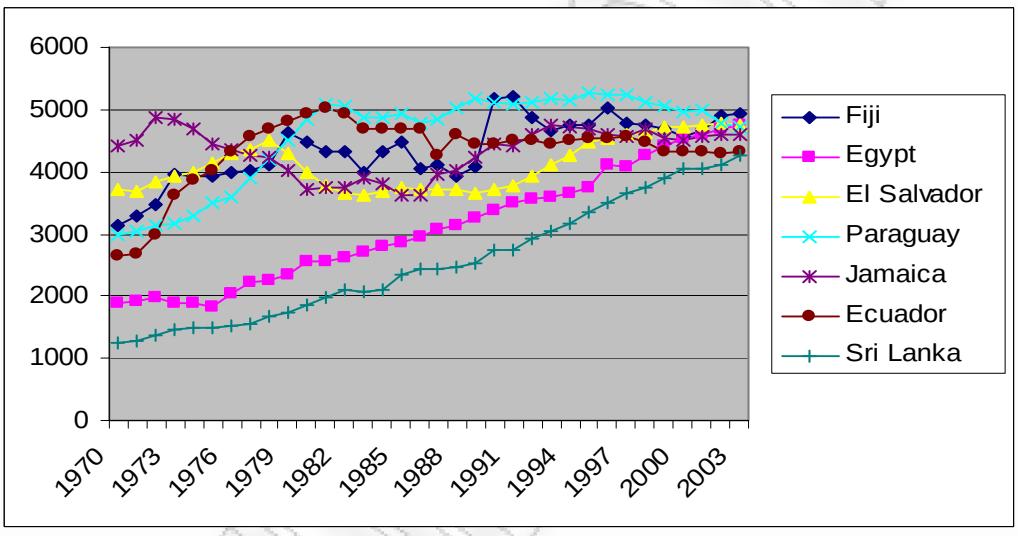
1st dataset – 3rd subgroup - levels of GDP



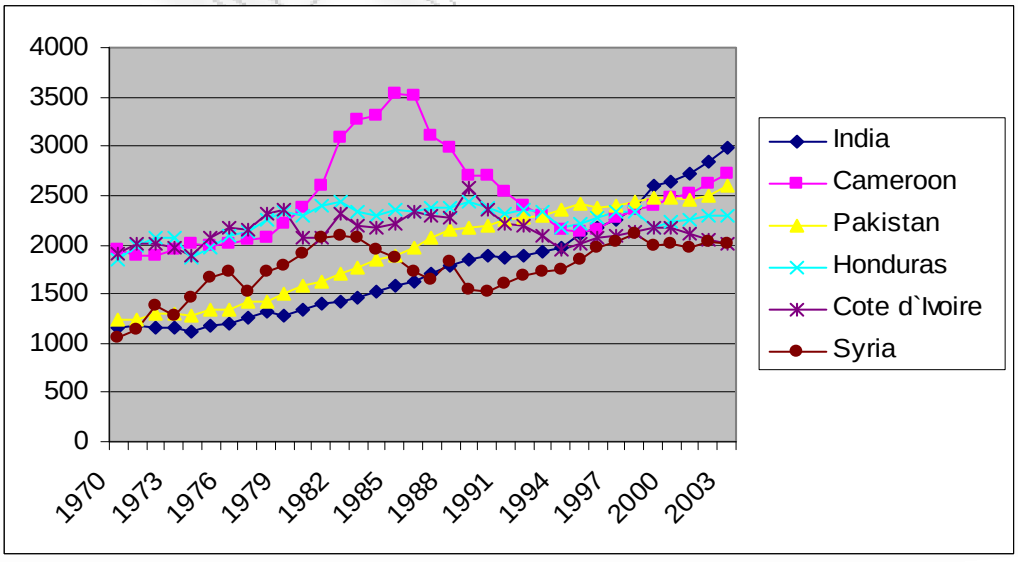
1st dataset – 4th subgroup - levels of GDP



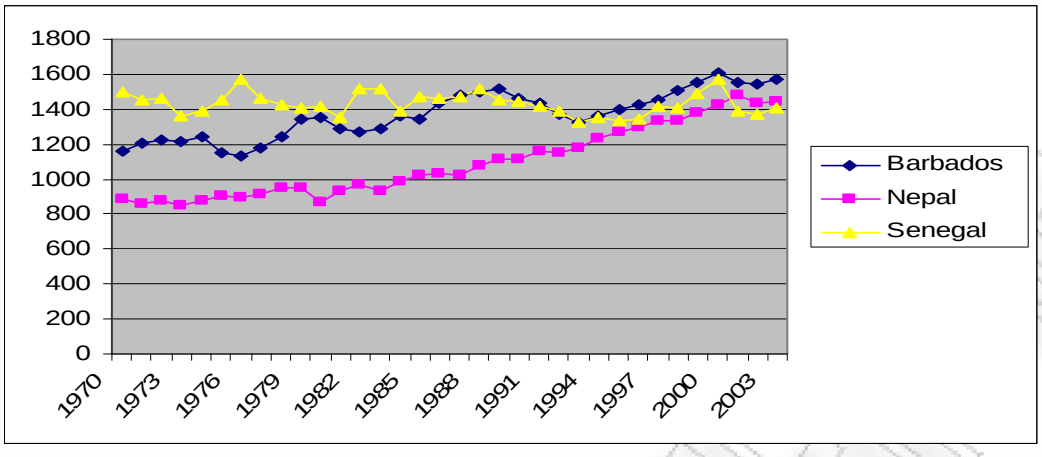
1st dataset – 5th subgroup - levels of GDP



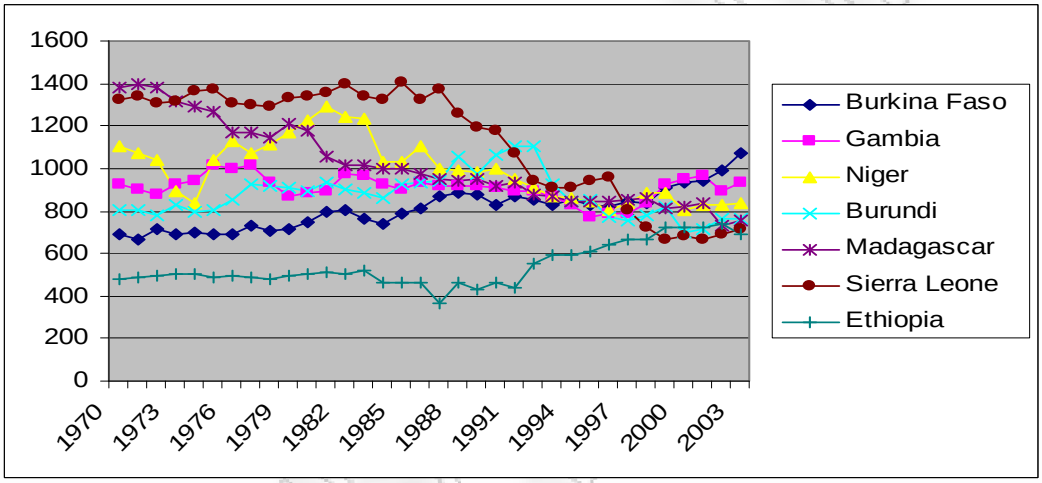
1st dataset – 6th subgroup - levels of GDP



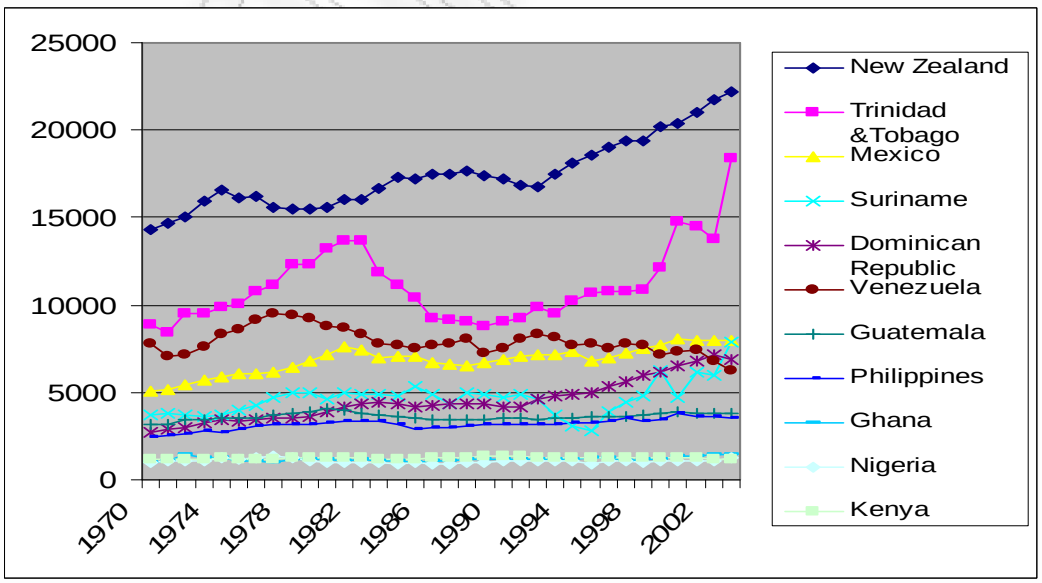
1st dataset – 7th subgroup - levels of GDP



1st dataset – 8th subgroup - levels of GDP

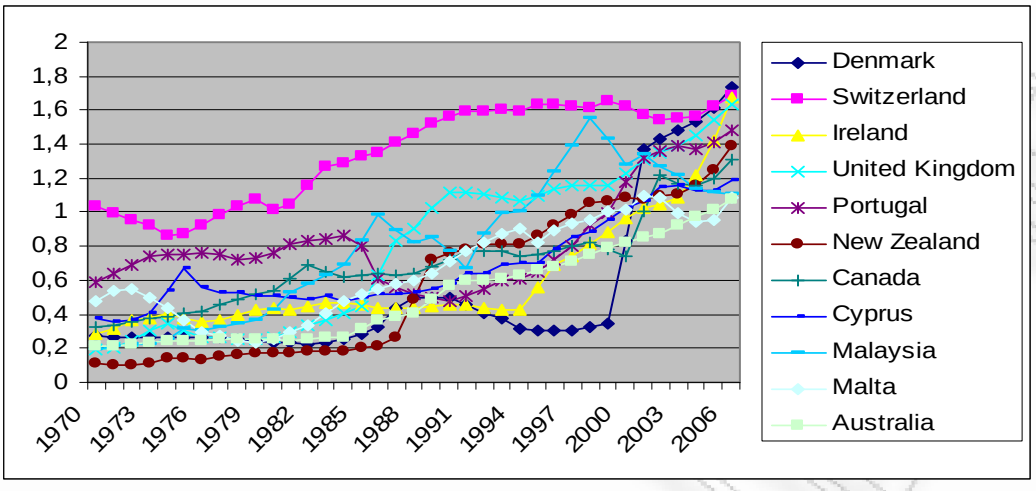


1st dataset – Non-converging countries - levels of GDP

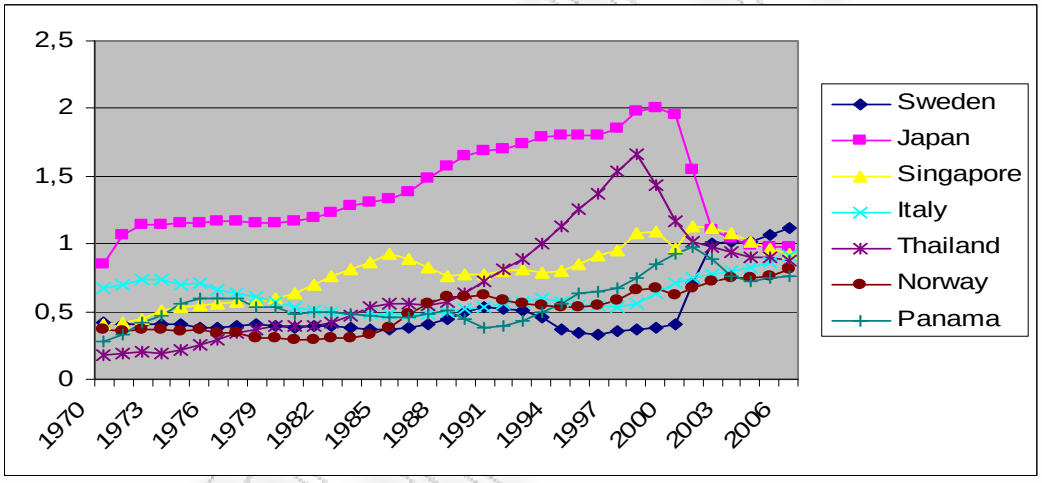


Convergence in the levels of the variable Private

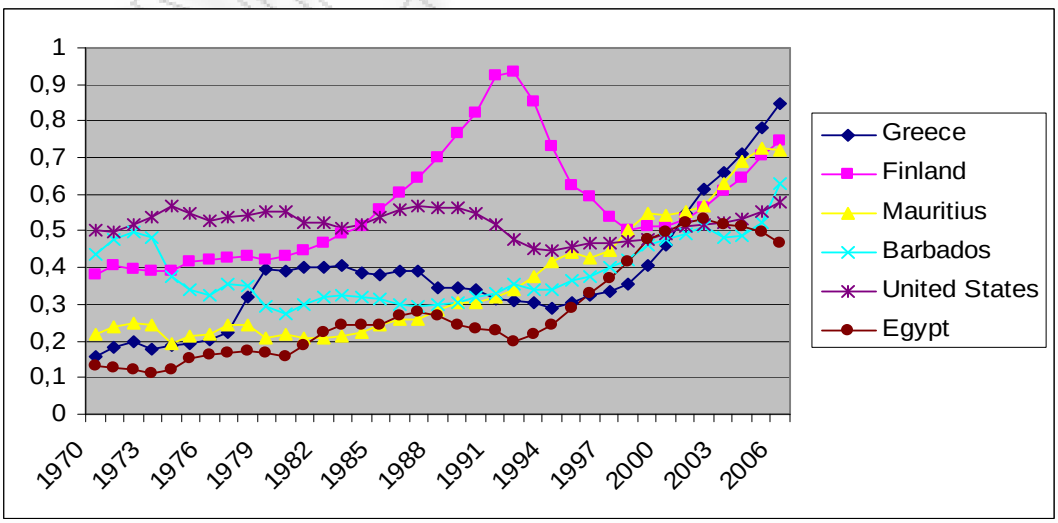
1st dataset – 1st subgroup - levels of the variable Private



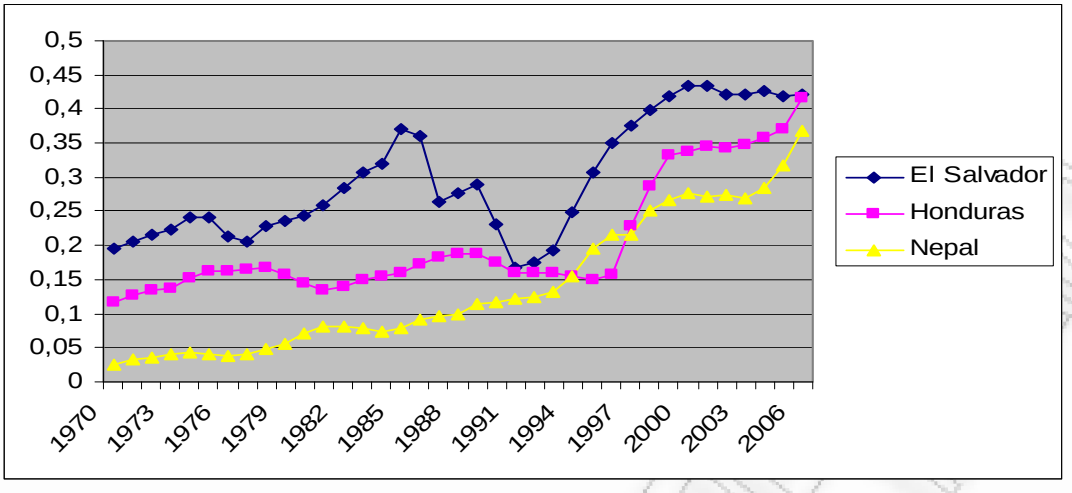
1st dataset – 2nd subgroup - levels of the variable Private



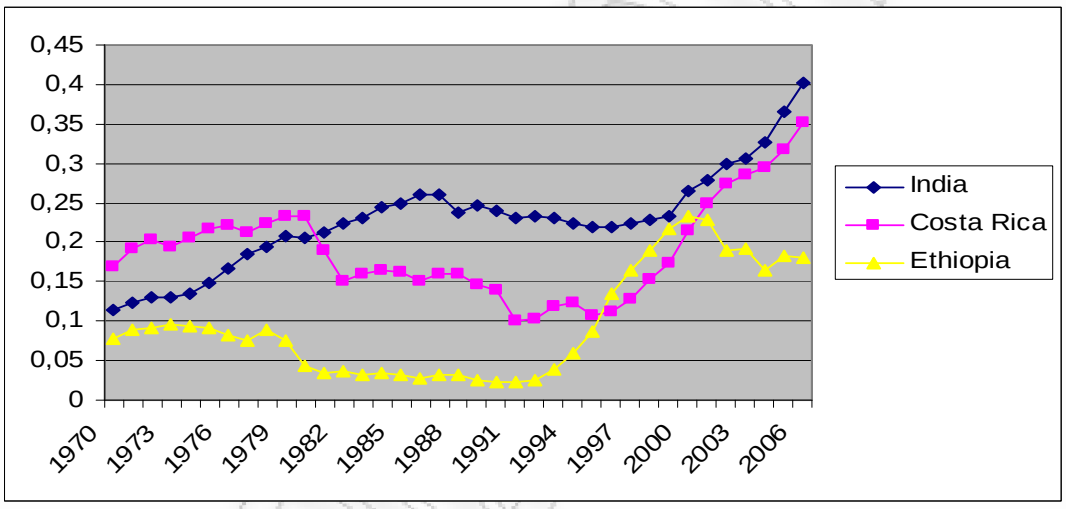
1st dataset – 3rd subgroup - levels of the variable Private



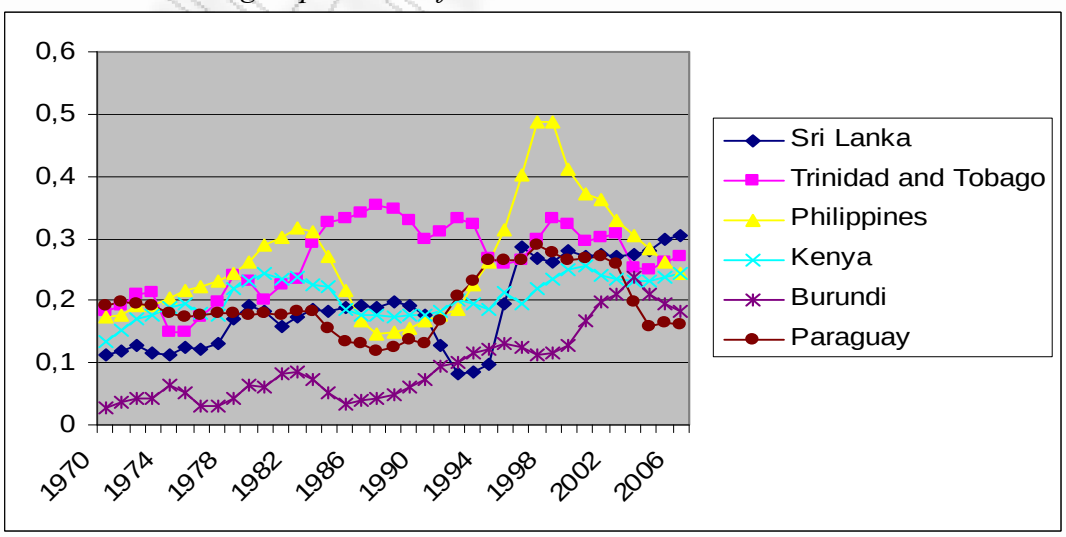
1st dataset – 4th subgroup - levels of the variable Private



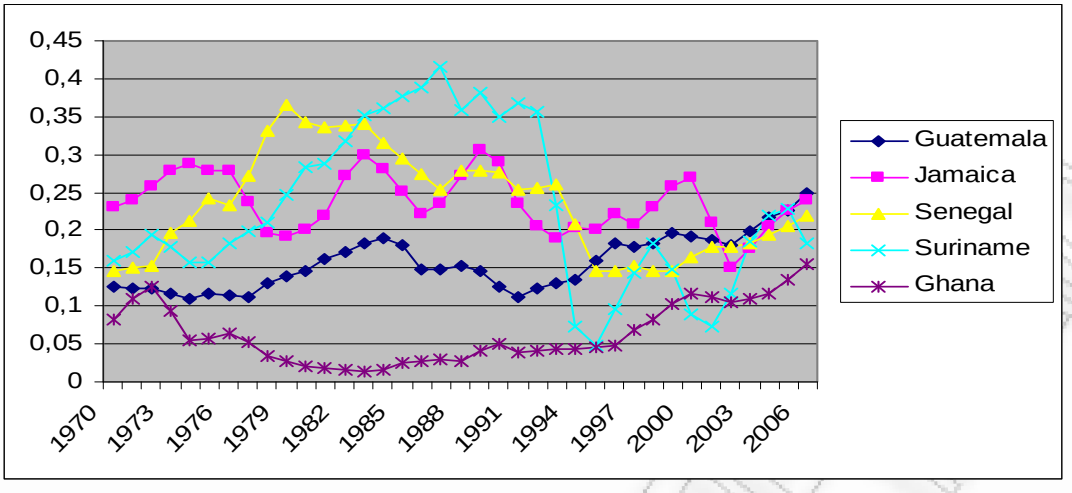
1st dataset – 5th subgroup - levels of the variable Private



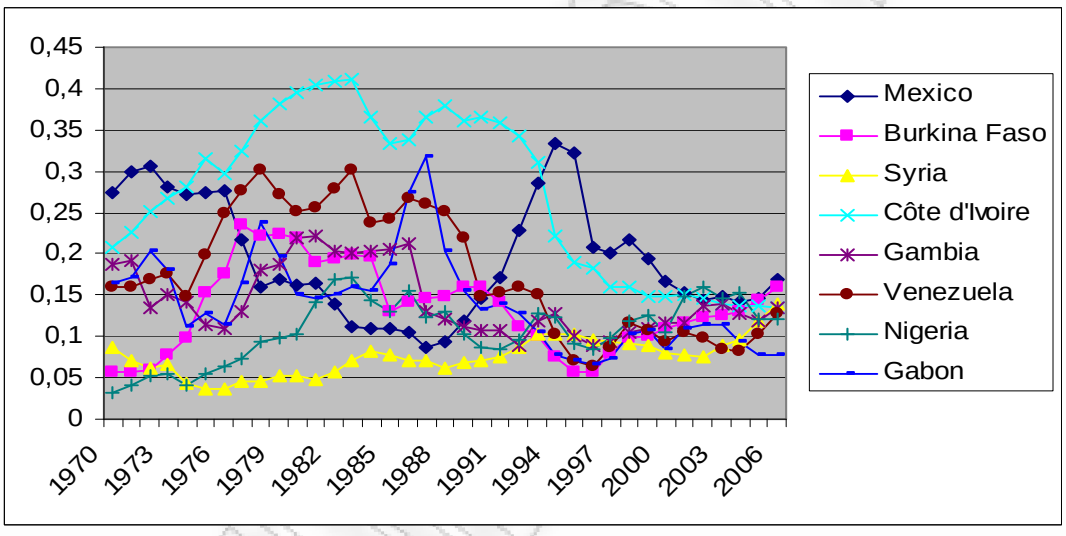
1st dataset – 6th subgroup - levels of the variable Private



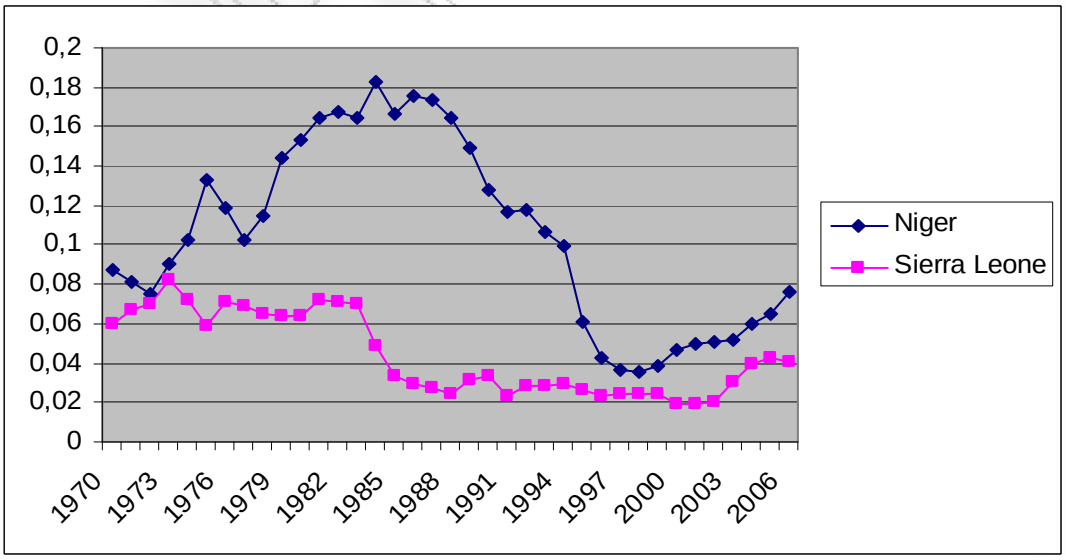
1st dataset – 7th subgroup - levels of the variable Private



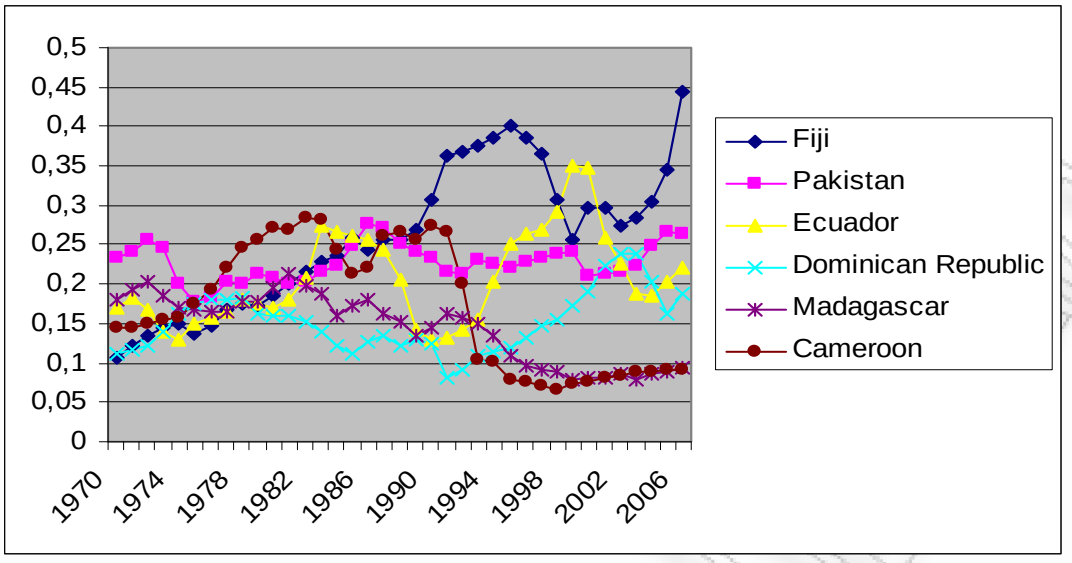
1st dataset – 8th subgroup - levels of the variable Private



1st dataset – 9th subgroup - levels of the variable Private



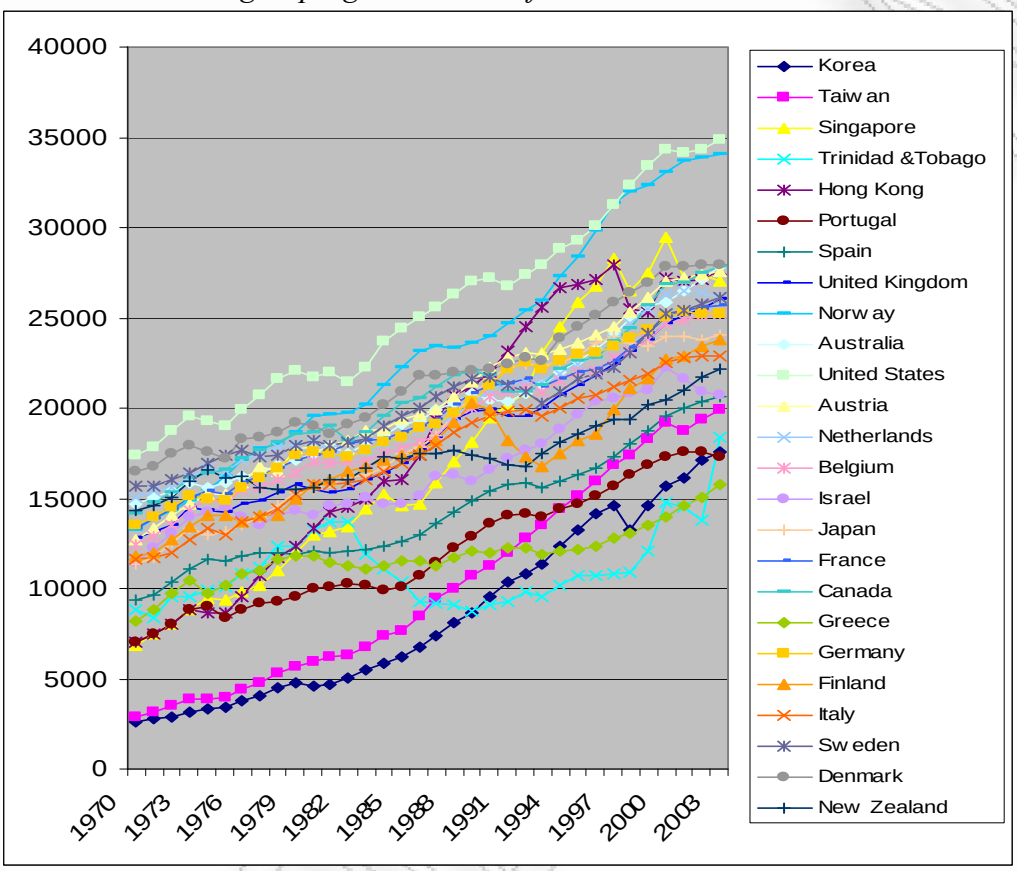
1st dataset – Non-converging countries - levels of the variable Private



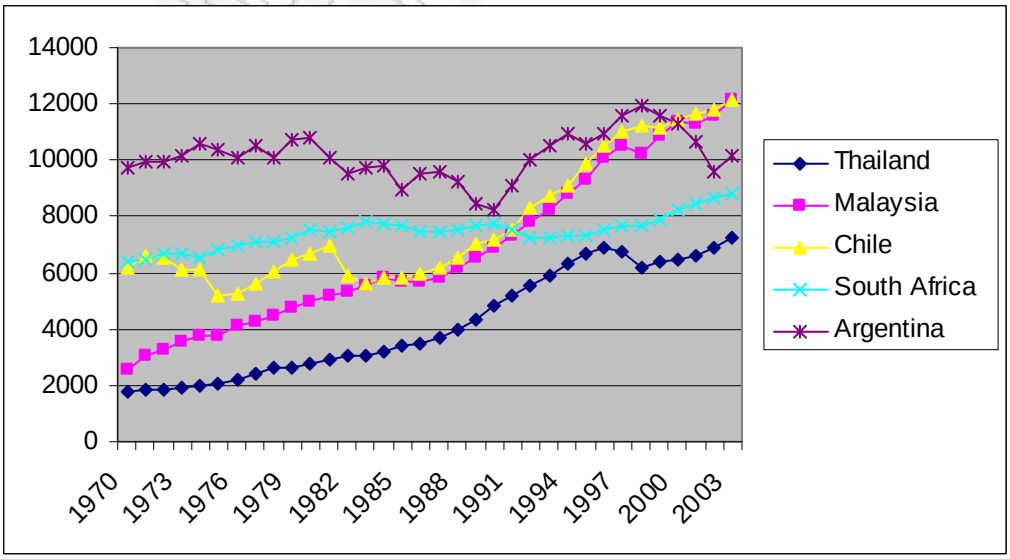
2nd dataset: GDP, Stock Market Total Value Traded and Stock Market Turnover Ratio

Converging subgroups of the growth rates of GDP

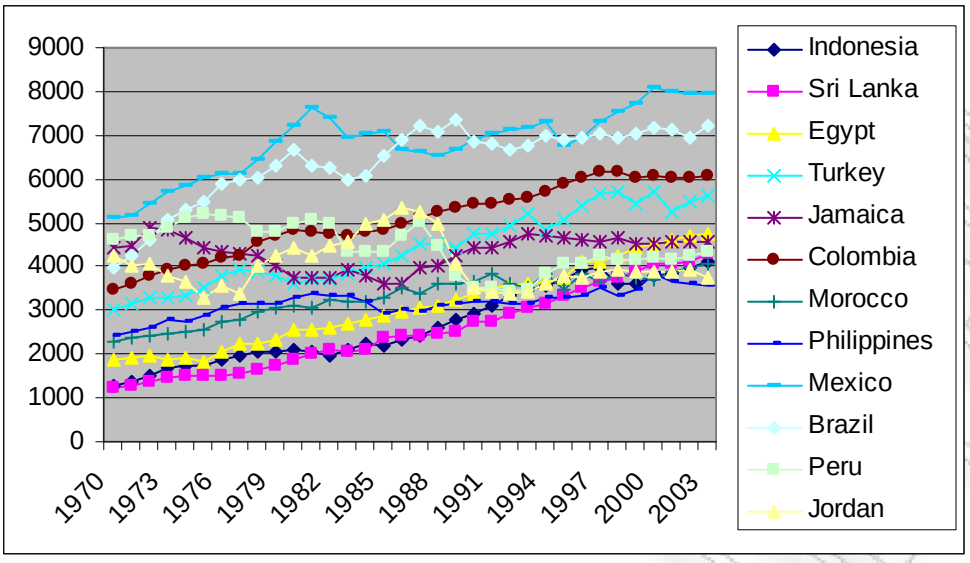
2nd dataset - 1st subgroup - growth rates of GDP



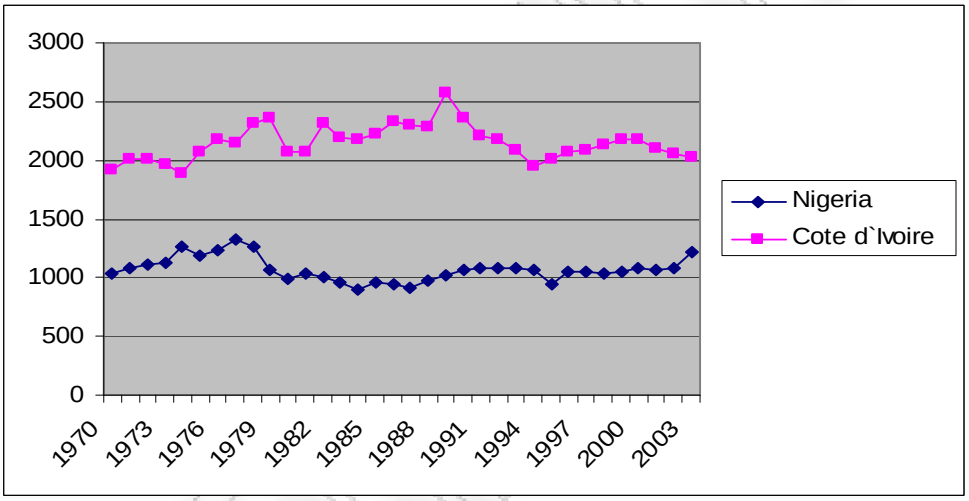
2nd dataset – 2nd subgroup - growth rates of GDP



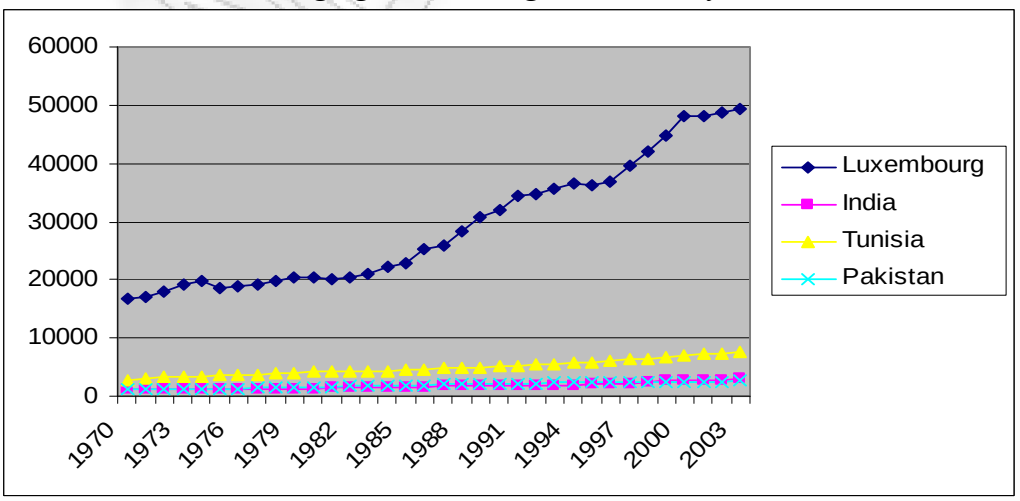
2nd dataset – 3rd subgroup - growth rates of GDP



2nd dataset – 4th subgroup - growth rates of GDP

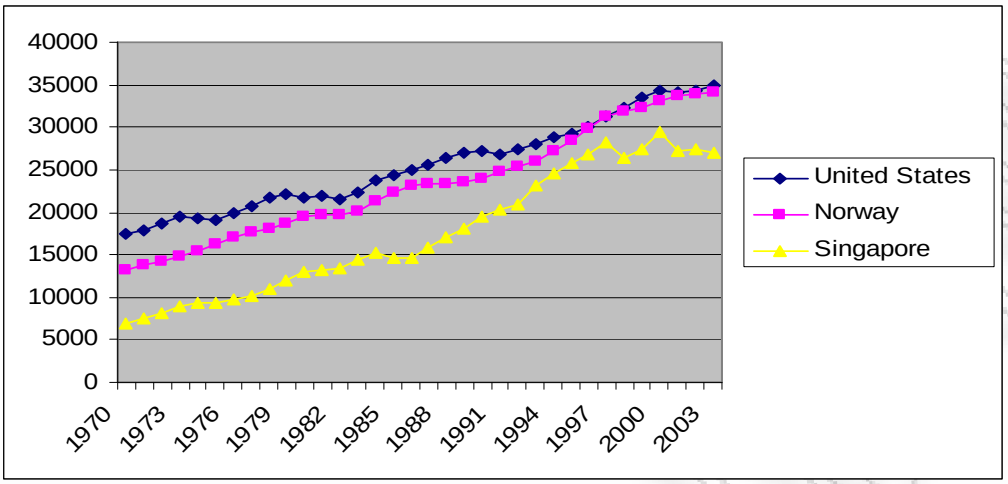


2nd dataset – Non-converging countries - growth rates of GDP

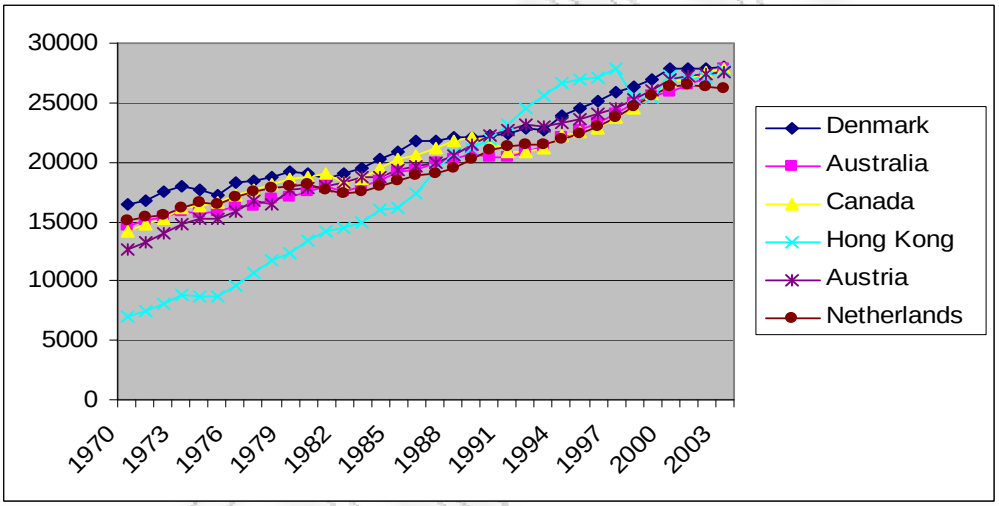


Converging subgroups of the levels of the GDP

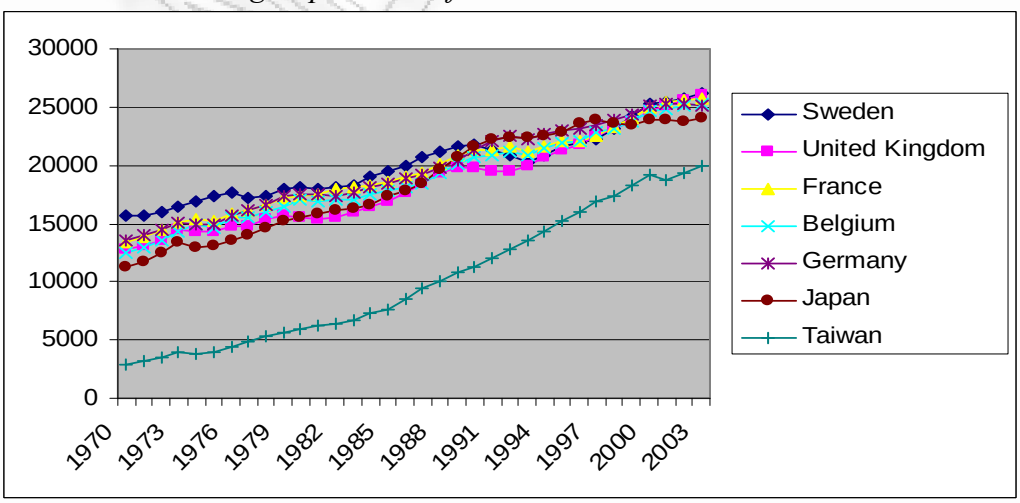
2nd dataset - 1st subgroup - levels of GDP



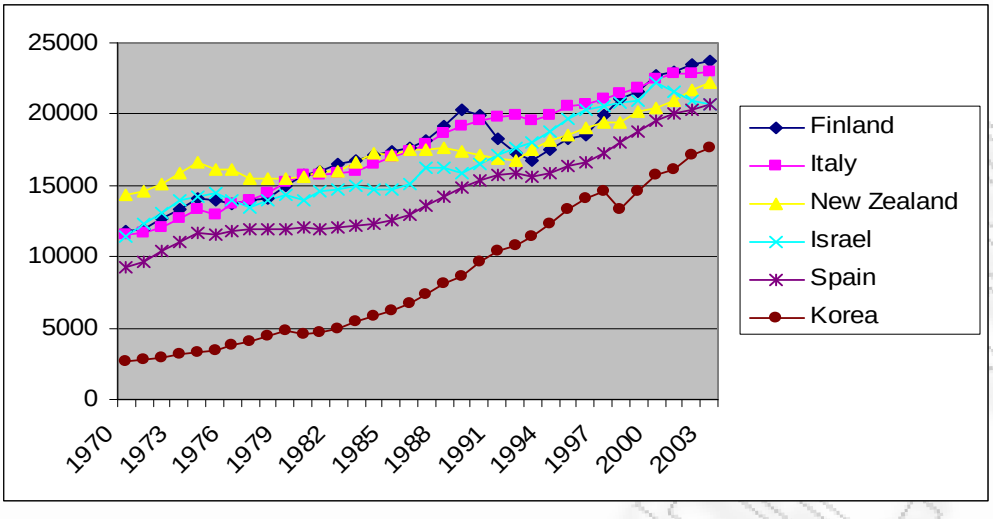
2nd dataset - 2nd subgroup - levels of GDP



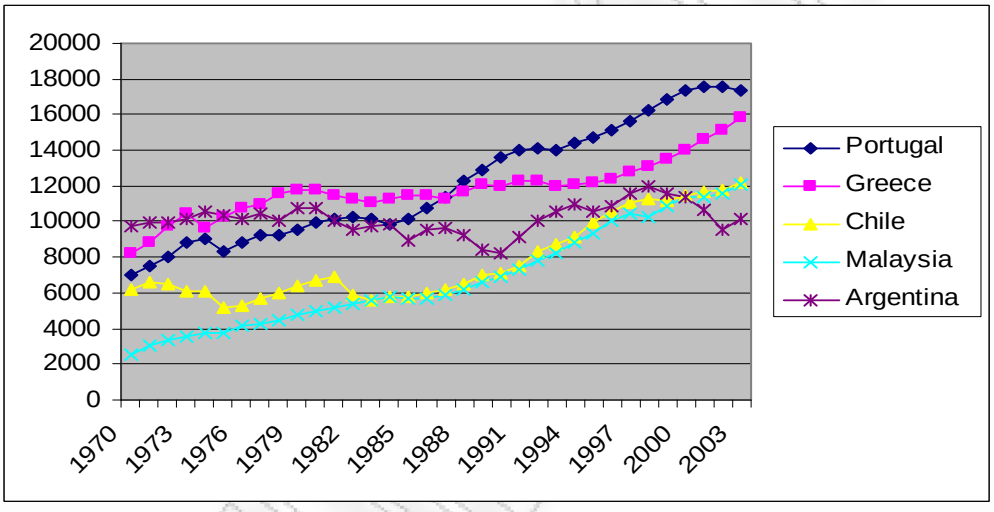
2nd dataset – 3rd subgroup - levels of GDP



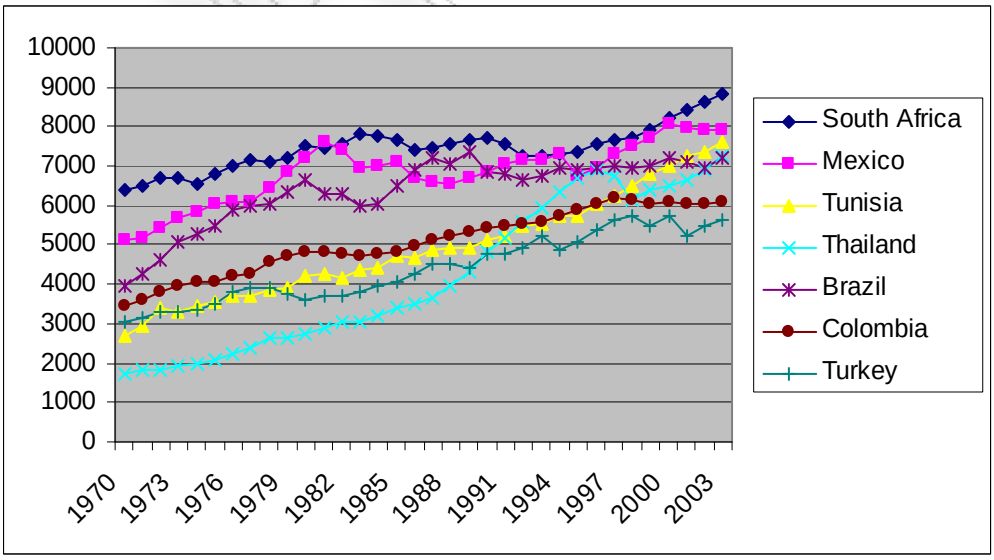
2nd dataset – 4th subgroup - levels of GDP



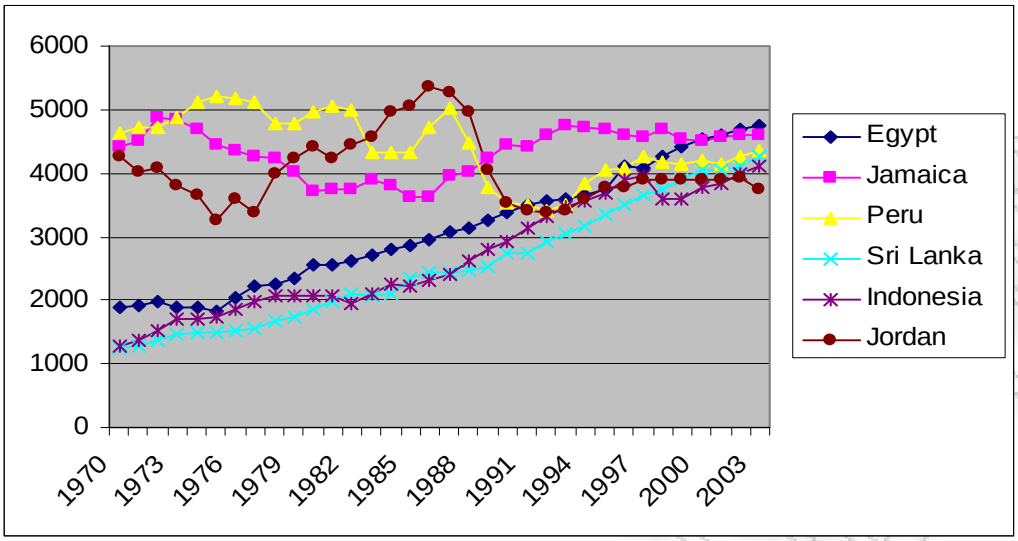
2nd dataset – 5th subgroup - levels of GDP



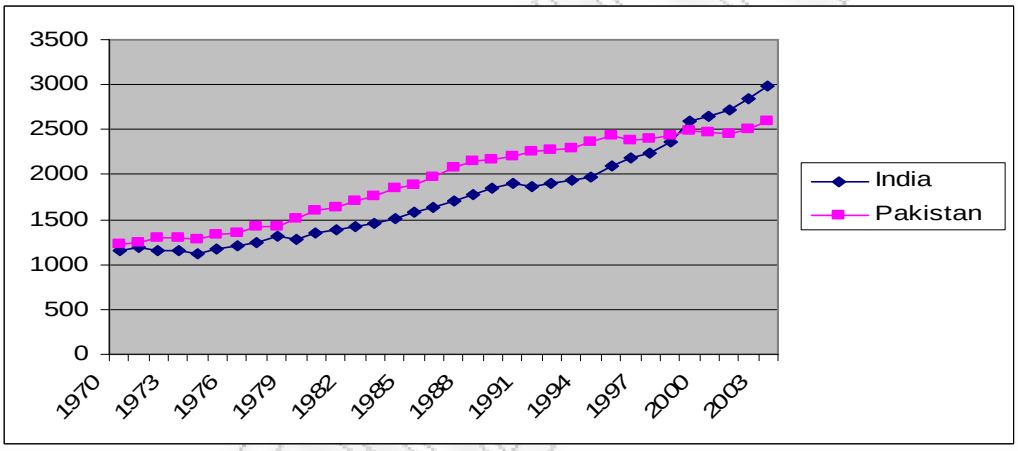
2nd dataset – 6th subgroup - levels of GDP



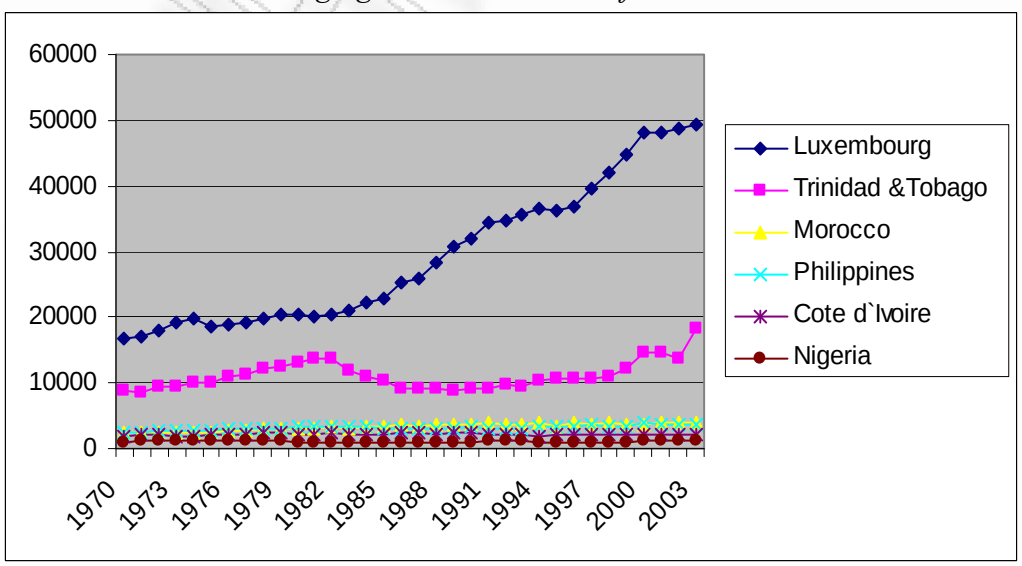
2nd dataset – 7th subgroup - levels of GDP



2nd dataset – 8th subgroup - levels of GDP

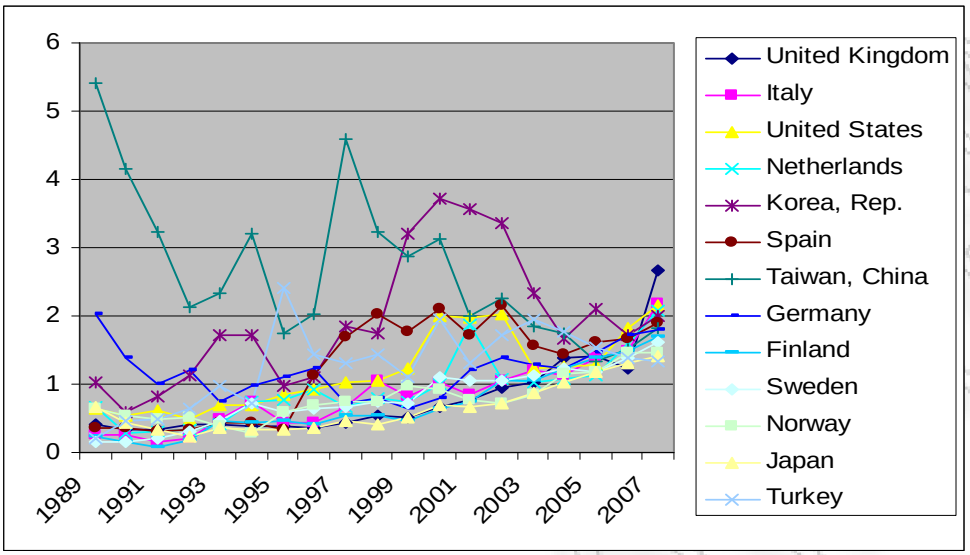


2nd dataset – Non-converging countries - levels of GDP

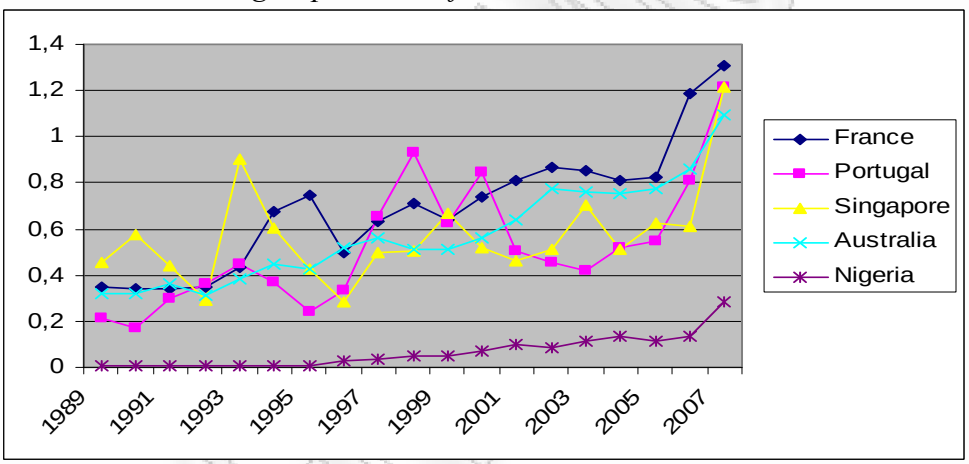


Convergence in the levels of the variable Stock Market Turnover Ratio

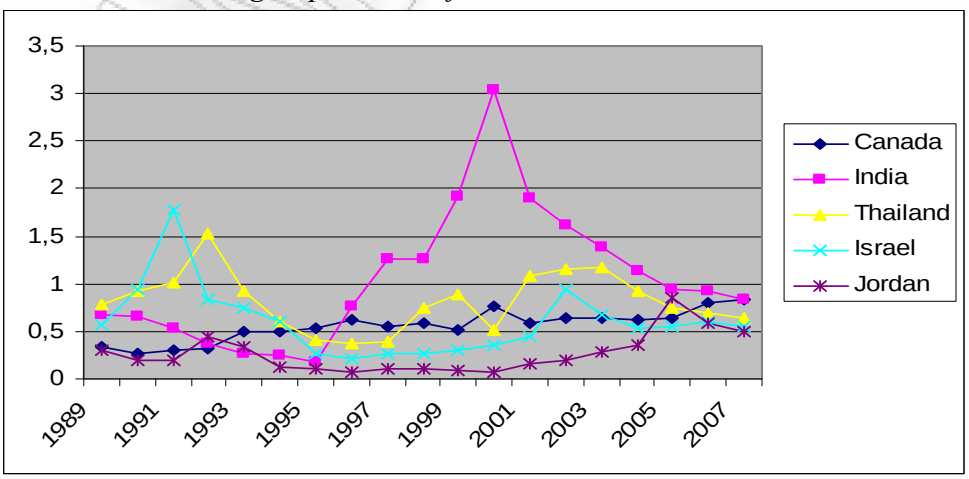
2nd dataset - 1st subgroup - levels of the variable Stock Market Turnover Ratio



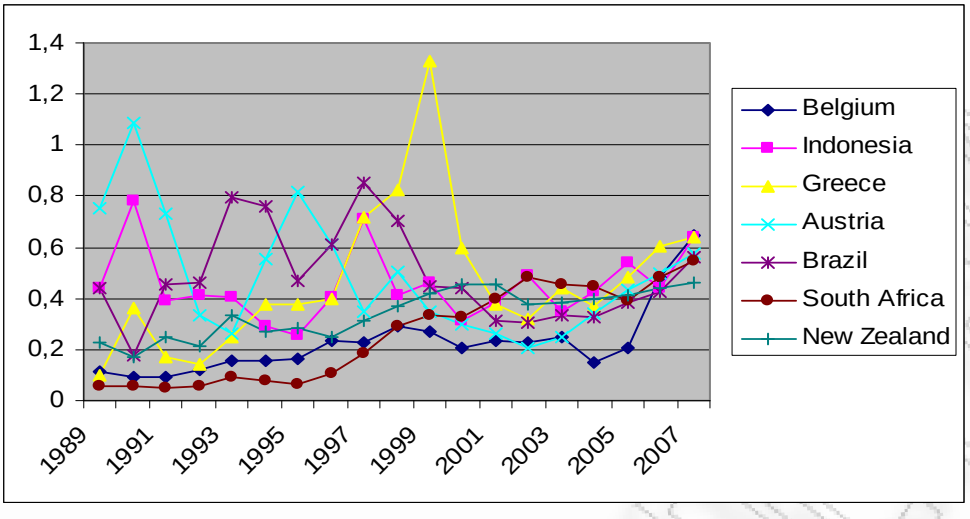
2nd dataset – 2nd subgroup - levels of the variable Stock Market Turnover Ratio



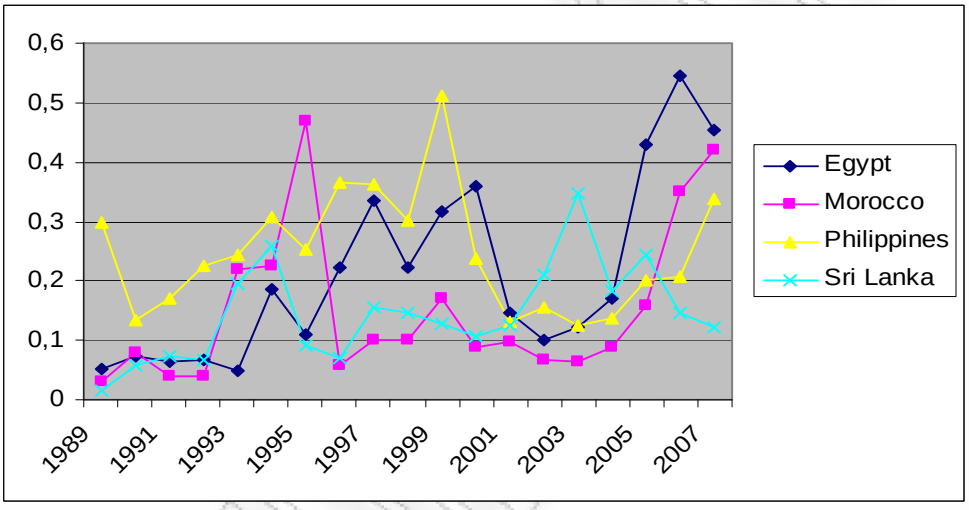
2nd dataset – 3rd subgroup - levels of the variable Stock Market Turnover Ratio



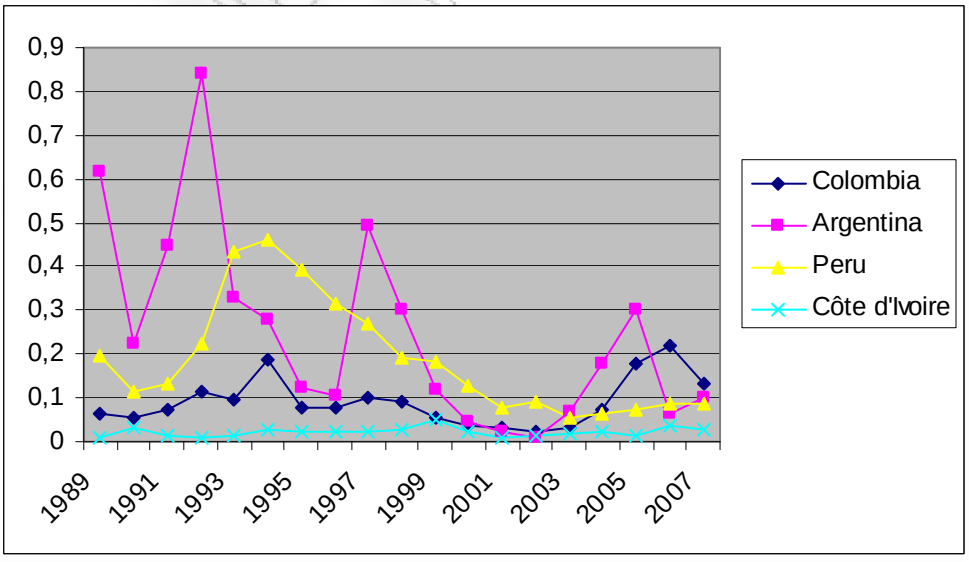
2nd dataset – 4th subgroup - levels of the variable Stock Market Turnover Ratio



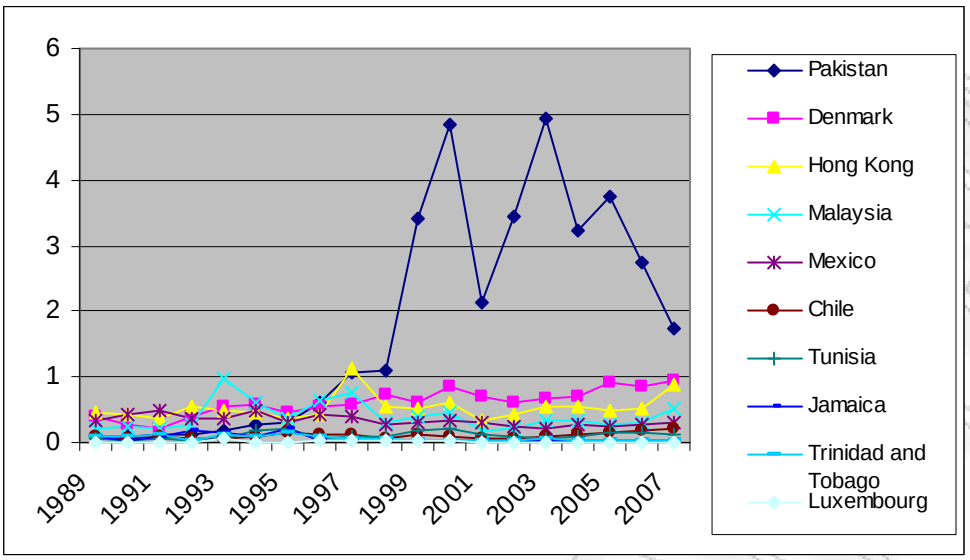
2nd dataset – 5th subgroup - levels of the variable Stock Market Turnover Ratio



2nd dataset – 6th subgroup - levels of the variable Stock Market Turnover Ratio

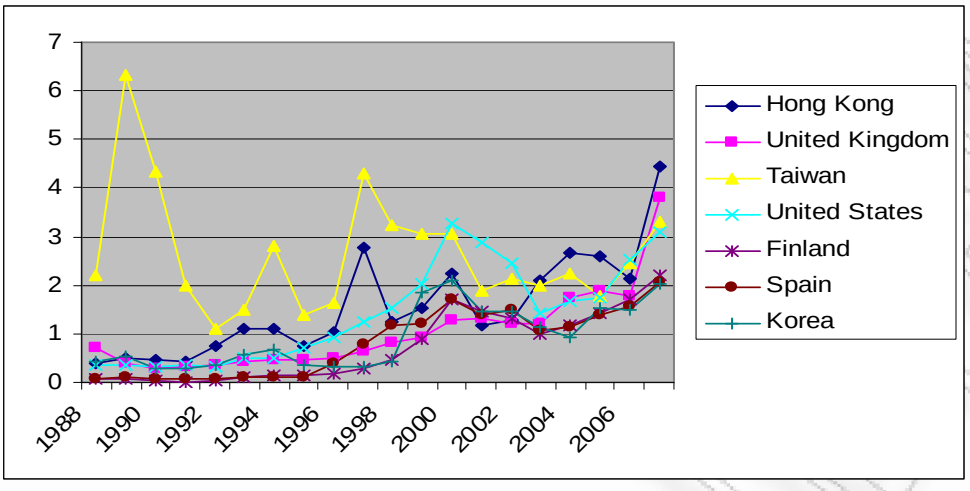


2nd dataset – Non-converging countries - levels of the variable Stock Market Turnover Ratio

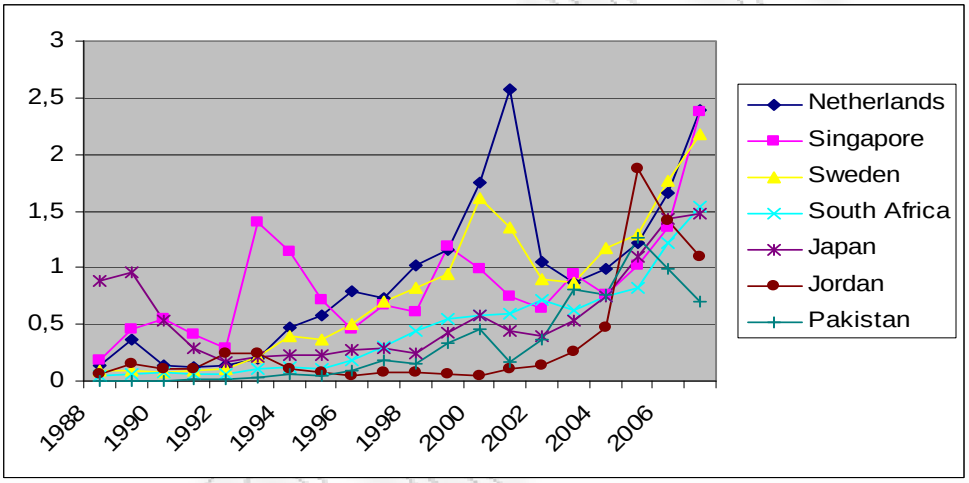


Convergence in the levels of the variable Stock Market Total Value Traded

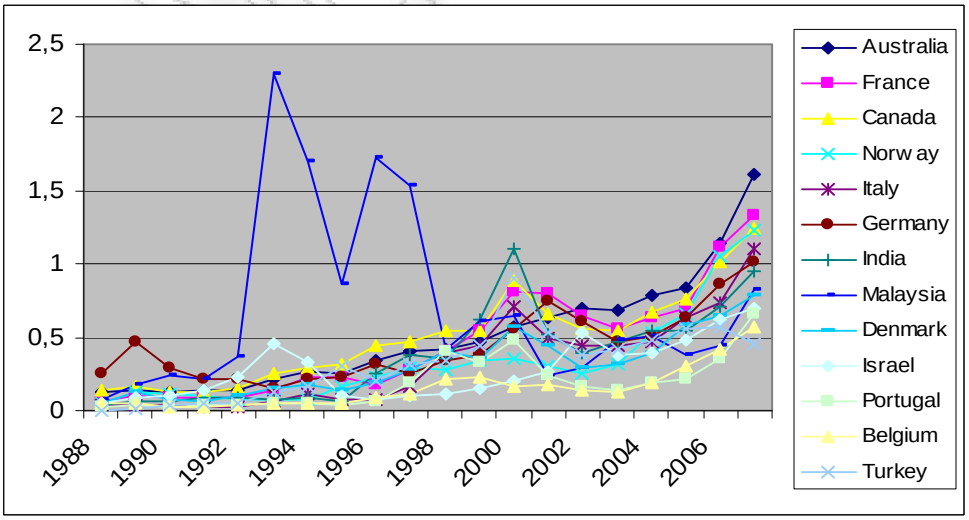
2nd dataset - 1st subgroup - levels of the variable Stock Market Total Value Traded



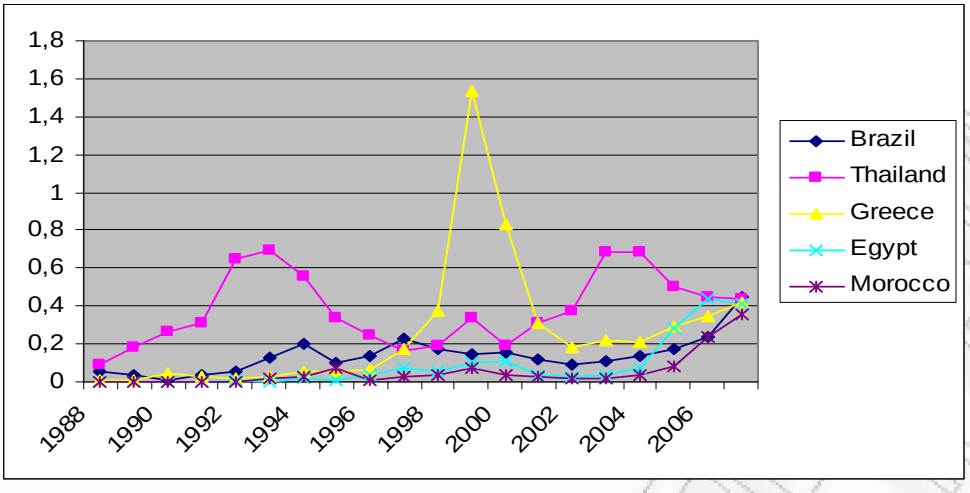
2nd dataset – 2nd subgroup - levels of the variable Stock Market Total Value Traded



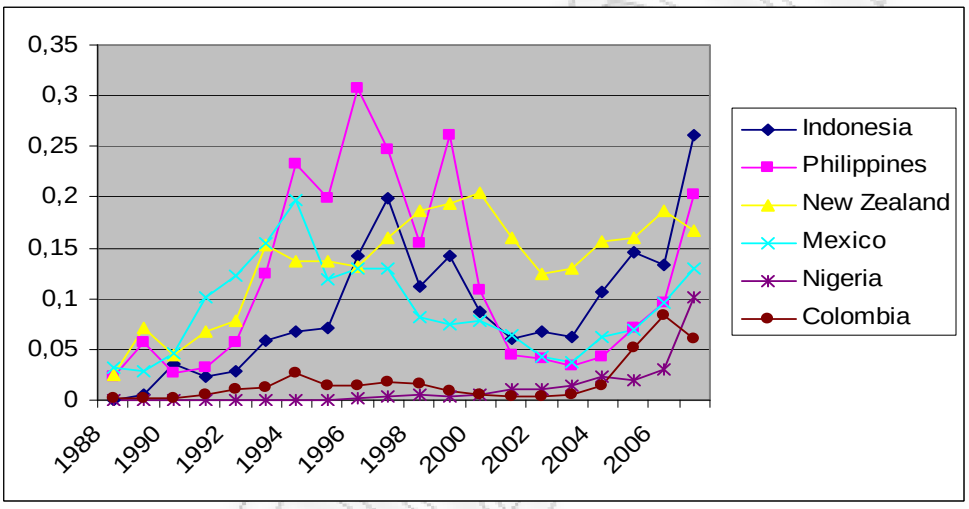
2nd dataset – 3rd subgroup - levels of the variable Stock Market Total Value Traded



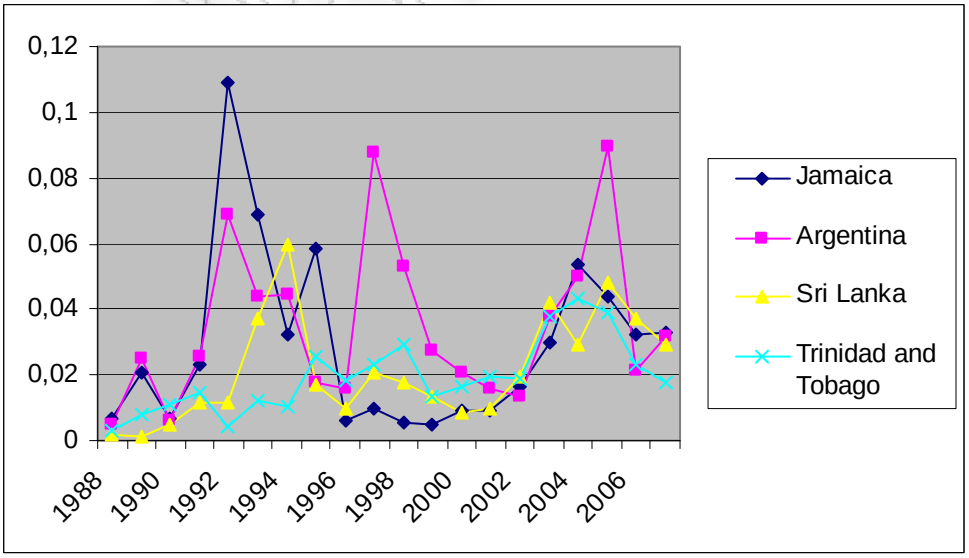
2nd dataset – 4th subgroup - levels of the variable Stock Market Total Value Traded



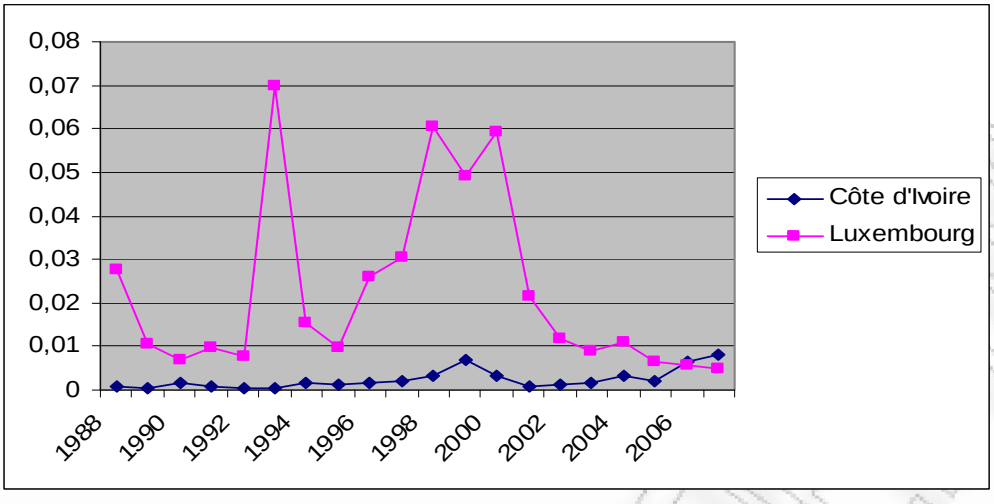
2nd dataset – 5th subgroup - levels of the variable Stock Market Total Value Traded



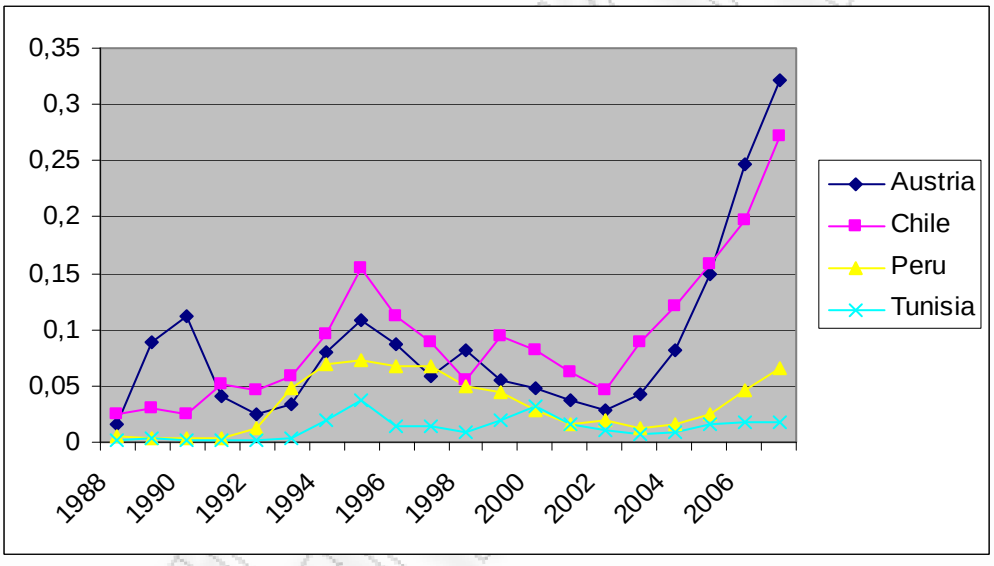
2nd dataset – 6th subgroup - levels of the variable Stock Market Total Value Traded



2nd dataset – 7th subgroup - levels of the variable Stock Market Total Value Traded



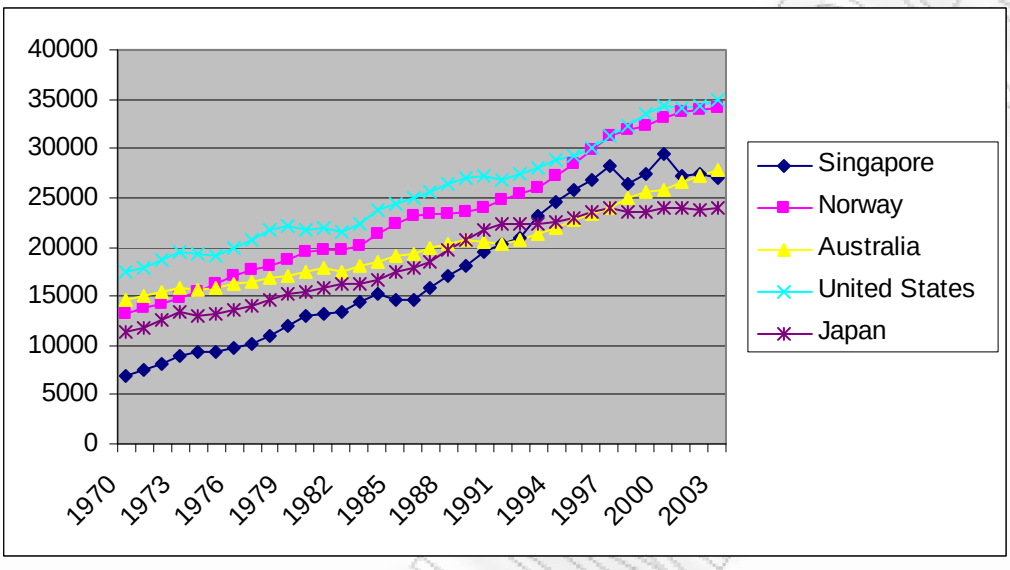
2nd dataset – Non-converging countries - levels of the variable Stock Market Total Value Traded



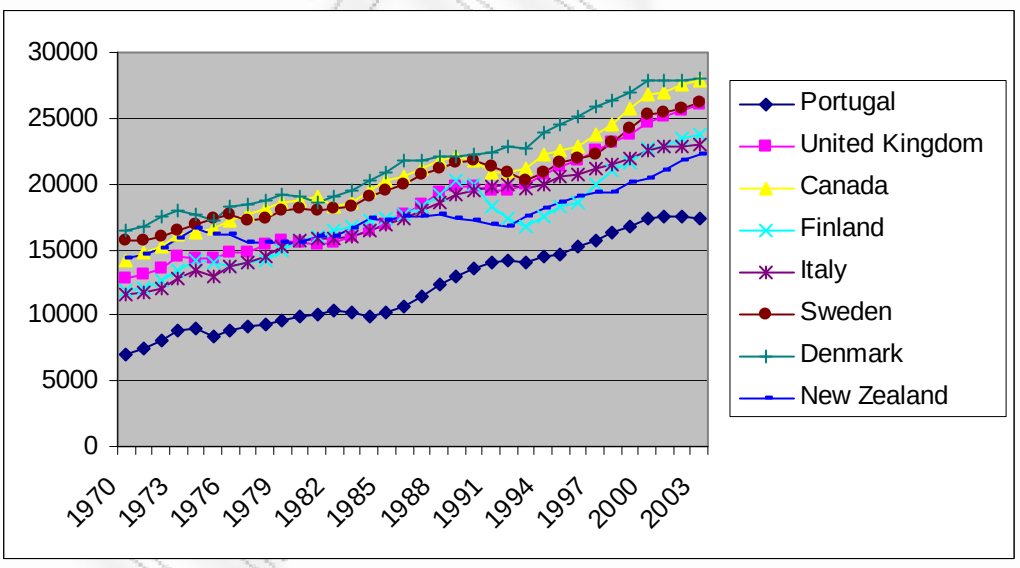
3rd dataset: GDP, Private, Stock Market Total Value Traded and Stock Market Turnover Ratio

Converging subgroups of the growth rates of GDP

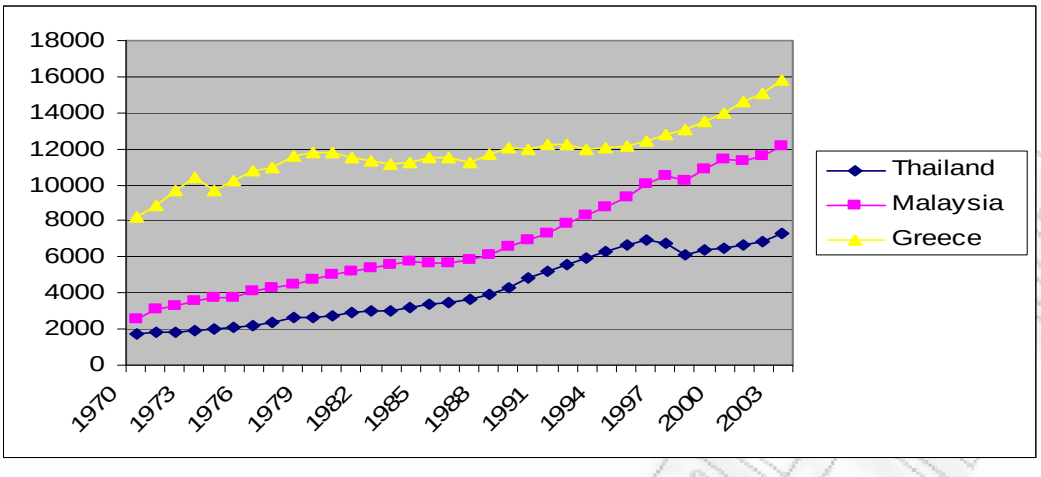
3rd dataset - 1st subgroup - growth rates of GDP



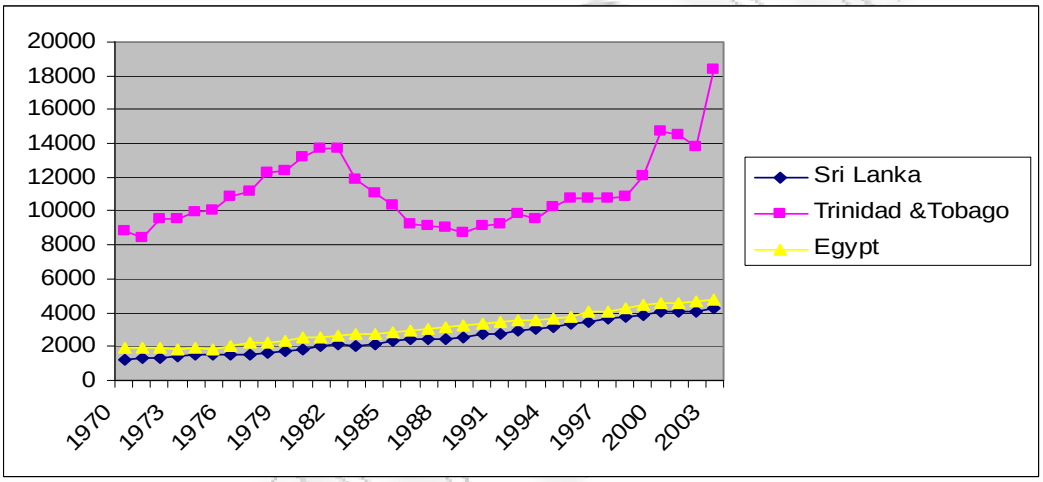
3rd dataset – 2nd subgroup - growth rates of GDP



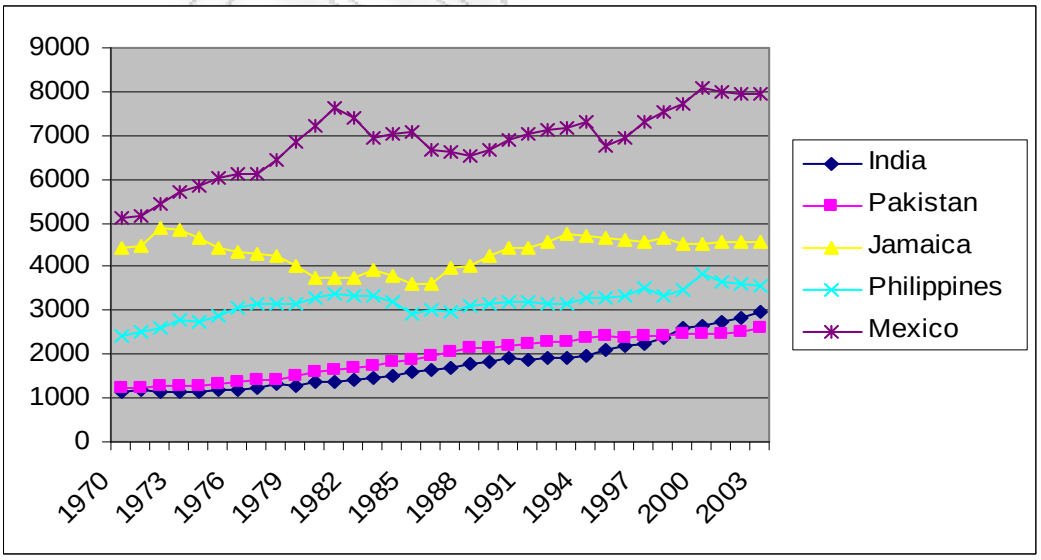
3rd dataset - 3rd subgroup - growth rates of GDP



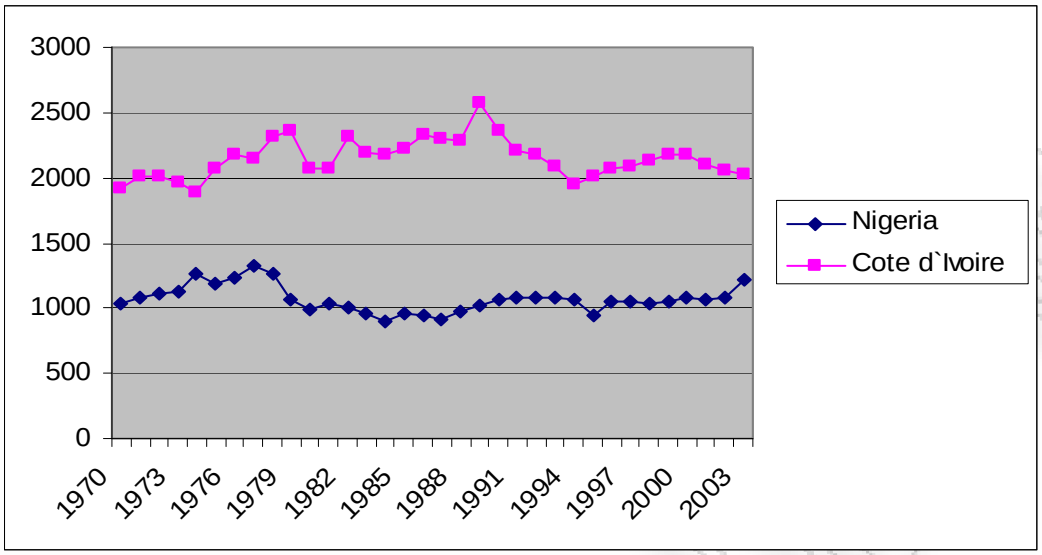
3rd dataset – 4th subgroup - growth rates of GDP



3rd dataset – 5th subgroup - growth rates of GDP

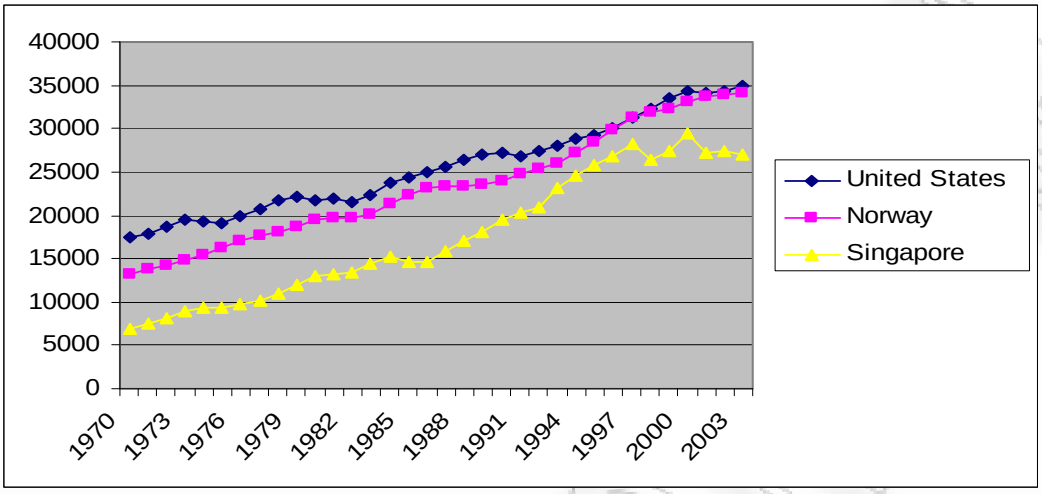


3rd dataset – 6th subgroup - growth rates of GDP

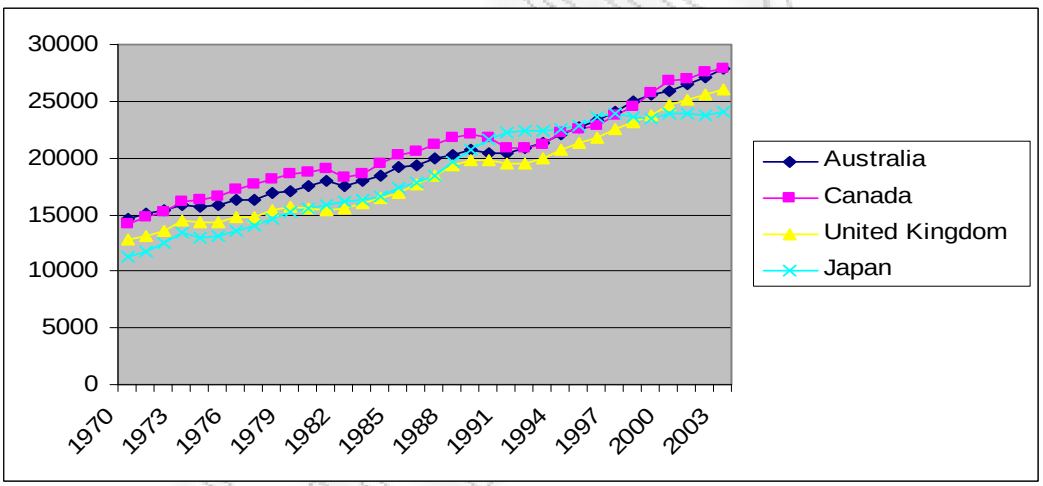


Converging subgroups of the levels of GDP

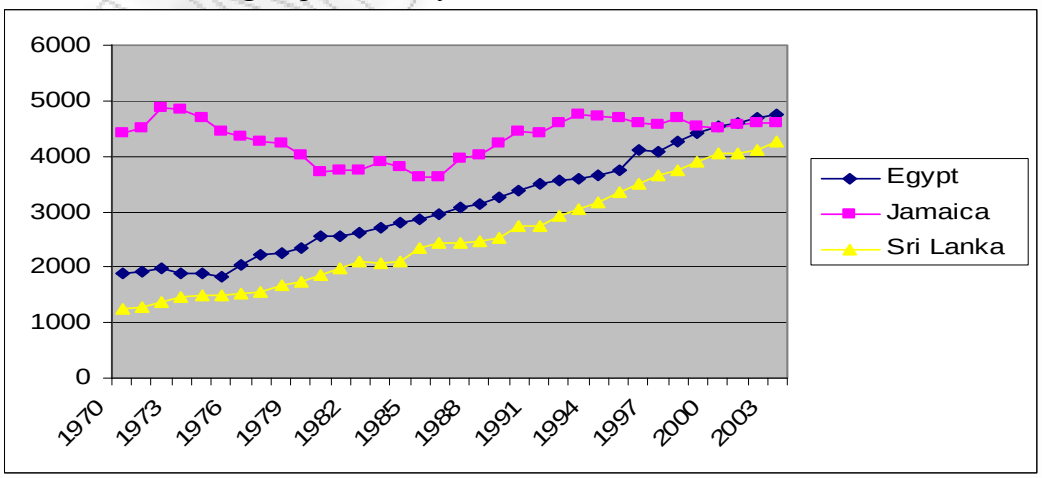
3rd dataset - 1st subgroup - levels of GDP



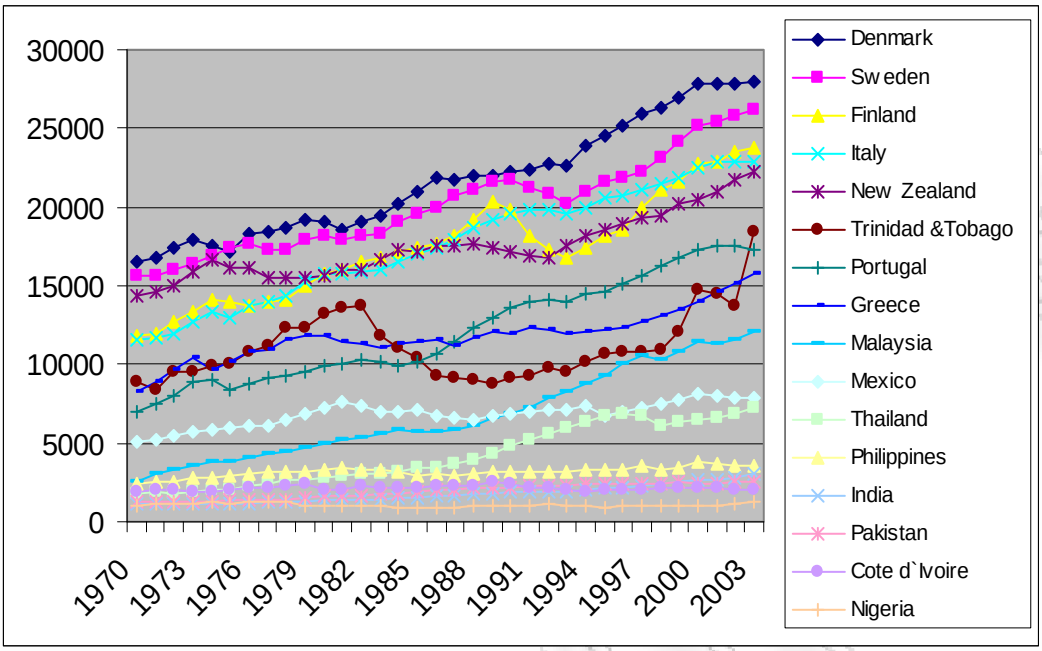
3rd dataset – 2nd subgroup - levels of GDP



3rd dataset - 3rd subgroup - levels of GDP

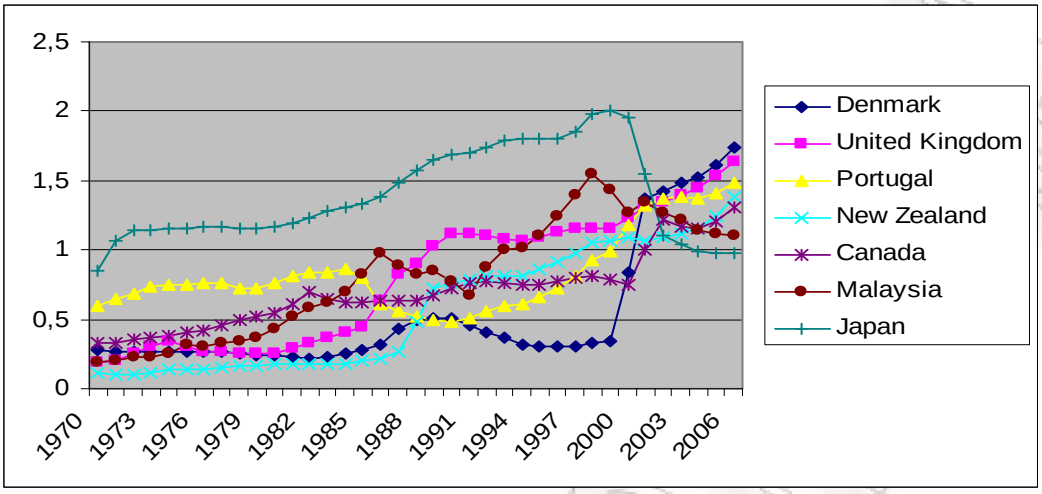


3rd dataset – Non-converging countries - levels of GDP

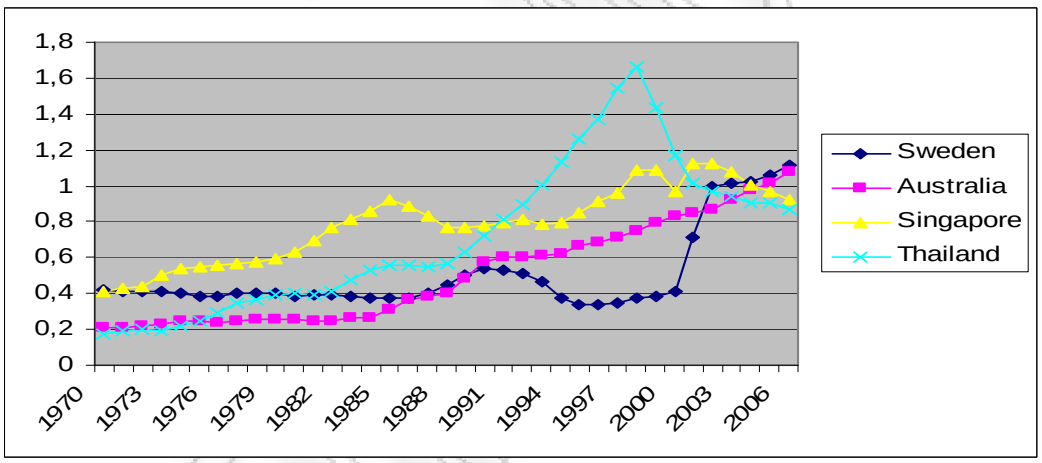


Convergence in the levels of the variable Private

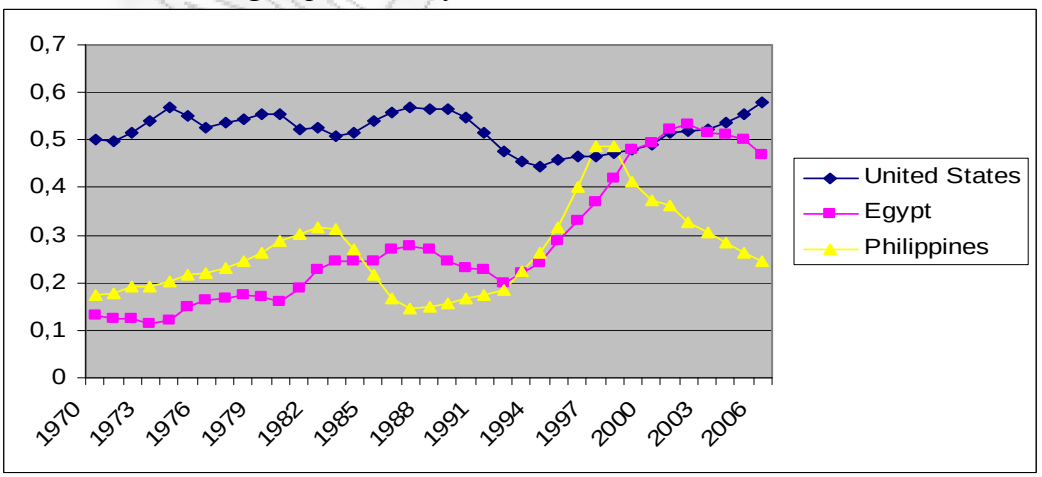
3rd dataset – 1st subgroup - levels of the variable Private



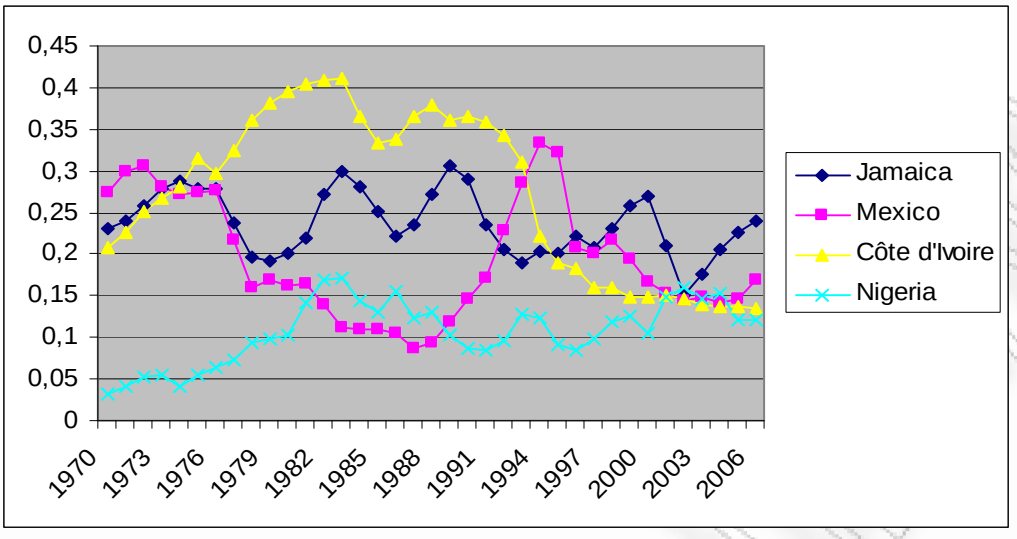
3rd dataset – 2nd subgroup - levels of the variable Private



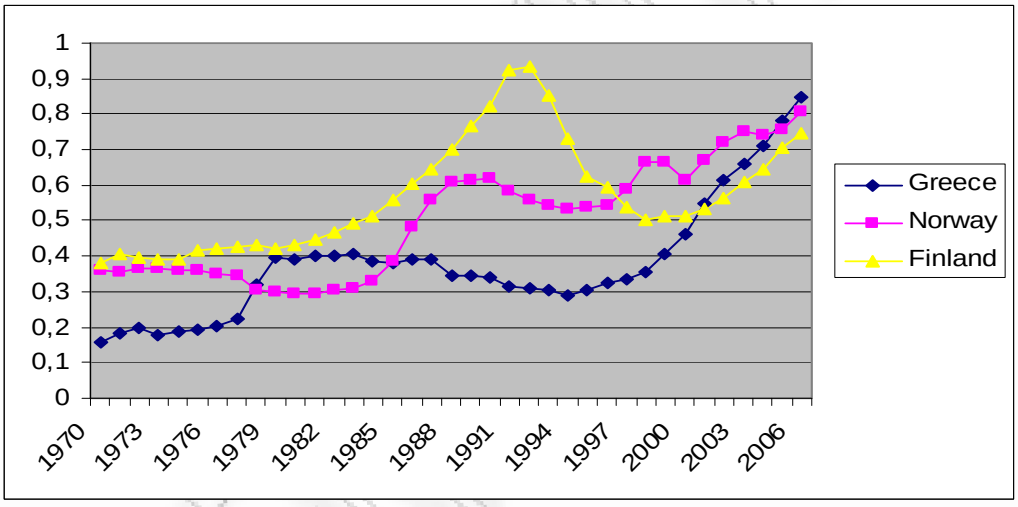
3rd dataset – 3rd subgroup - levels of the variable Private



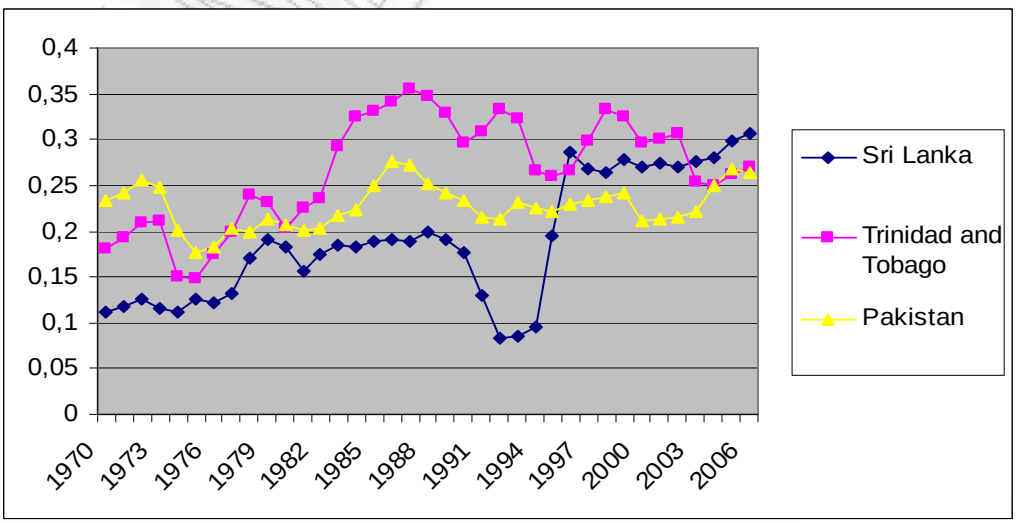
3rd dataset – 4th subgroup - levels of the variable Private



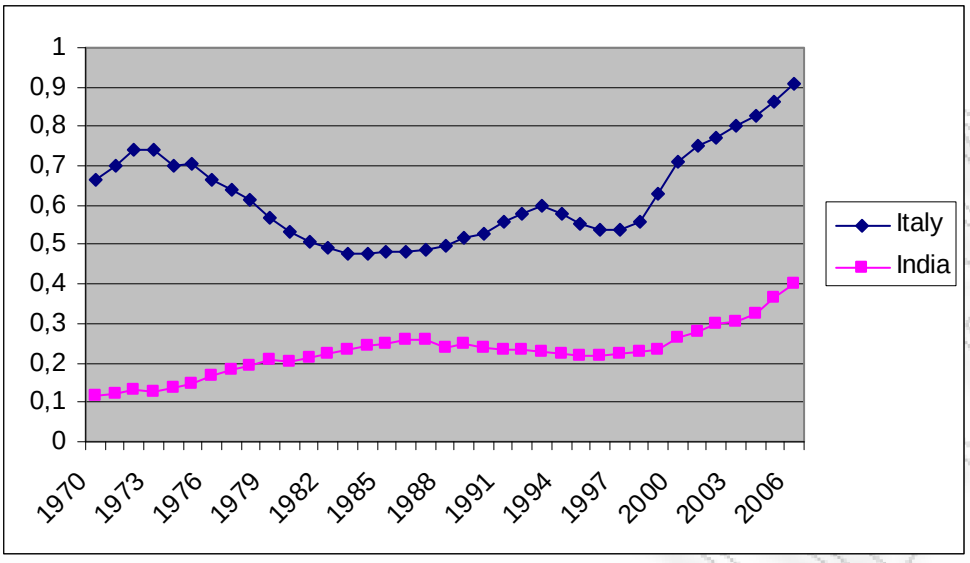
3rd dataset – 5th subgroup - levels of the variable Private



3rd dataset – 6th subgroup - levels of the variable Private

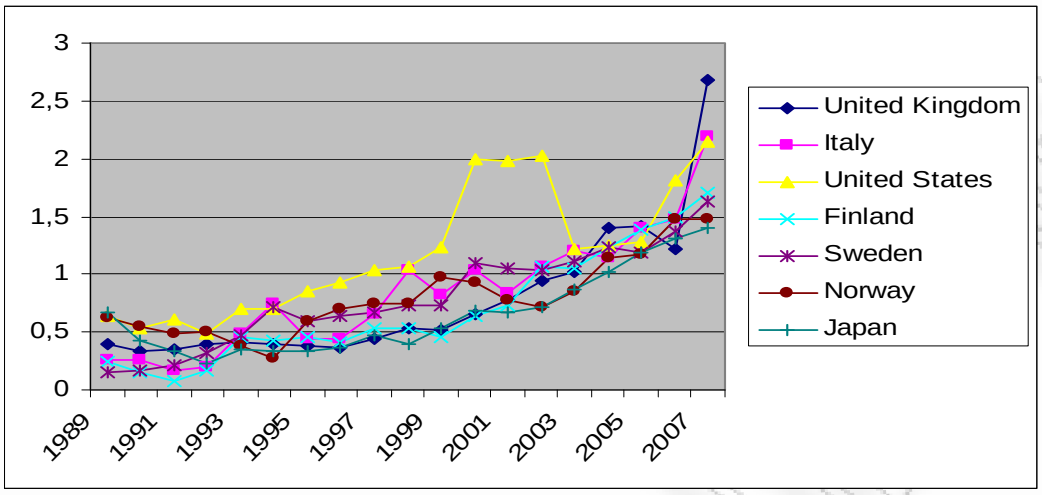


3rd dataset – Non-converging countries - levels of the variable Private

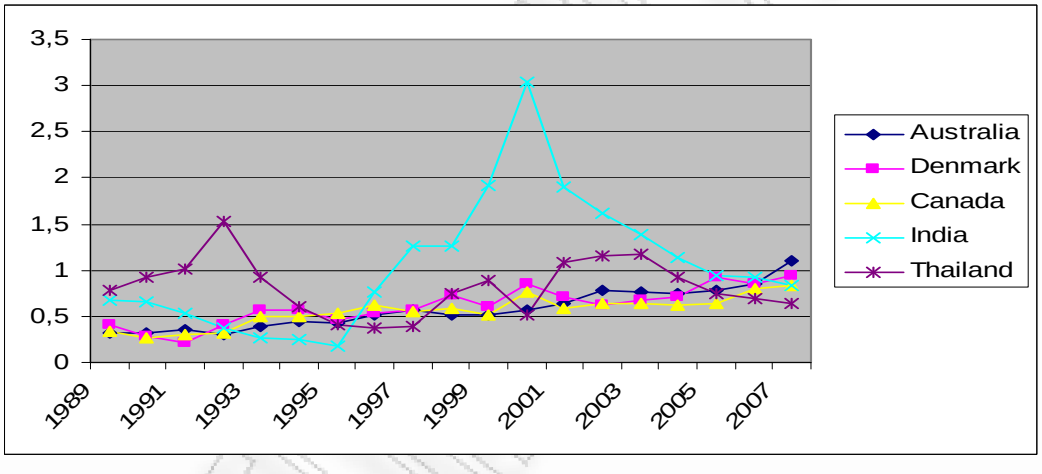


Convergence in the levels of the variable Stock Market Turnover Ratio

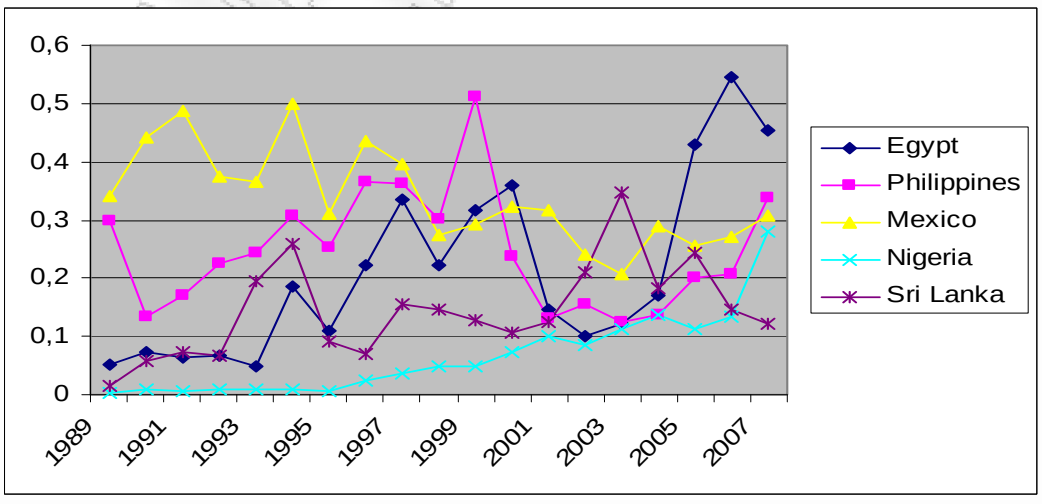
3rd dataset – 1st subgroup - levels of the variable Stock Market Turnover Ratio



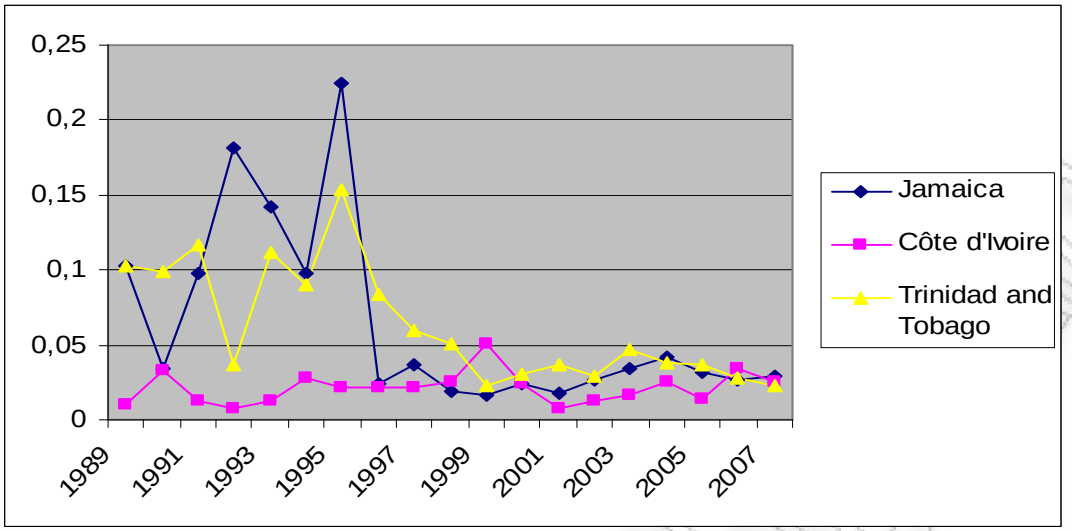
3rd dataset – 2nd subgroup - levels of the variable Stock Market Turnover Ratio



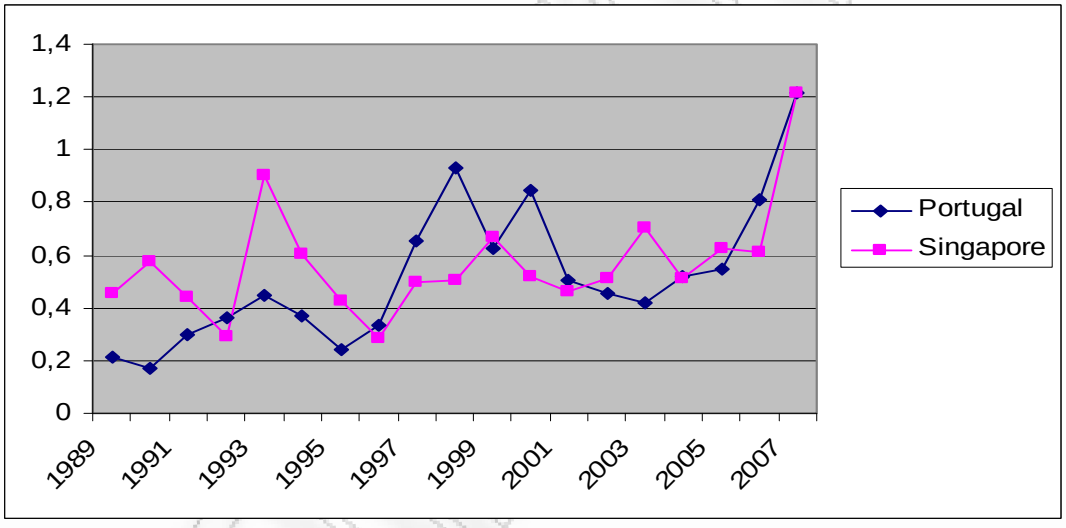
3rd dataset – 3rd subgroup - levels of the variable Stock Market Turnover Ratio



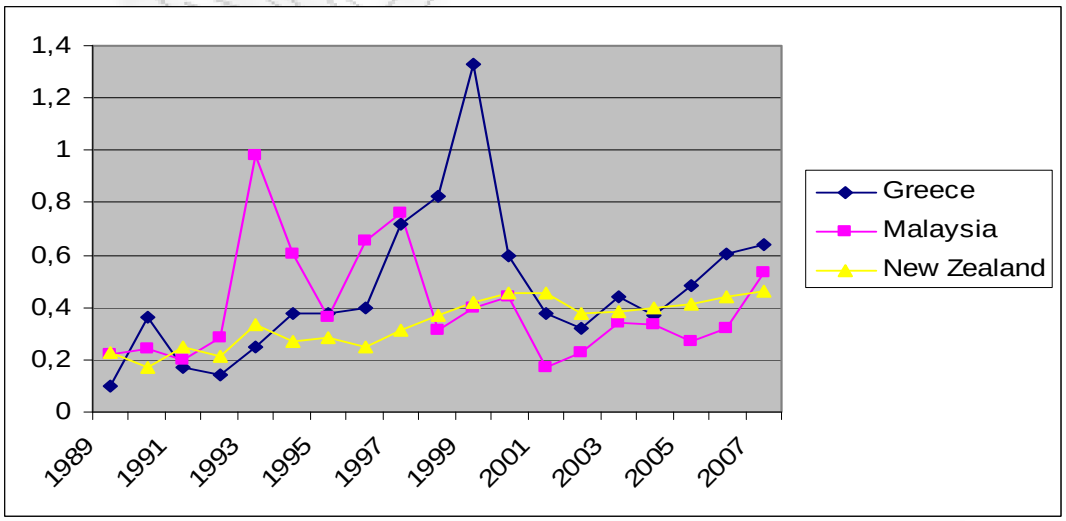
3rd dataset – 4th subgroup - levels of the variable Stock Market Turnover Ratio



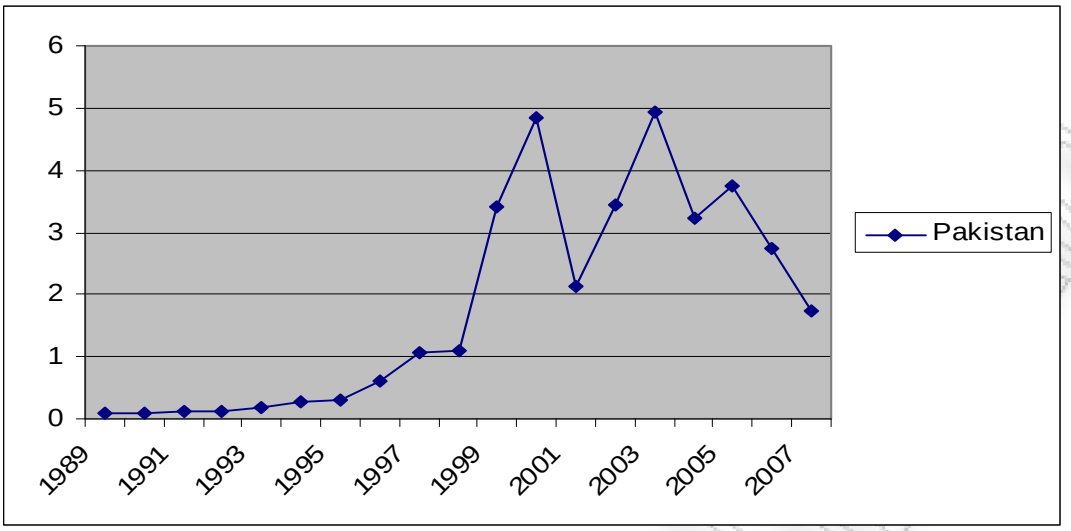
3rd dataset – 5th subgroup - levels of the variable Stock Market Turnover Ratio



3rd dataset – 6th subgroup - levels of the variable Stock Market Turnover Ratio

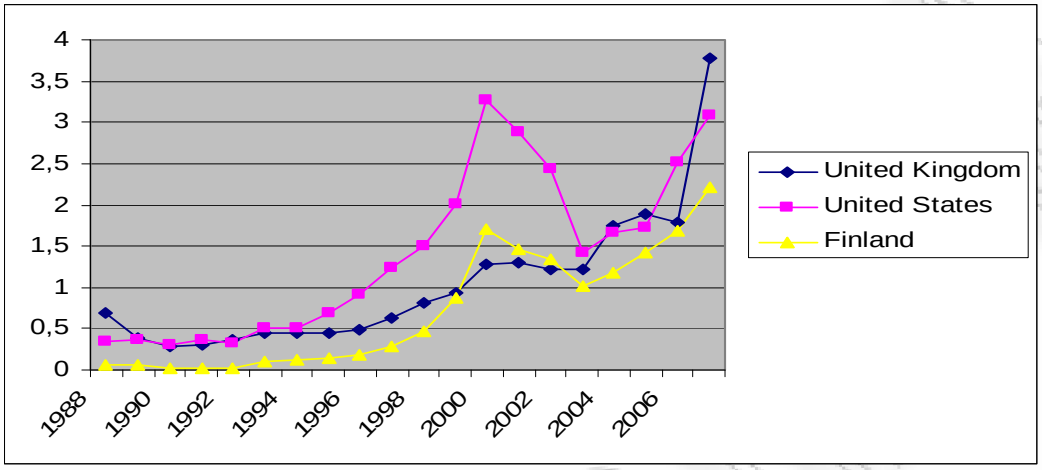


3rd dataset – Non-converging countries - levels of the variable Stock Market Turnover Ratio

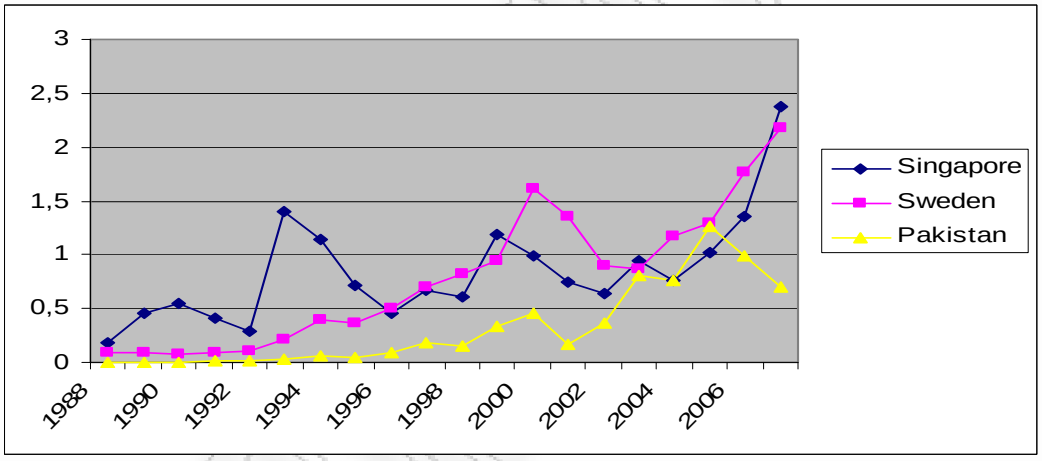


Convergence in the levels of the variable Stock Market Total Value Traded

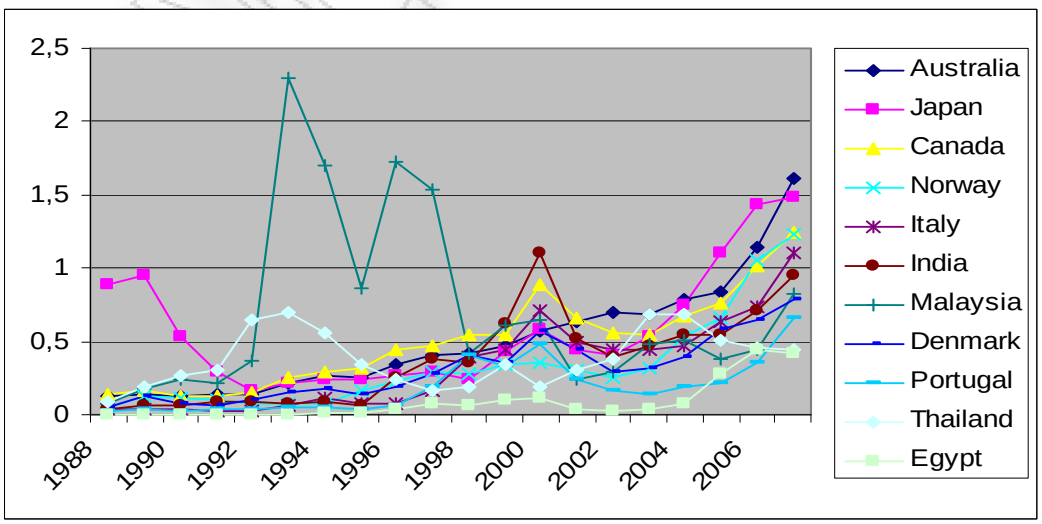
3rd dataset – 1st subgroup - levels of the variable Stock Market Total Value Traded



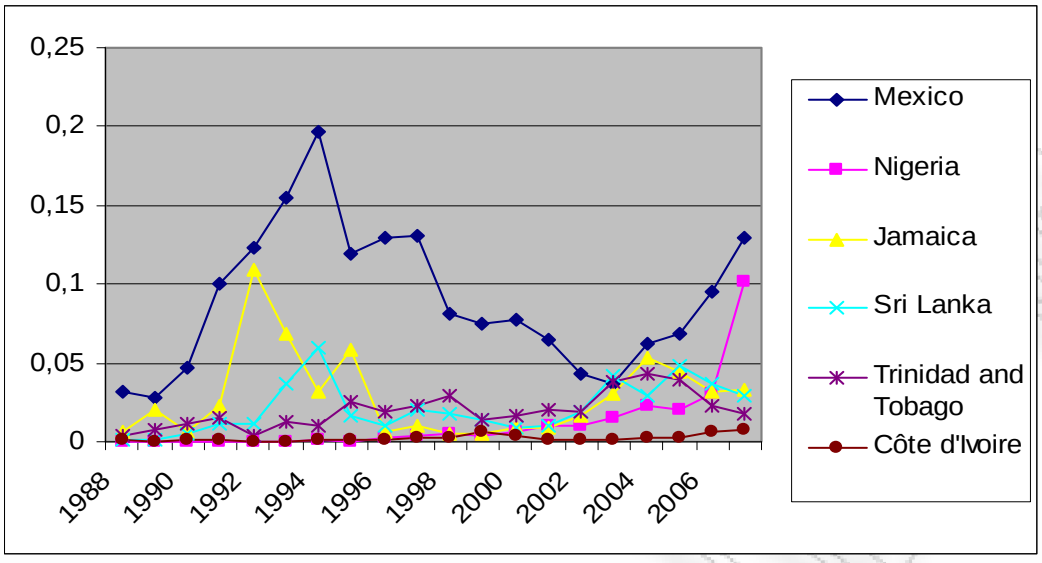
3rd dataset – 2nd subgroup - levels of the variable Stock Market Total Value Traded



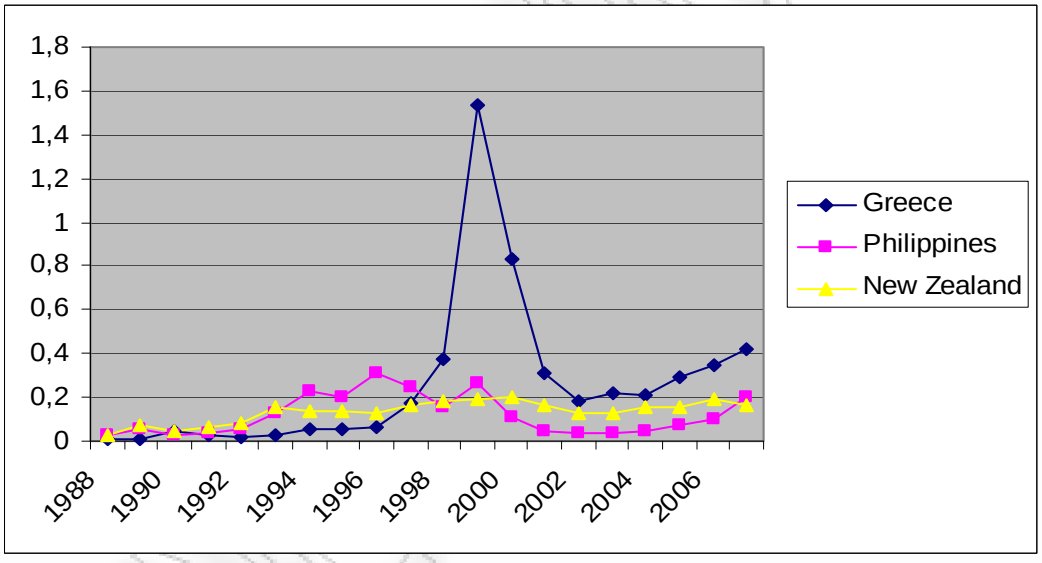
3rd dataset – 3rd subgroup - levels of the variable Stock Market Total Value Traded



3rd dataset – 4th subgroup - levels of the variable Stock Market Total Value Traded



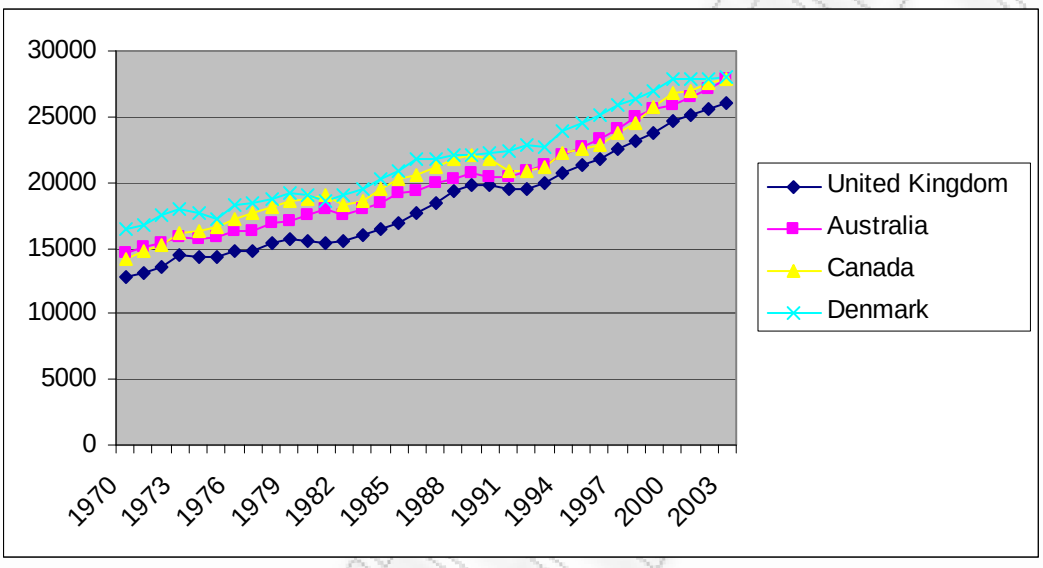
3rd dataset – Non-converging countries - levels of the variable Stock Market Total Value Traded



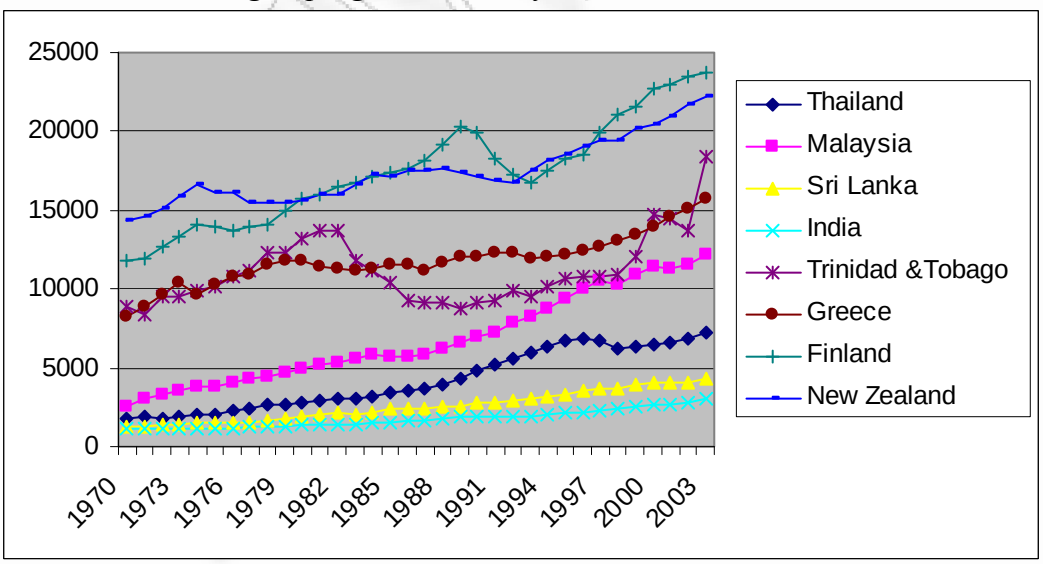
4th dataset: GDP, Private, Stock Market Total Value Traded, Stock Market Turnover Ratio, Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets (BANK), Currency Outside Banking System to Base Money.

Converging subgroups of the growth rates of GDP

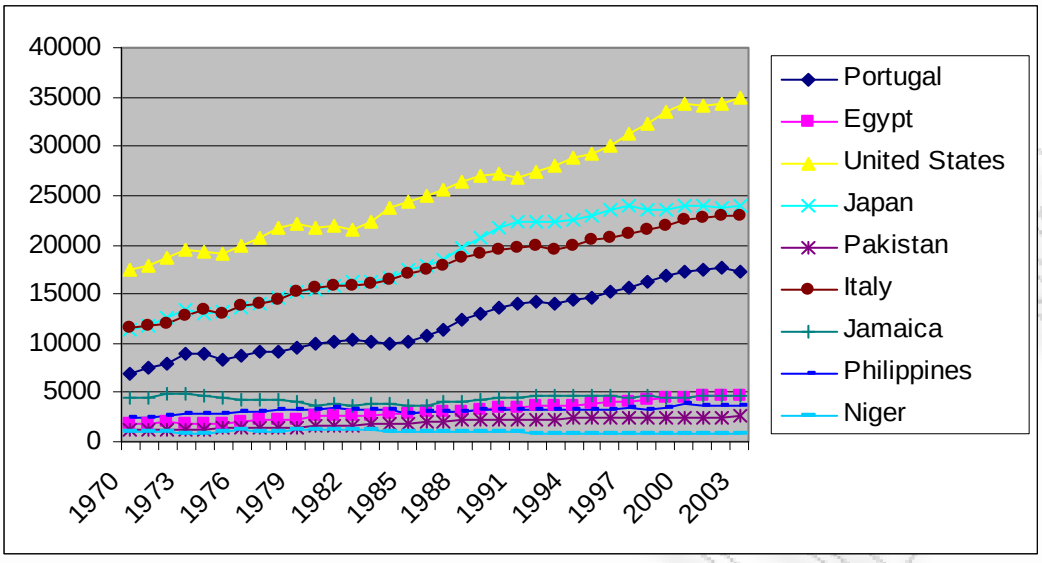
4th dataset – 1st subgroup - growth rates of GDP



4th dataset – 2nd subgroup - growth rates of GDP

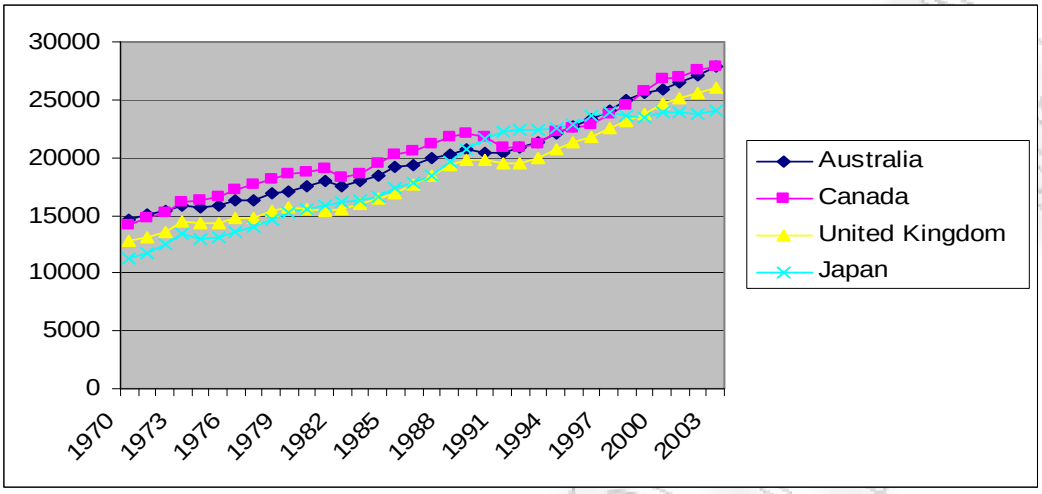


4th dataset – Non-converging countries - growth rates of GDP

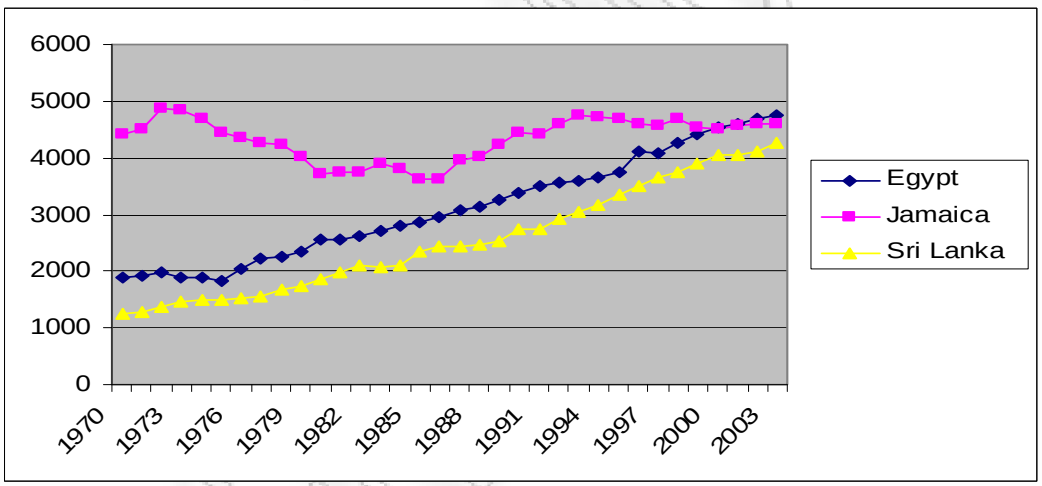


Converging subgroups of the levels of the GDP

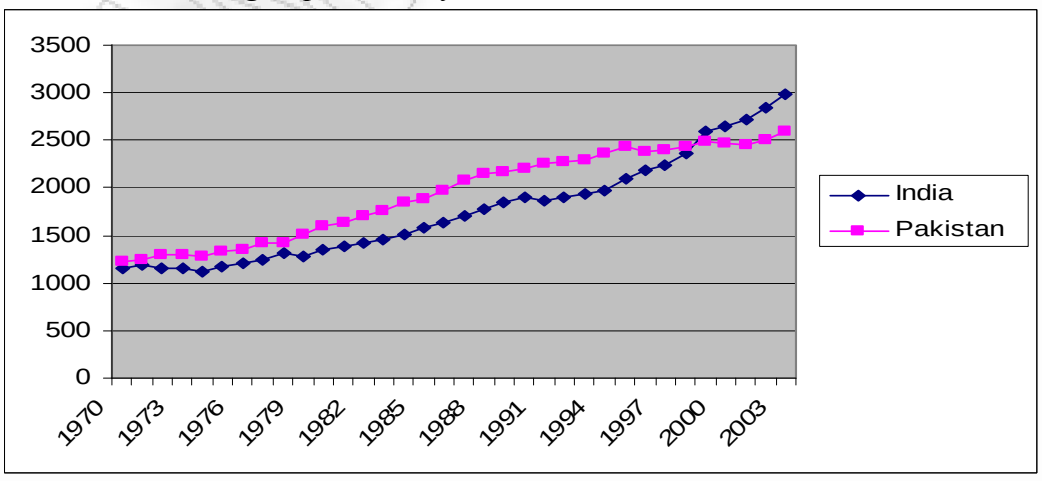
4th dataset – 1st subgroup - levels of GDP



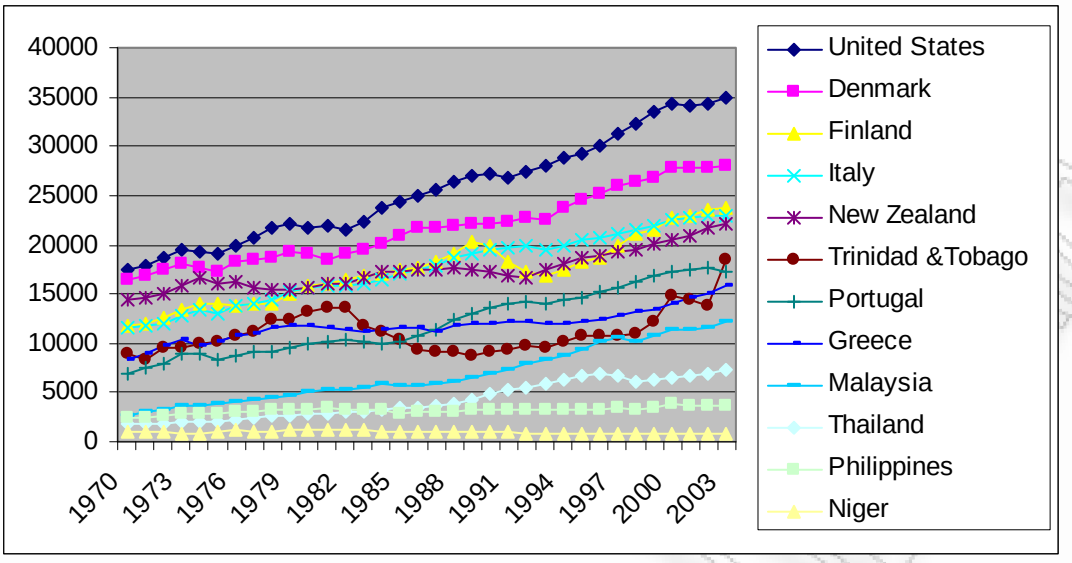
4th dataset – 2nd subgroup - levels of GDP



4th dataset – 3rd subgroup - levels of GDP

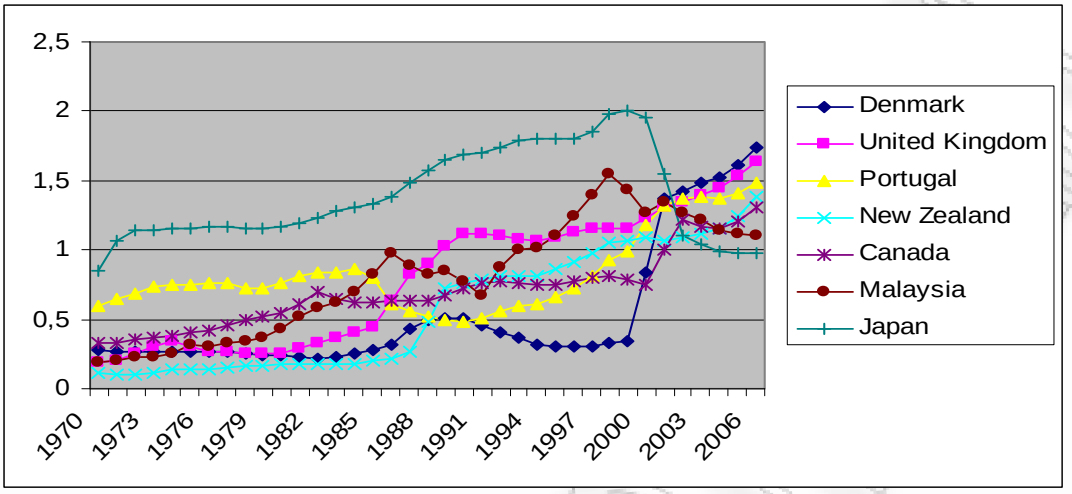


4th dataset – Non-converging countries - levels of GDP

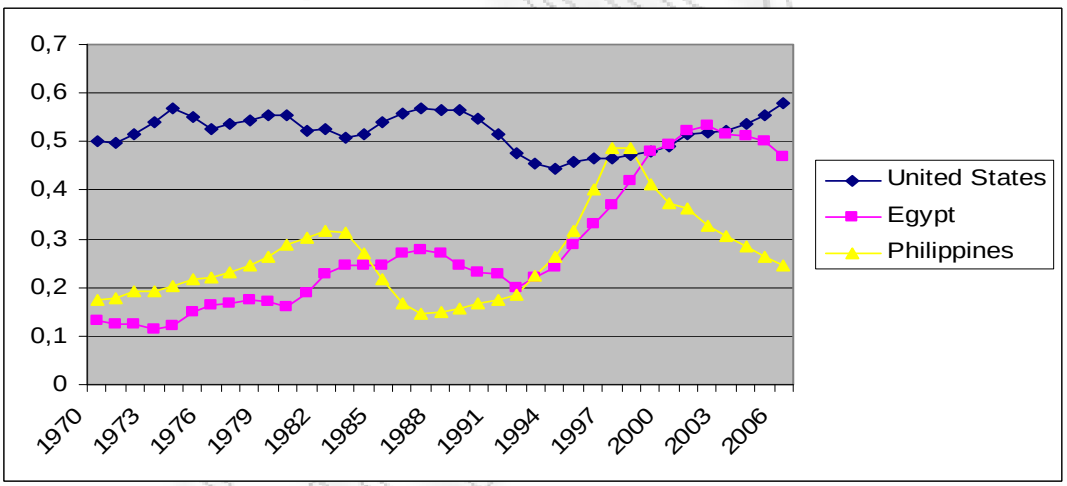


Convergence in the levels of the variable Private

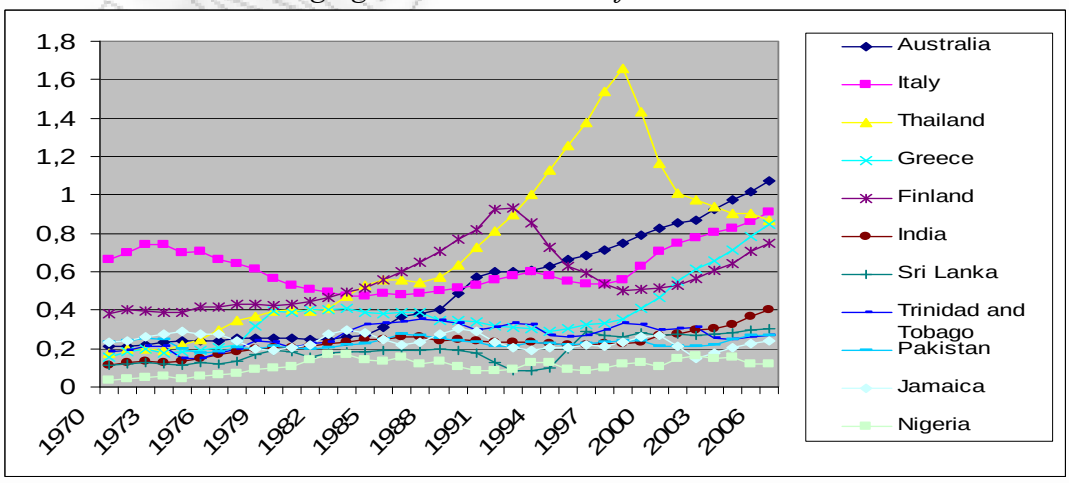
4th dataset – 1st subgroup - levels of the variable Private



4th dataset – 2nd subgroup - levels of the variable Private

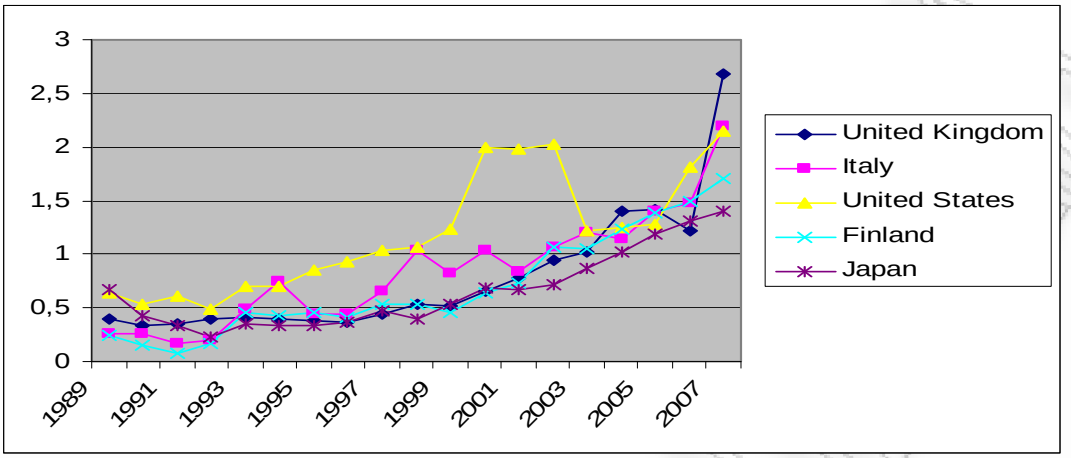


4th dataset – Non-converging countries - levels of the variable Private

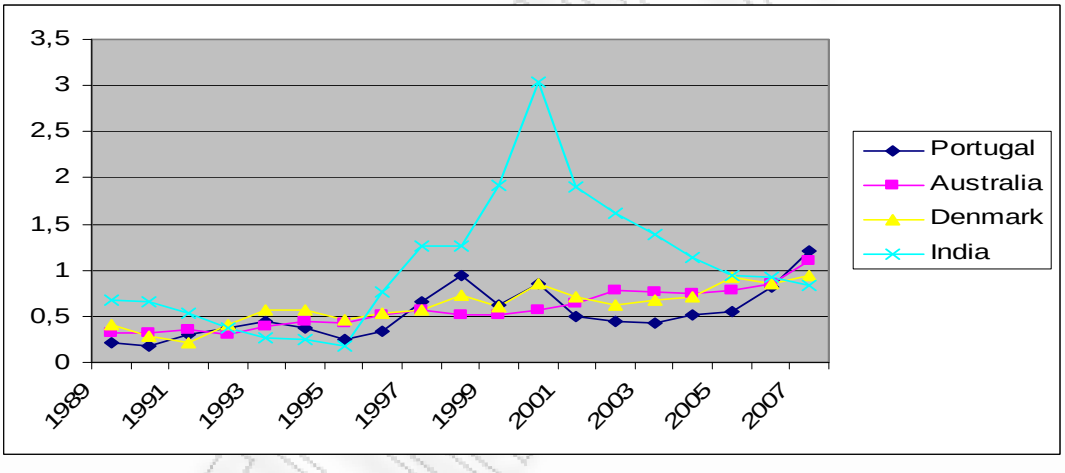


Convergence in the levels of the variable Stock Market Turnover Ratio

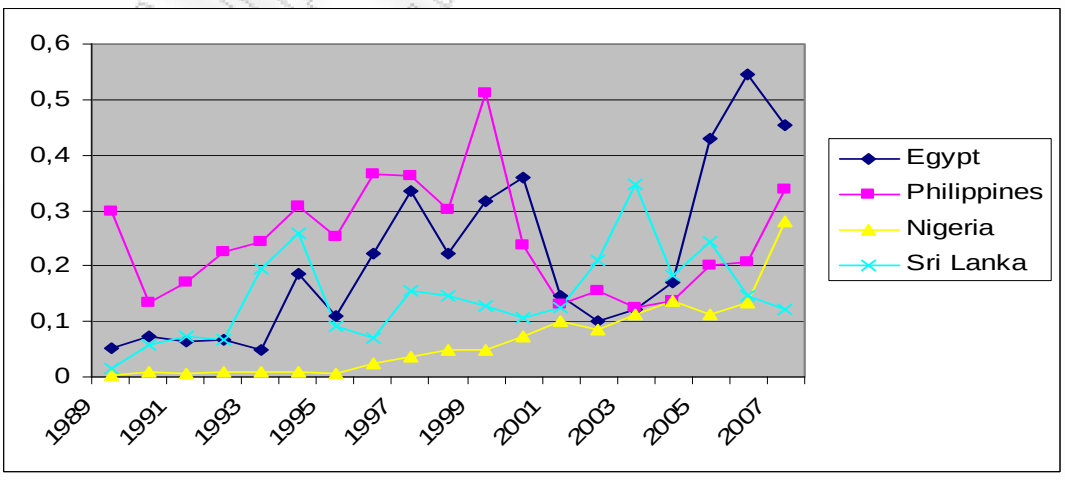
4th dataset – 1st subgroup - levels of the variable Stock Market Turnover Ratio



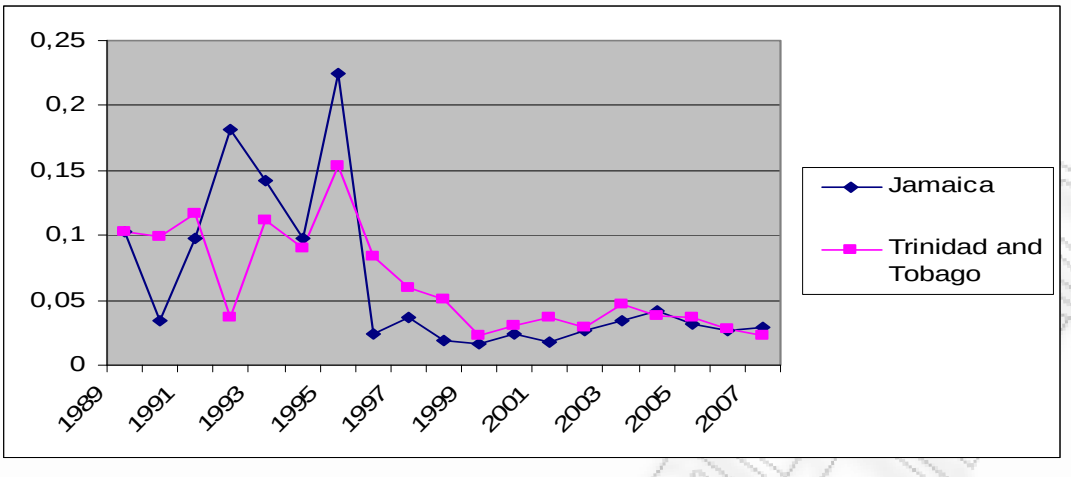
4th dataset – 2nd subgroup - levels of the variable Stock Market Turnover Ratio



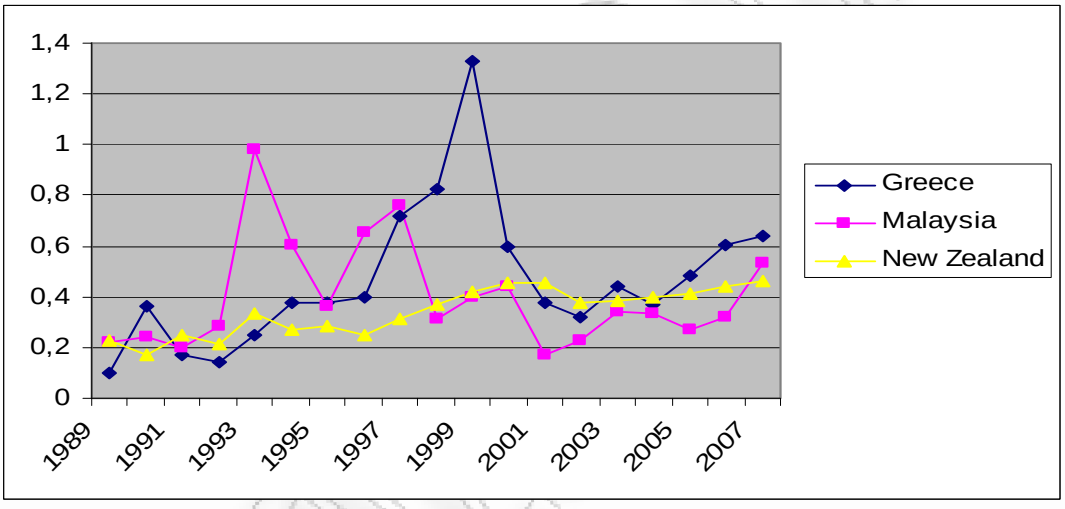
4th dataset – 3rd subgroup - levels of the variable Stock Market Turnover Ratio



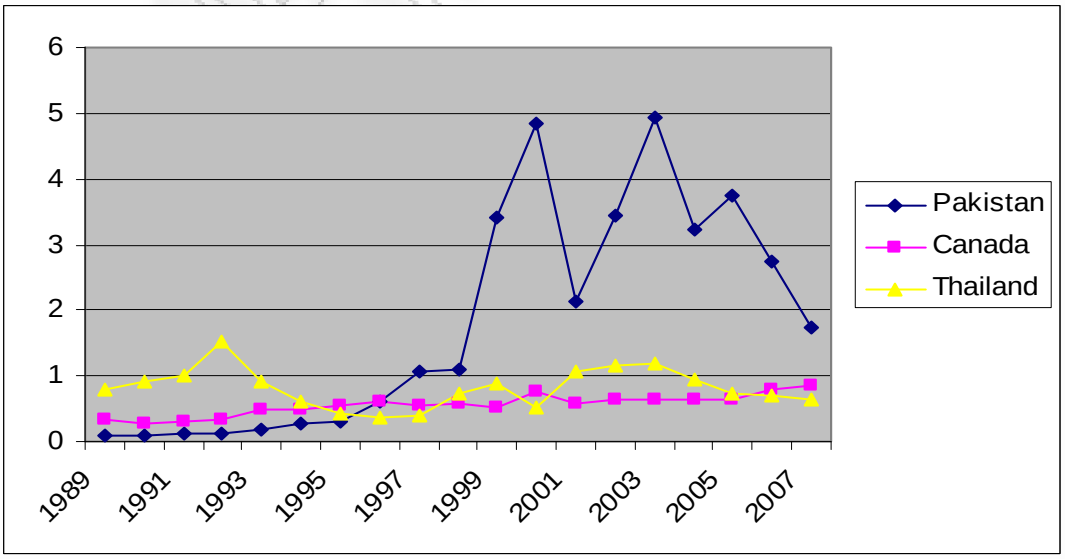
4th dataset – 4th subgroup - levels of the variable Stock Market Turnover Ratio



4th dataset – 5th subgroup - levels of the variable Stock Market Turnover Ratio

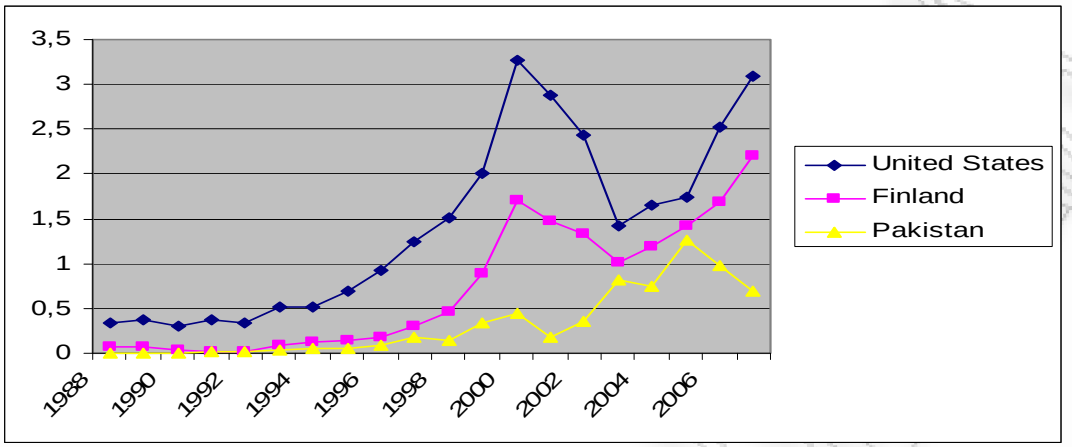


4th dataset – Non-converging countries - levels of the variable Stock Market Turnover Ratio

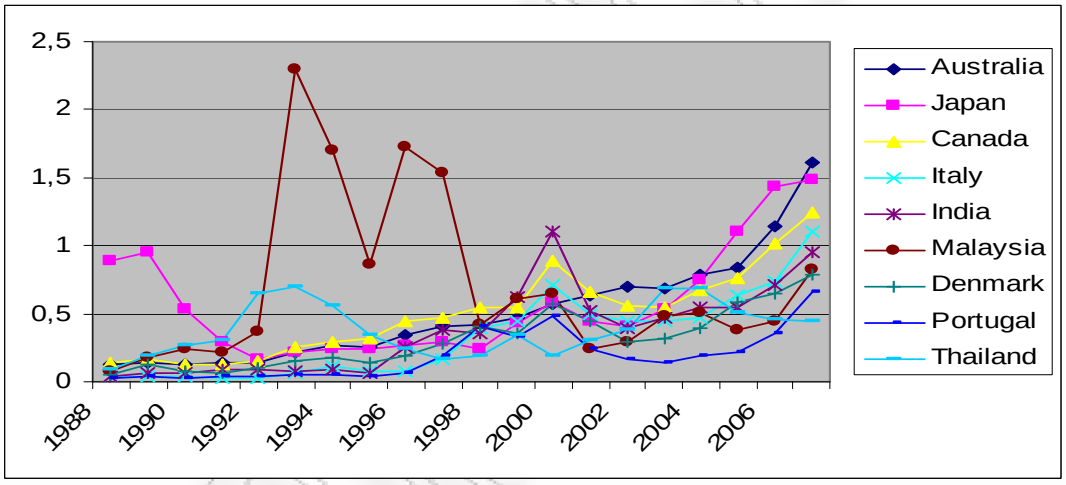


Convergence in the levels of the variable Stock Market Total Value Traded

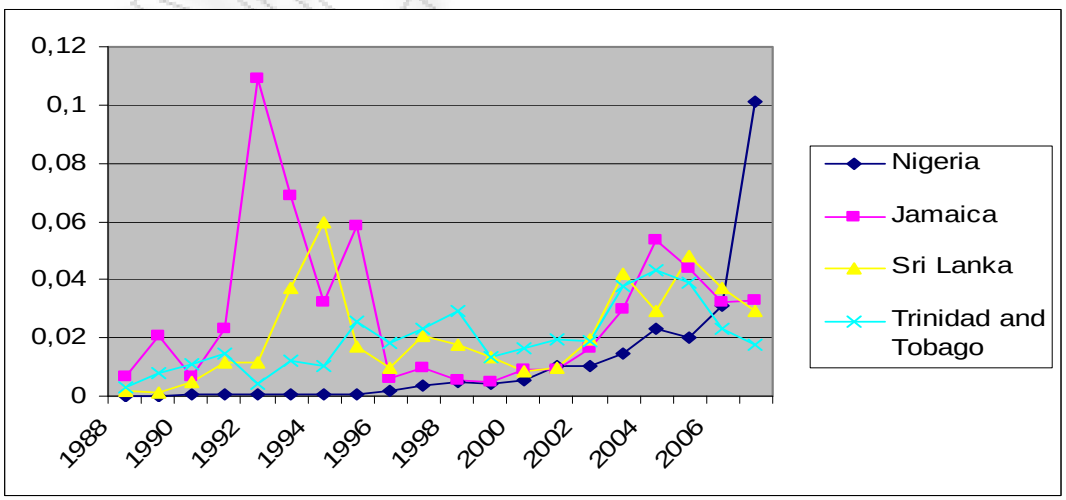
4th dataset – 1st subgroup - levels of the variable Stock Market Total Value Traded



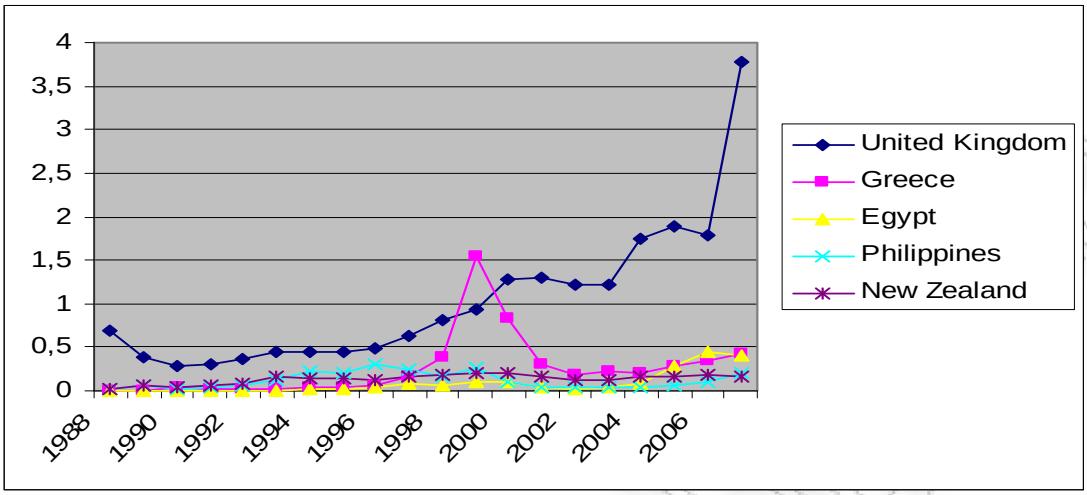
4th dataset – 2nd subgroup - levels of the variable Stock Market Total Value Traded



4th dataset – 3rd subgroup - levels of the variable Stock Market Total Value Traded

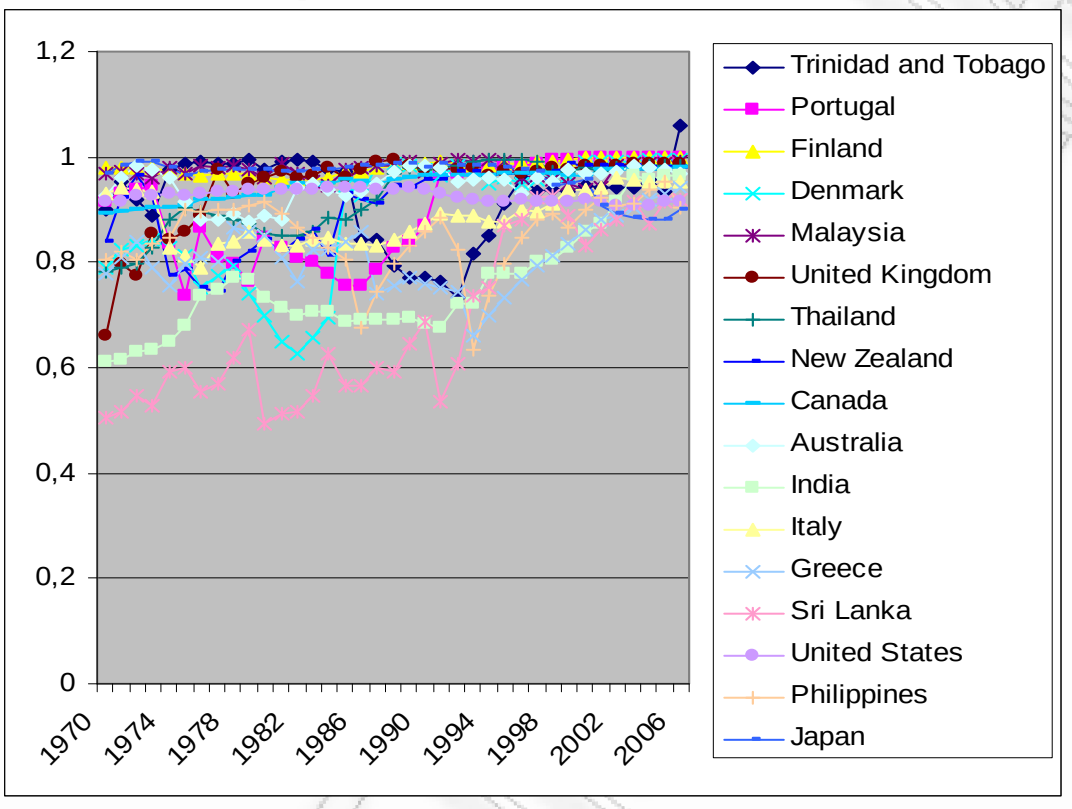


4th dataset – Non-converging countries - levels of the variable Stock Market Total Value Traded

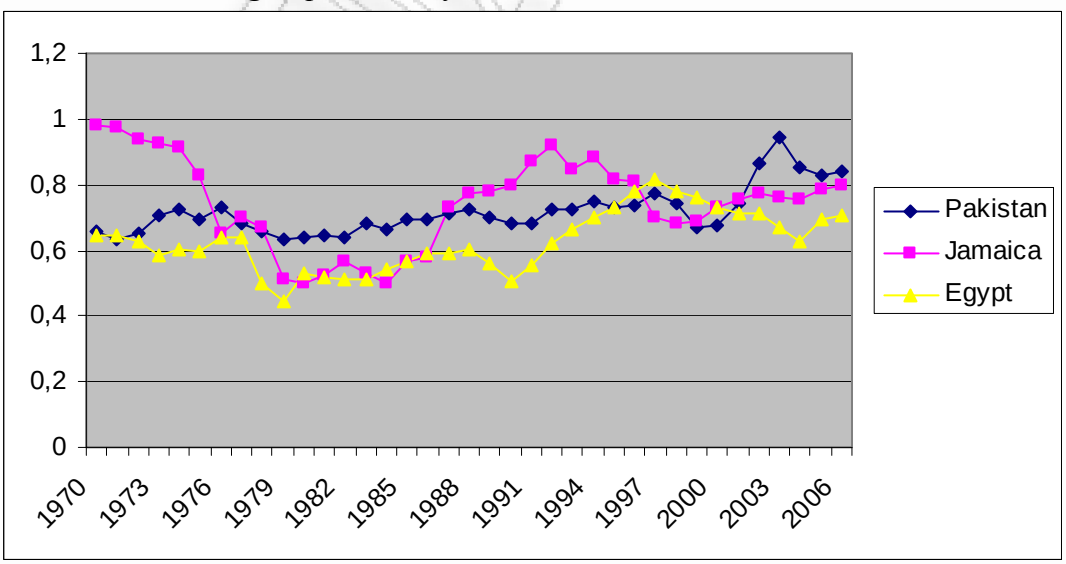


Convergence in the levels of the variable "Commercial Bank Assets / Commercial Bank Assets + Central Bank Assets" (BANK)

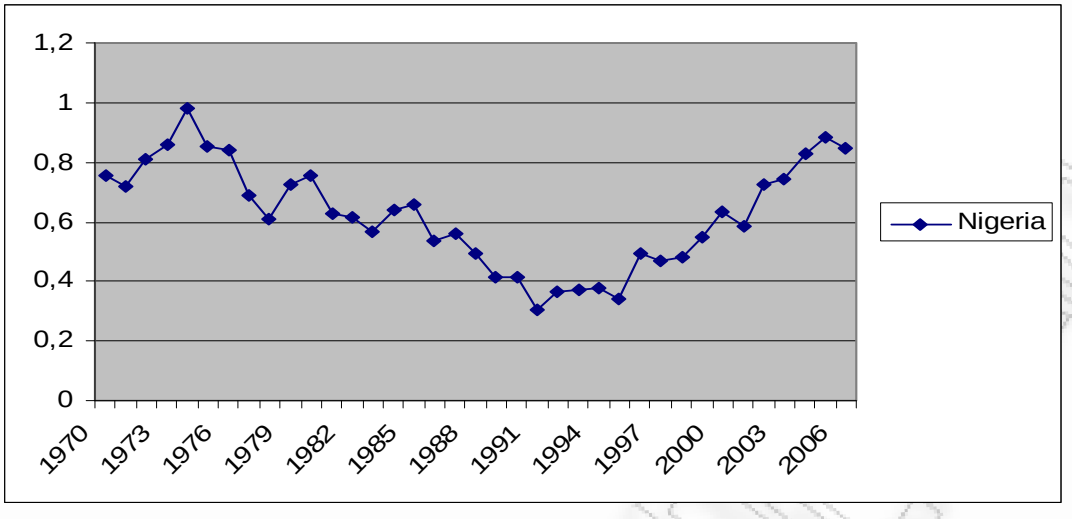
4th dataset – 1st subgroup - levels of the variable BANK



4th dataset – 2nd subgroup - levels of the variable BANK

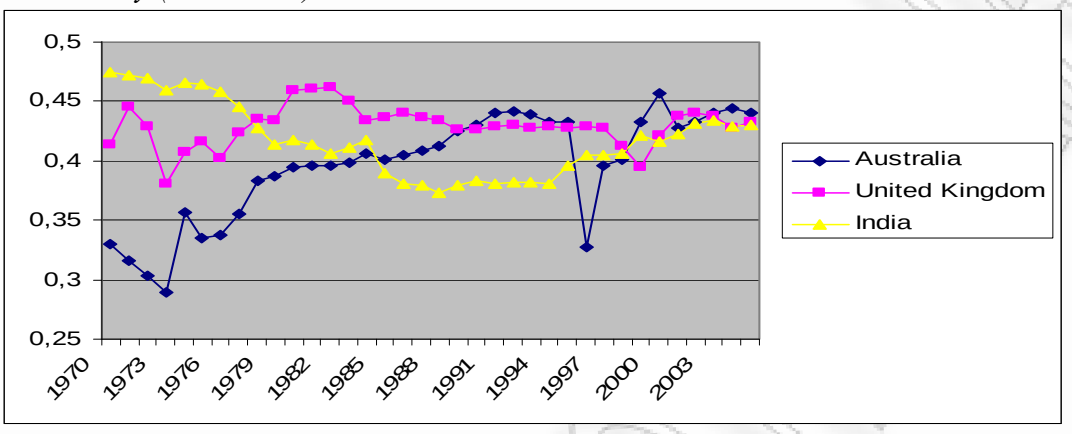


4th dataset – Non-converging countries - levels of the variable BANK

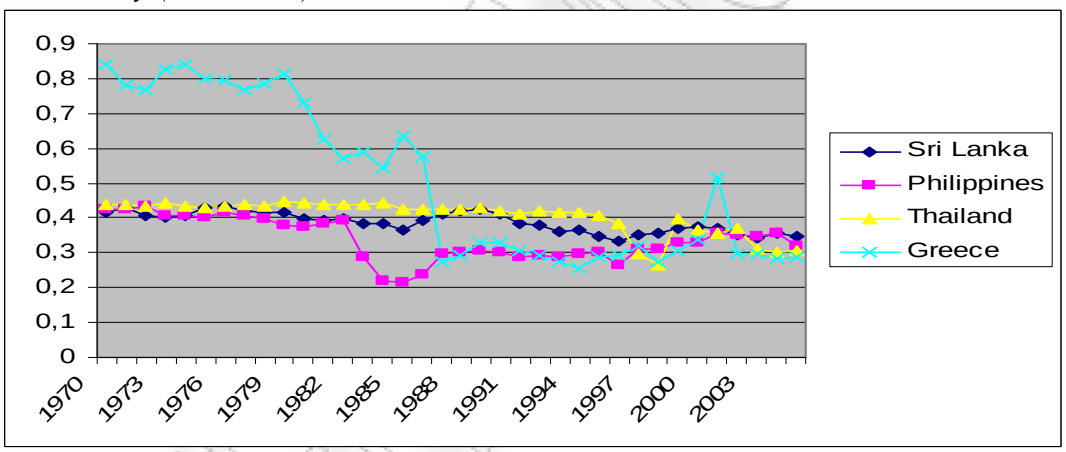


Convergence in the levels of the variable "Currency Outside Banking System / Base Money" (COBS/BM)

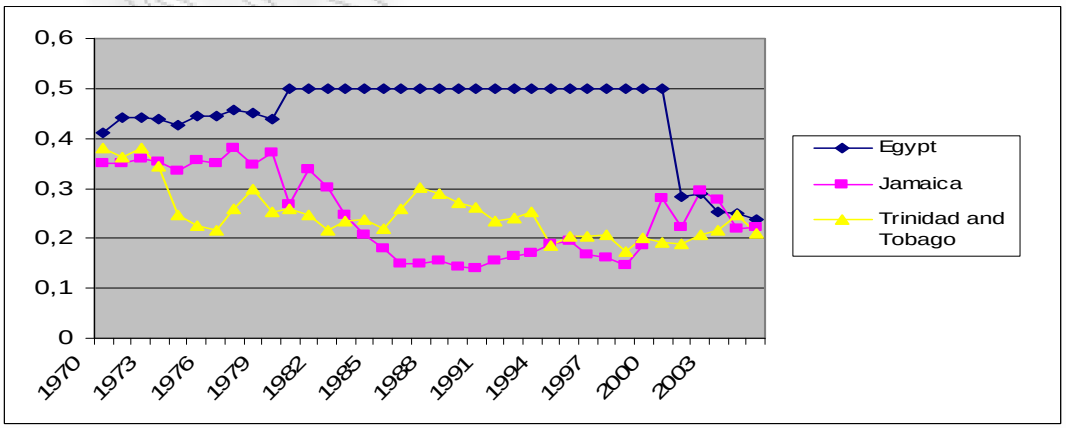
4th dataset – 1st subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



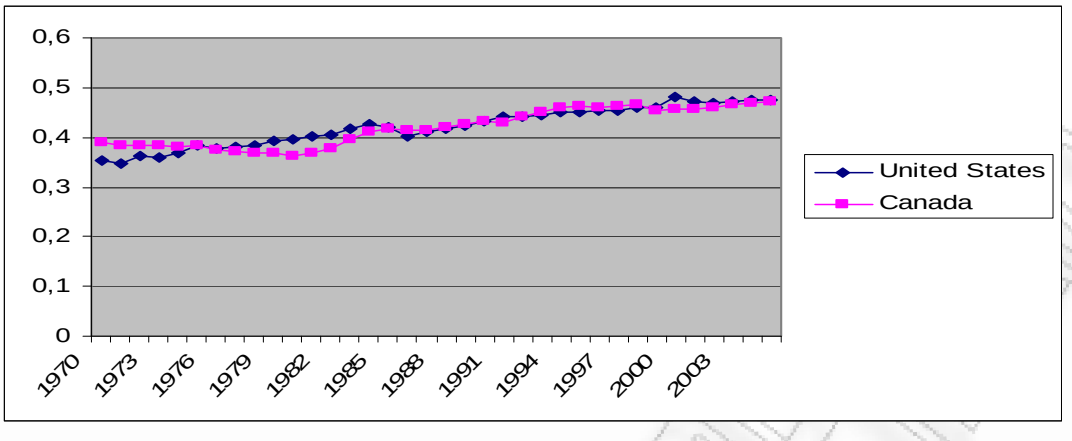
4th dataset – 2nd subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



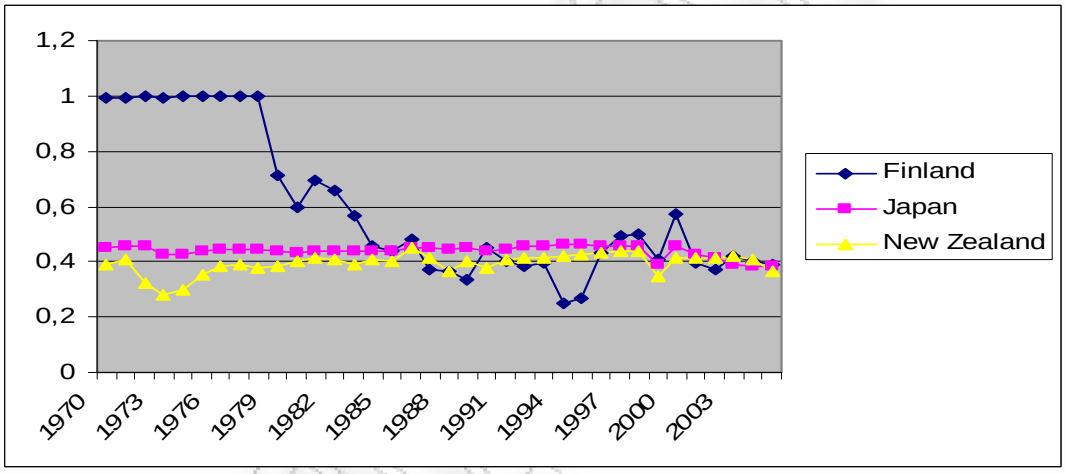
4th dataset – 3rd subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



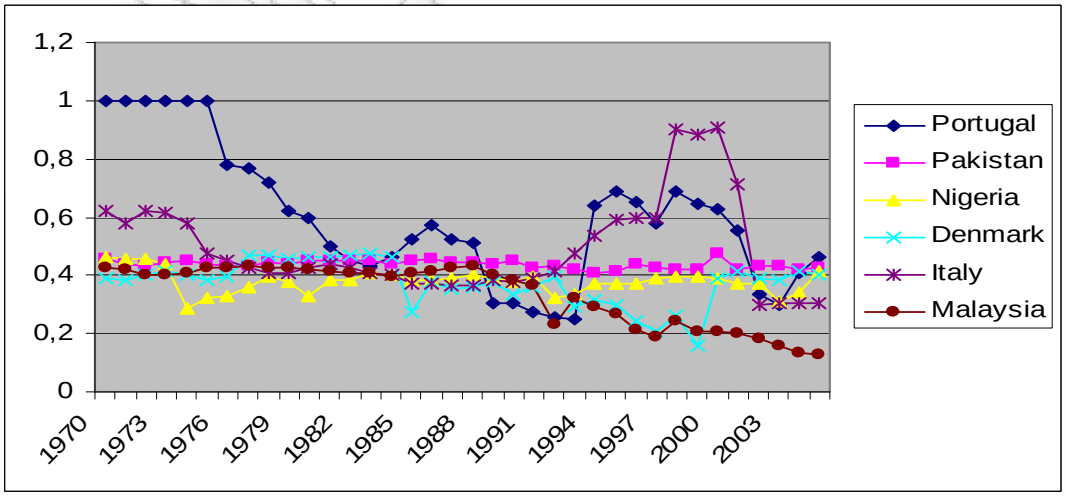
4th dataset – 4th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



4th dataset – 5th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



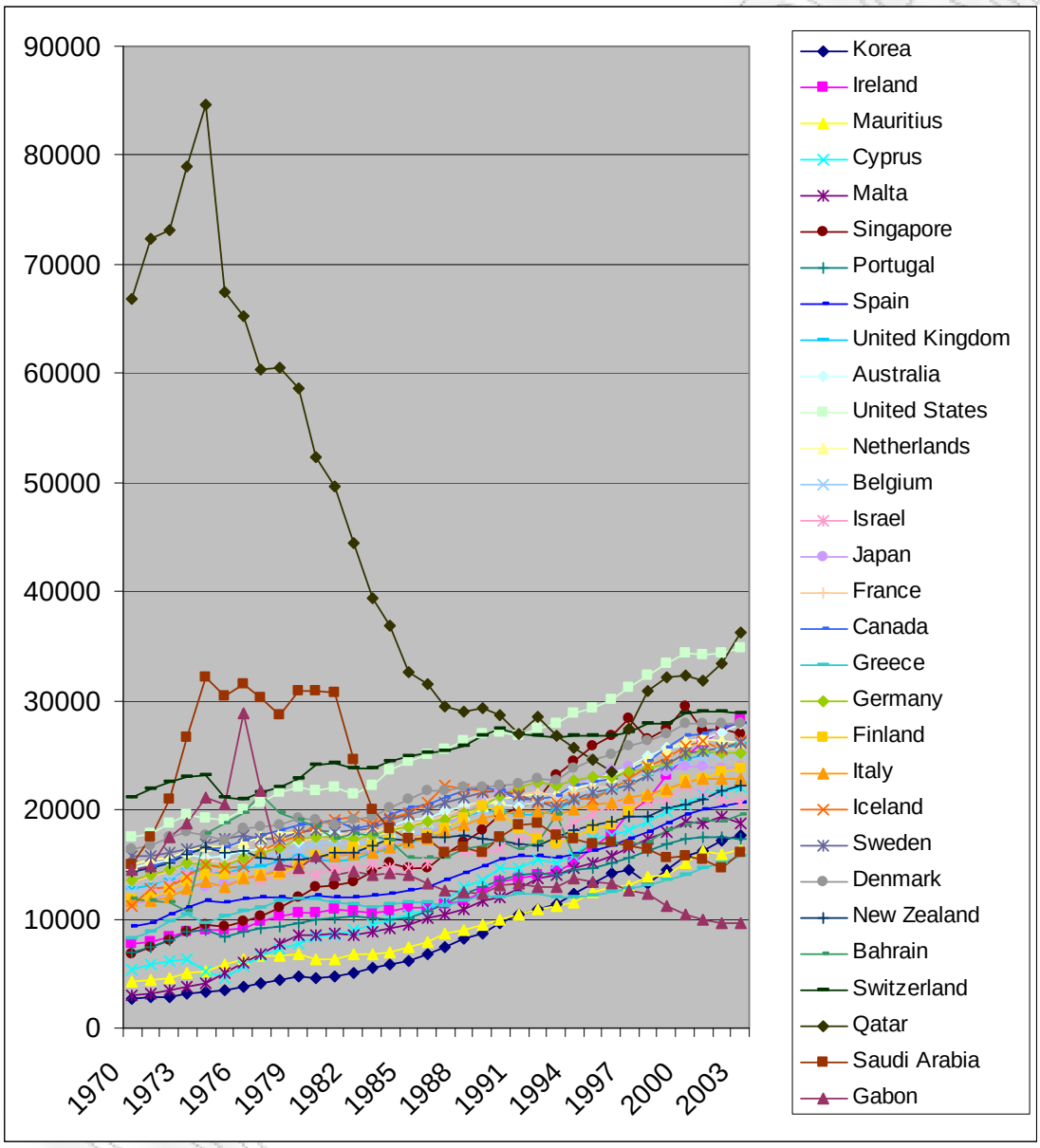
4th dataset – Non-converging countries - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



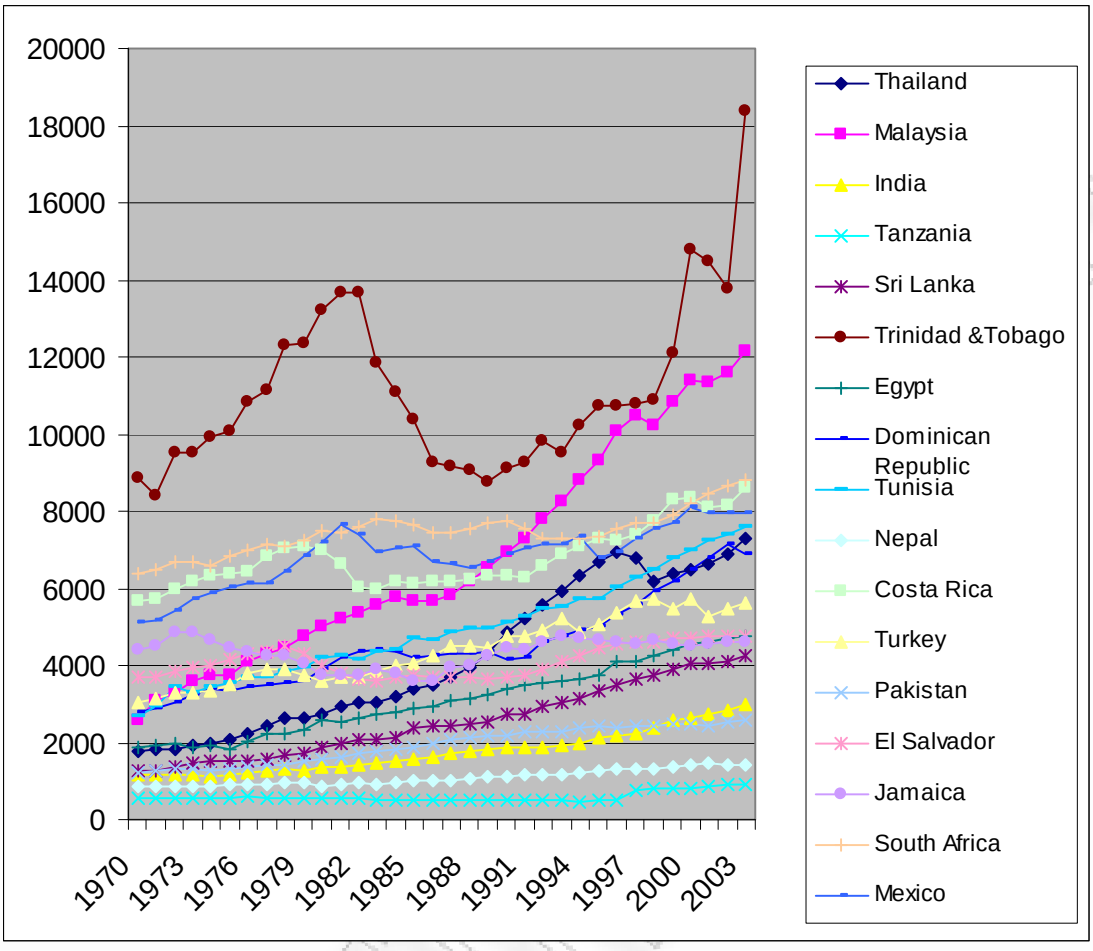
5th dataset: GDP, Currency Outside Banking System to Base Money.

Converging subgroups of the growth rates of GDP

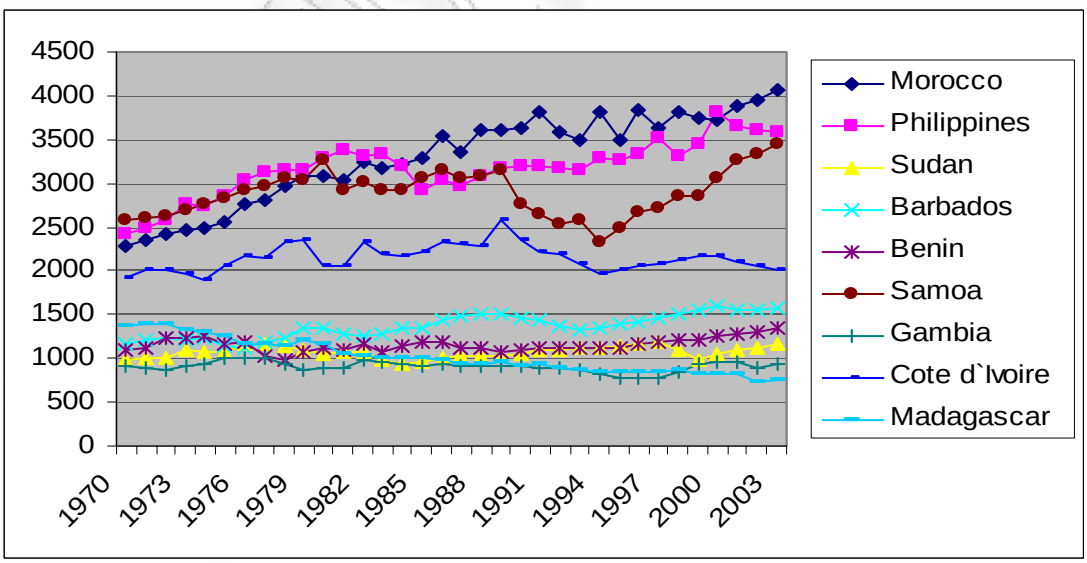
5th dataset – 1st subgroup - growth rates of GDP



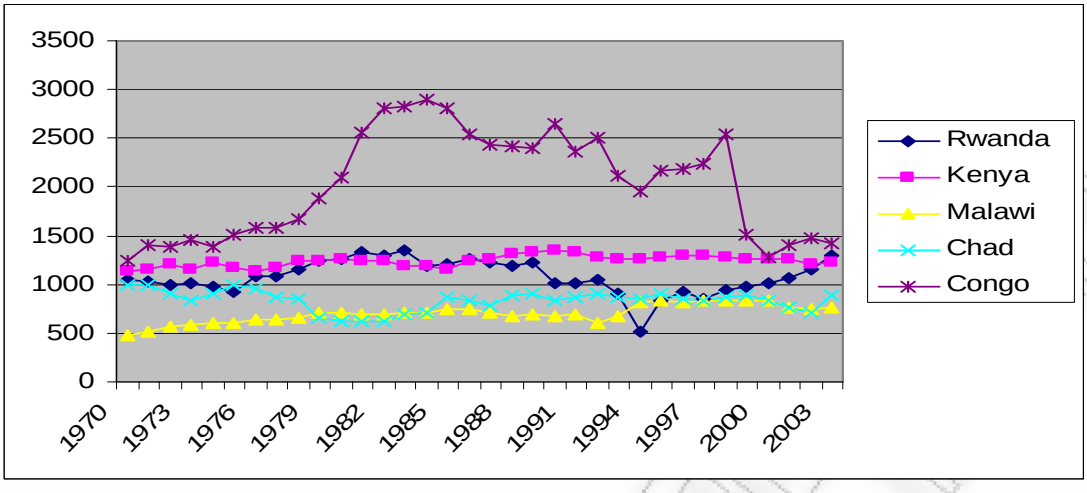
5th dataset – 2nd subgroup - growth rates of GDP



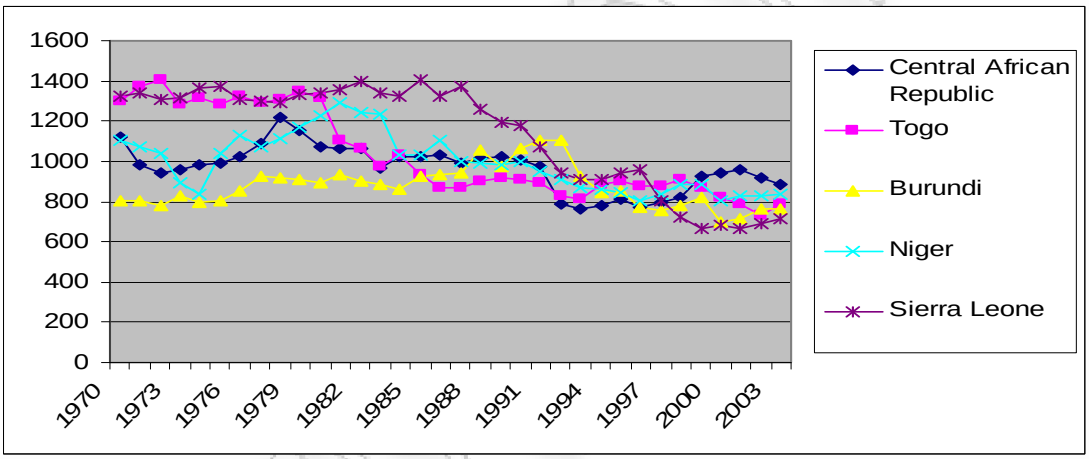
5th dataset – 3rd subgroup - growth rates of GDP



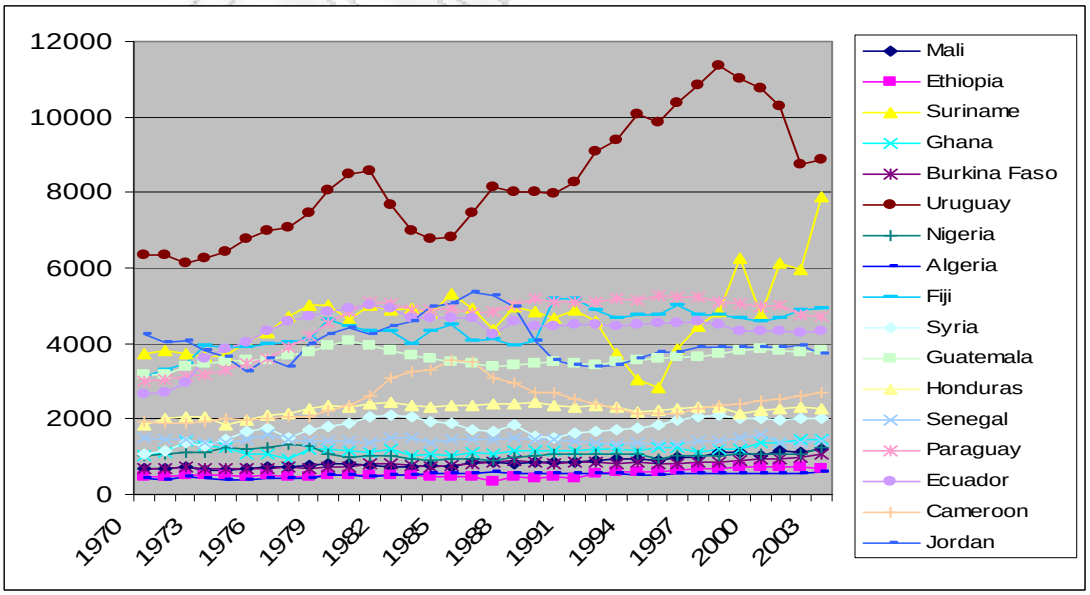
5th dataset – 4th subgroup - growth rates of GDP



5th dataset – 5th subgroup - growth rates of GDP

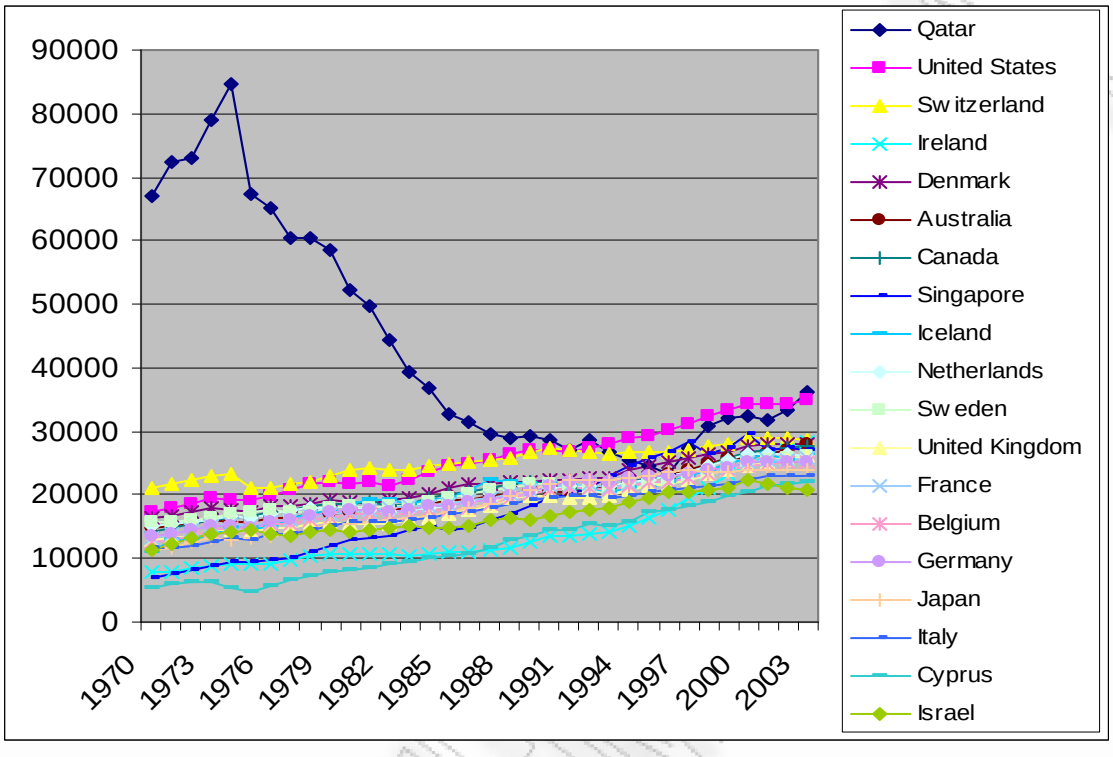


5th dataset – Non-converging countries - growth rates of GDP

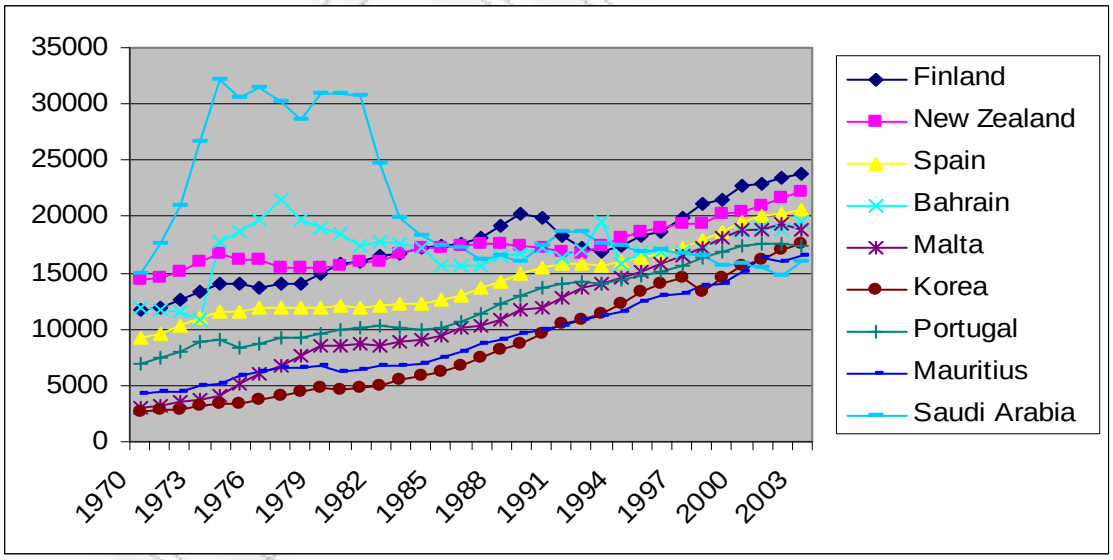


Converging subgroups of the levels of GDP

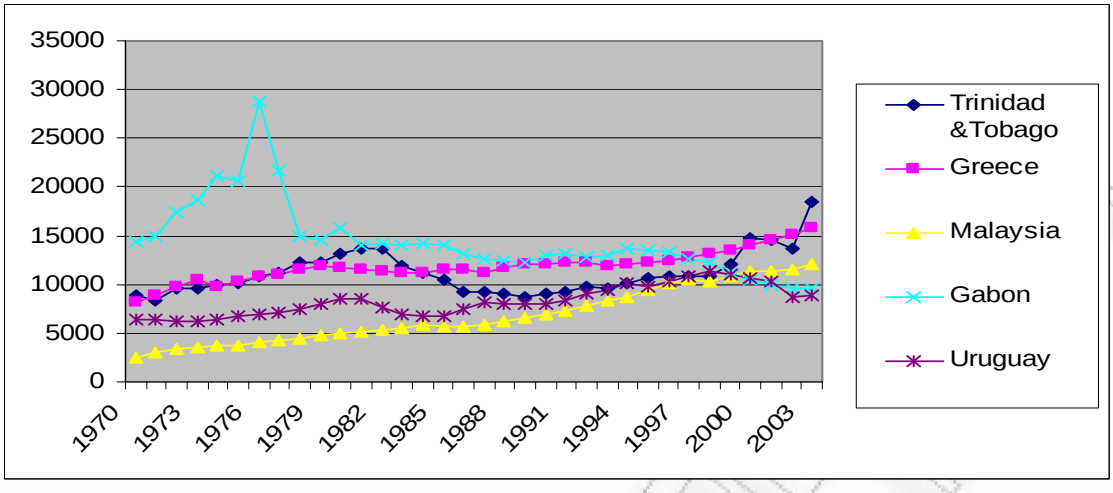
5th dataset – 1st subgroup - levels of GDP



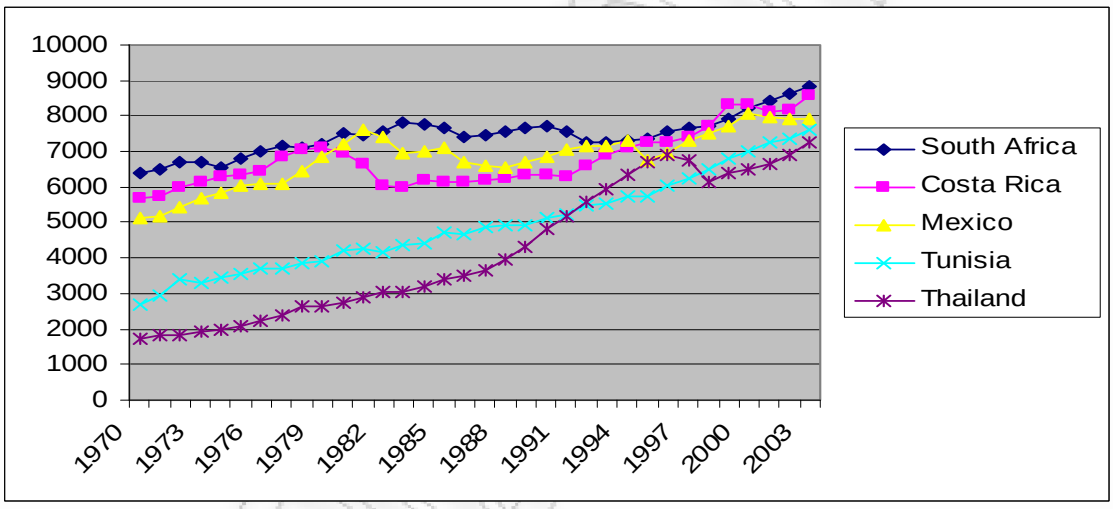
5th dataset – 2nd subgroup - levels of GDP



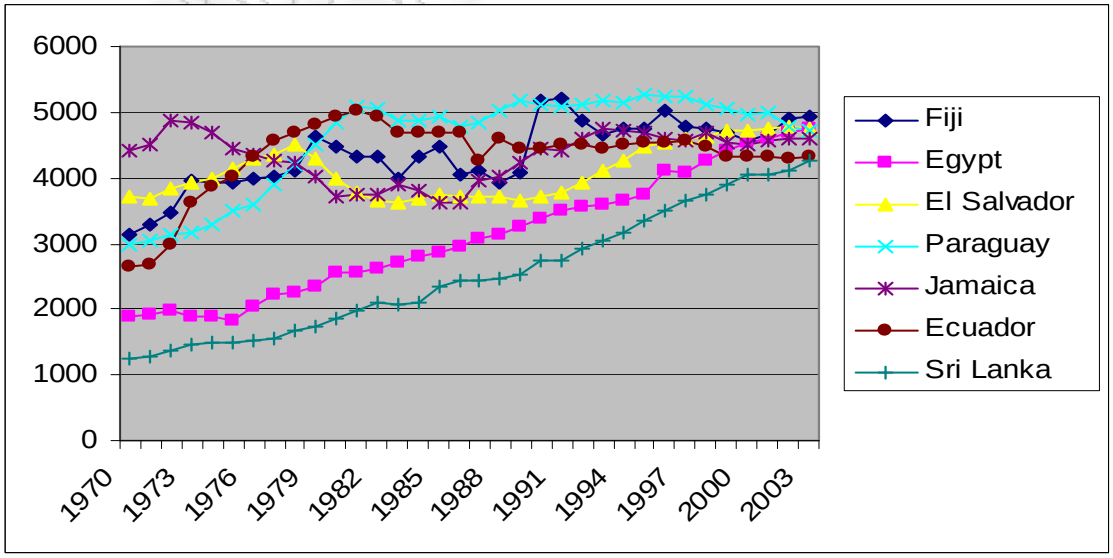
5th dataset – 3rd subgroup - levels of GDP



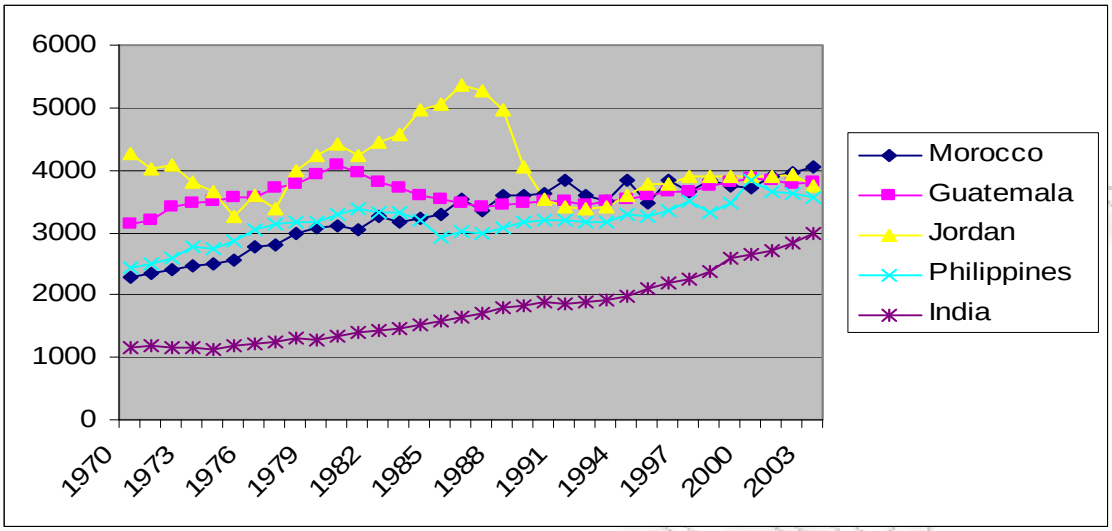
5th dataset – 4th subgroup - levels of GDP



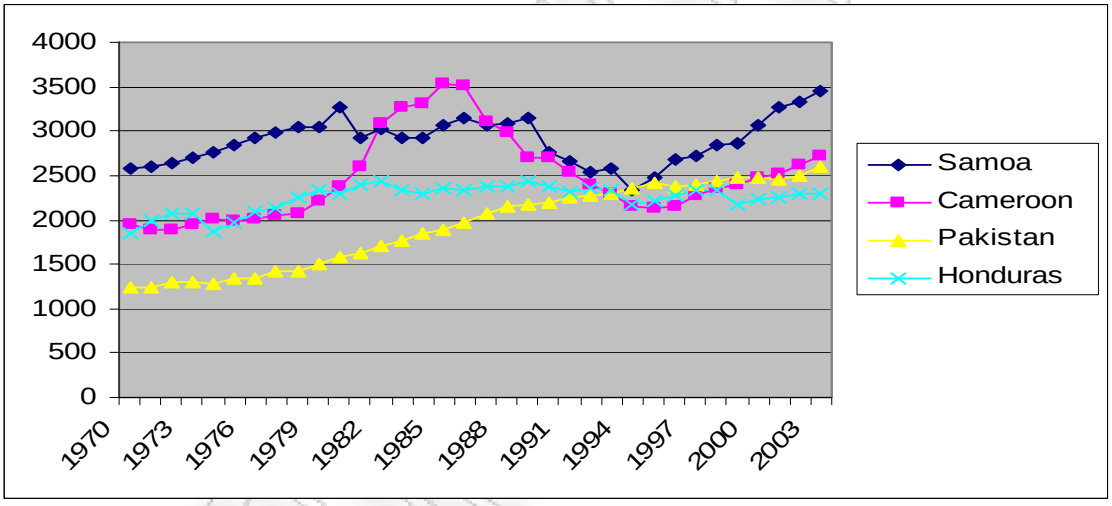
5th dataset – 5th subgroup - levels of GDP



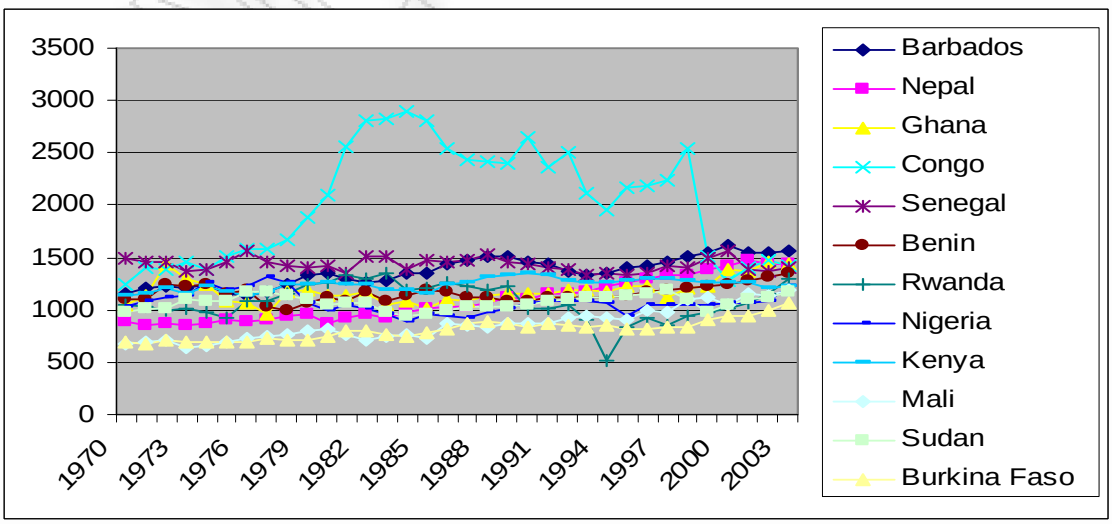
5th dataset – 6th subgroup - levels of GDP



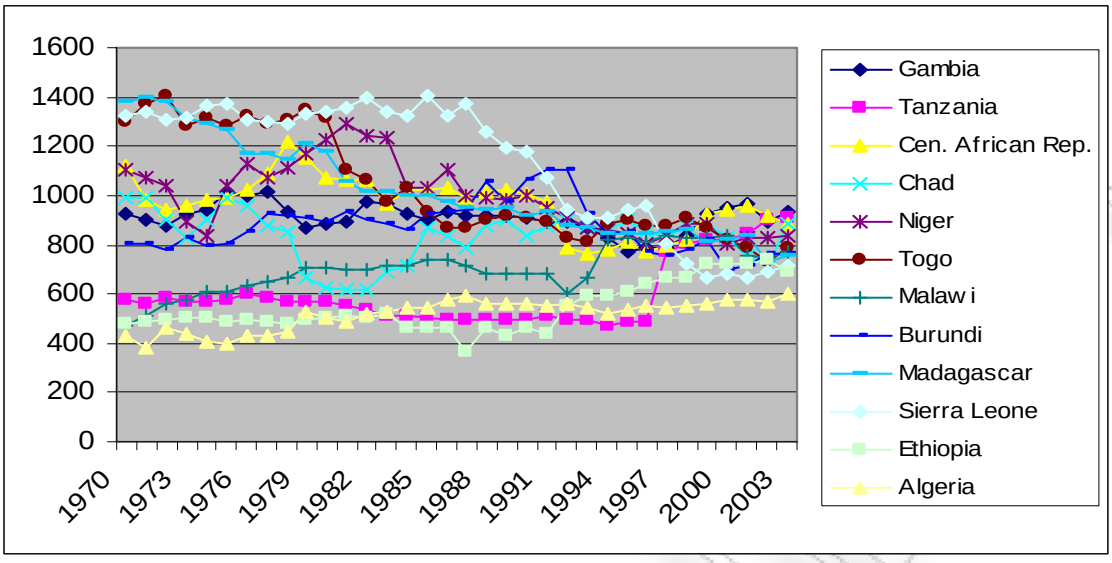
5th dataset – 7th subgroup - levels of GDP



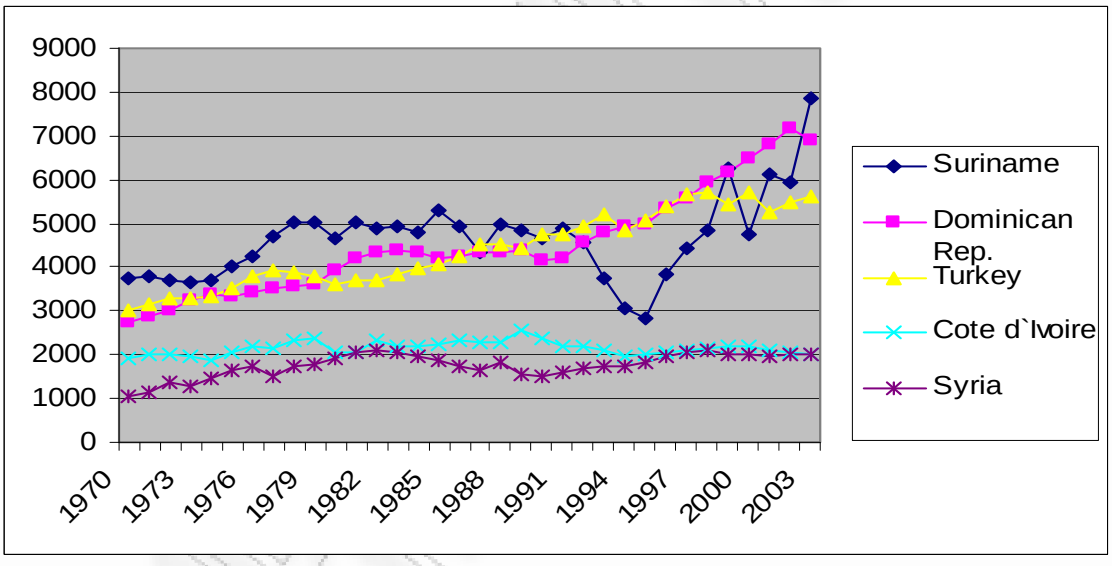
5th dataset – 8th subgroup - levels of GDP



5th dataset – 9th subgroup - levels of GDP

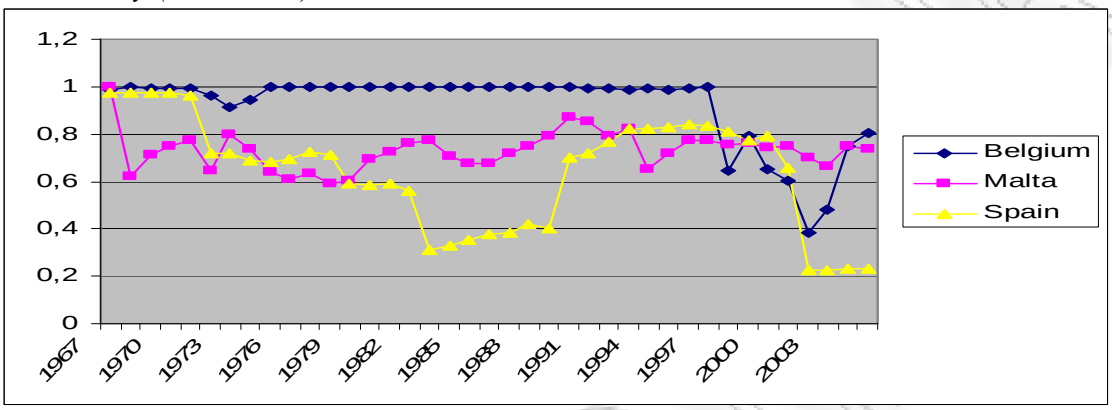


5th dataset – Non-converging countries - levels of GDP

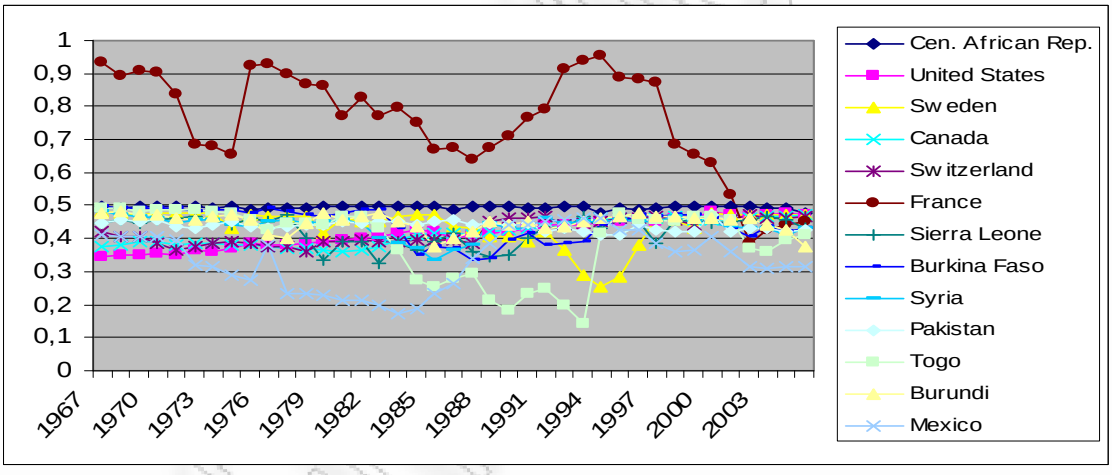


Convergence in the levels of the variable "Currency Outside Banking System / Base Money" (COBS/BM)

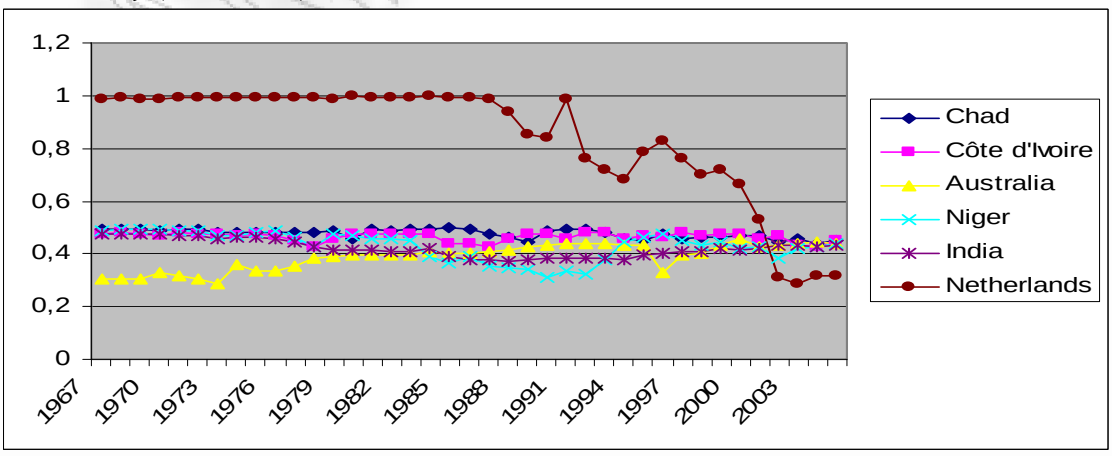
5th dataset – 1st subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



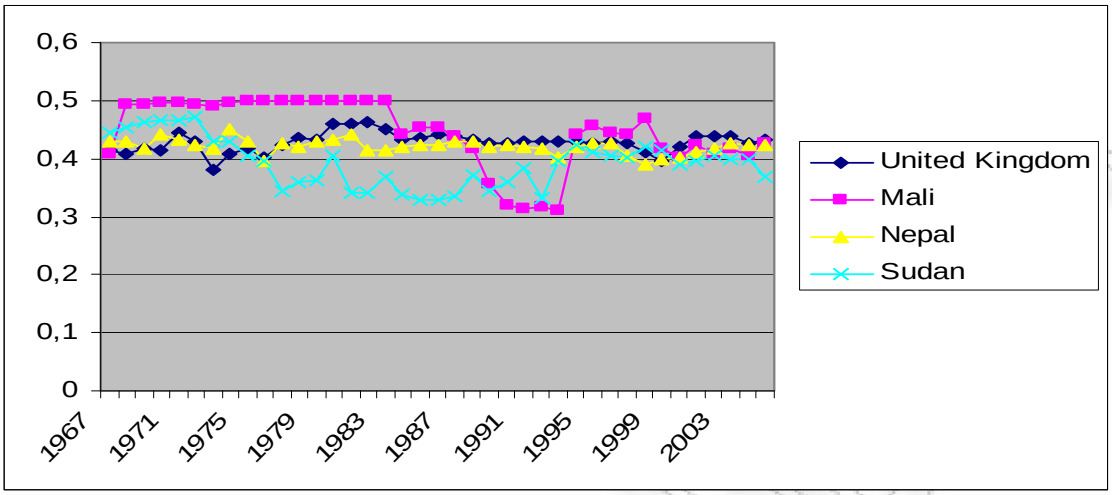
5th dataset – 2nd subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



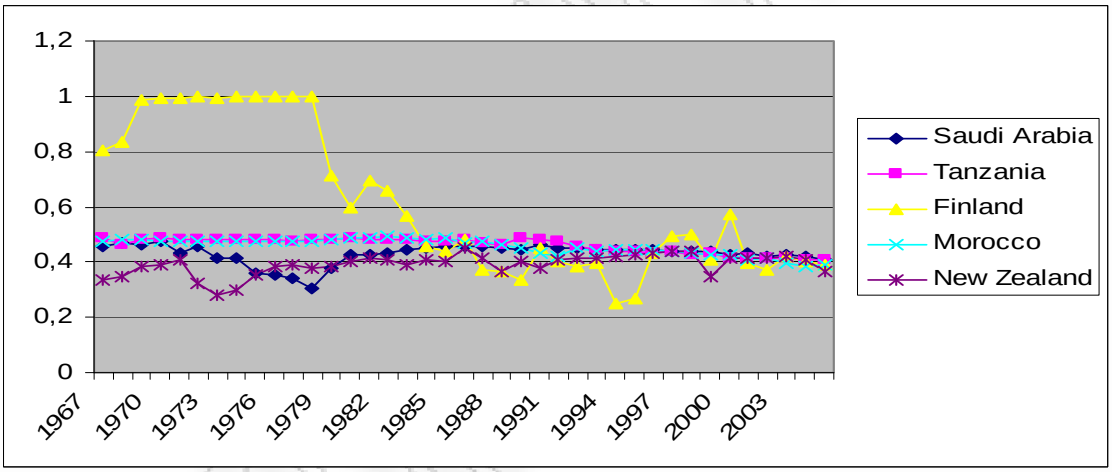
5th dataset – 3rd subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



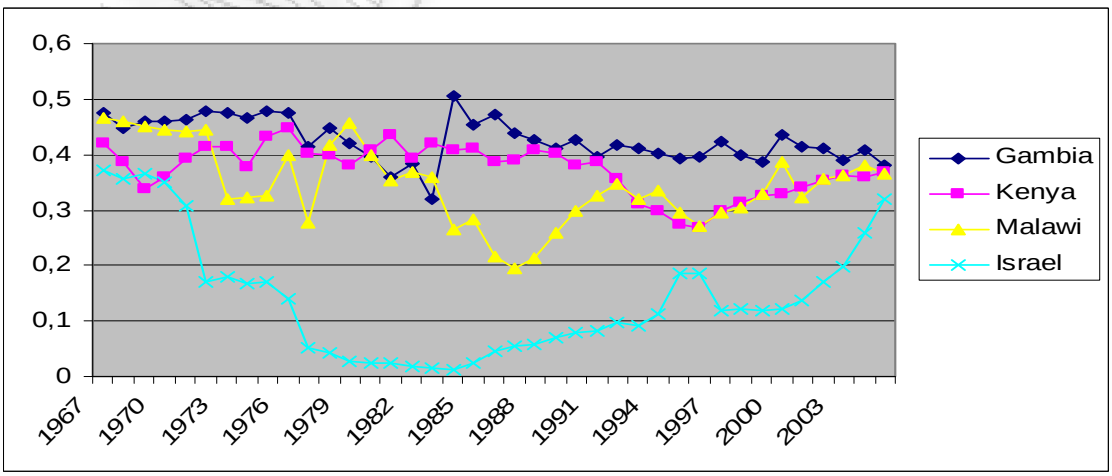
5th dataset – 4th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



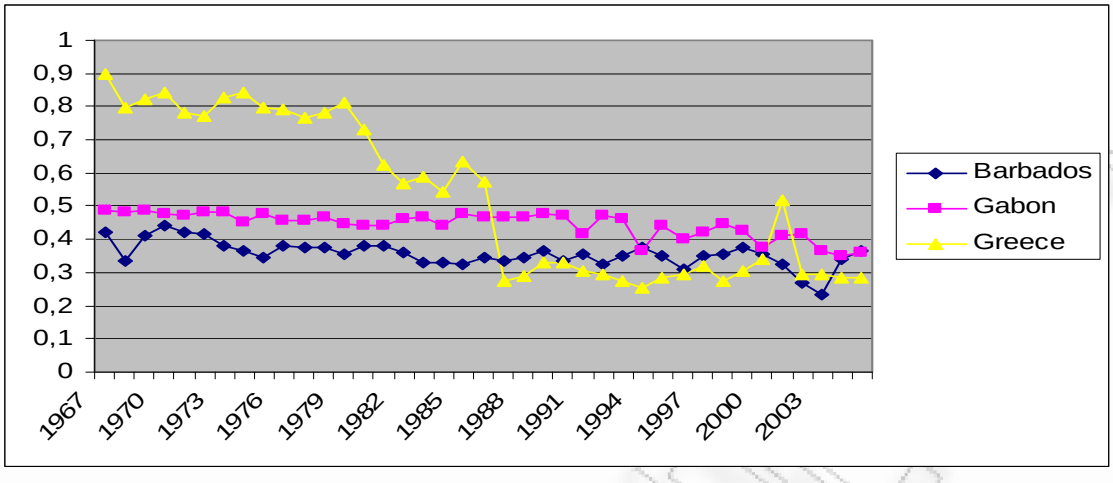
5th dataset – 5th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



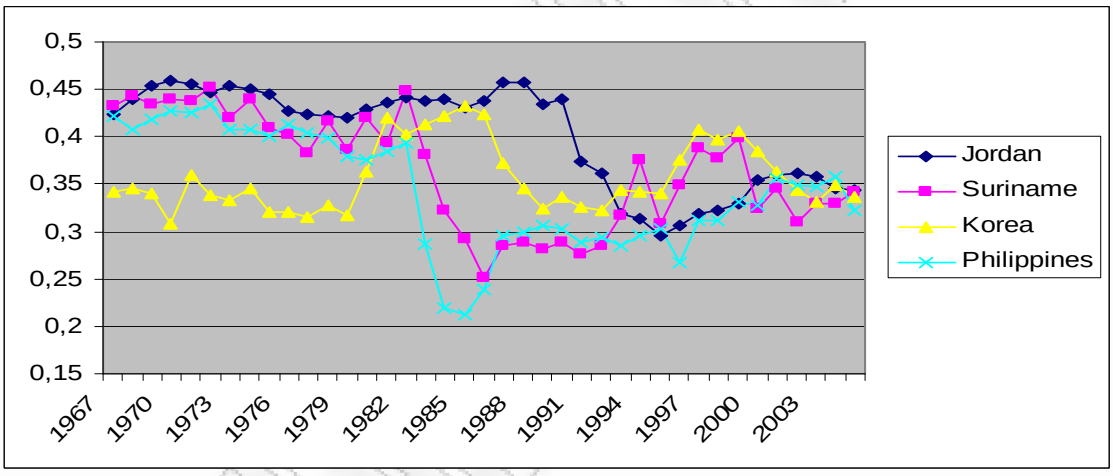
5th dataset – 6th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



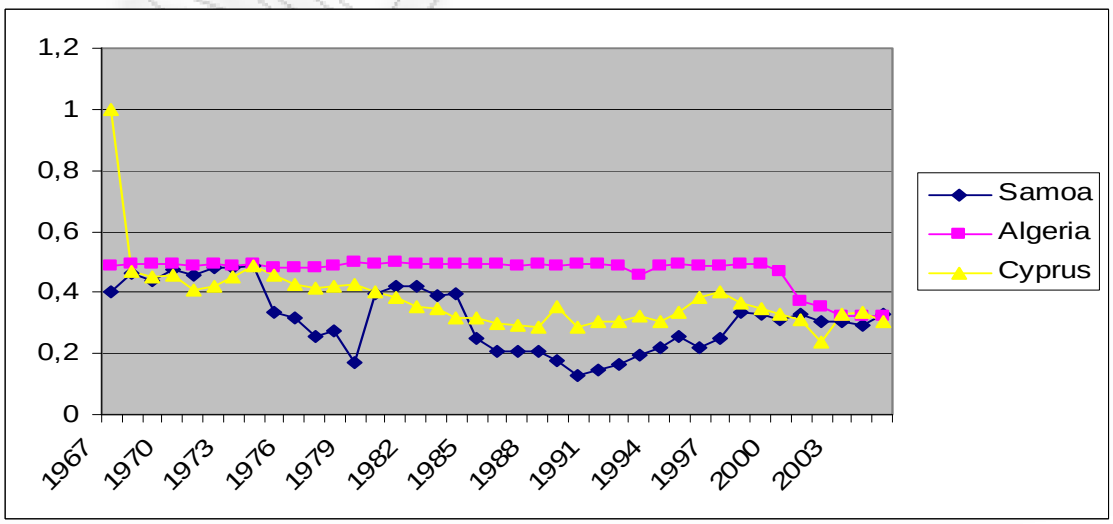
5th dataset – 7th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



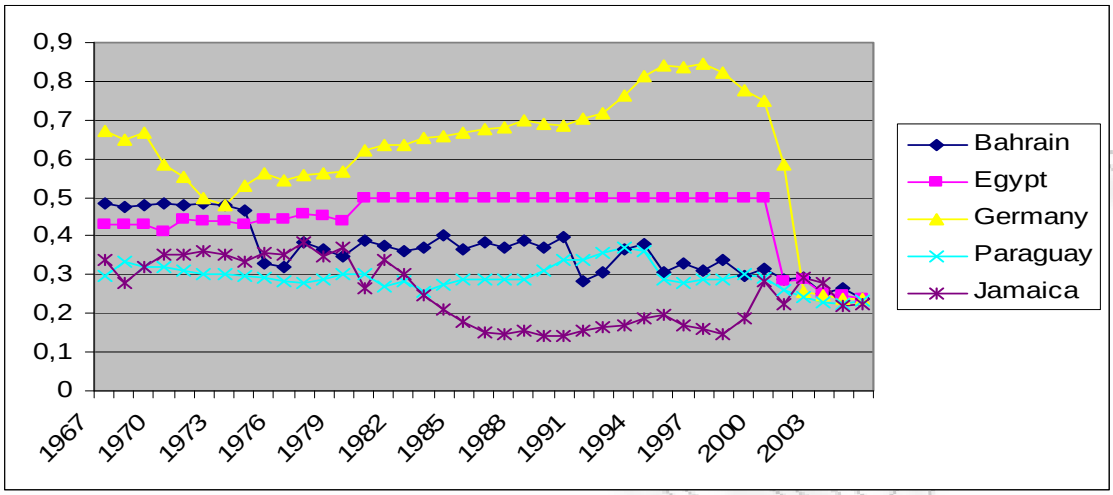
5th dataset – 8th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



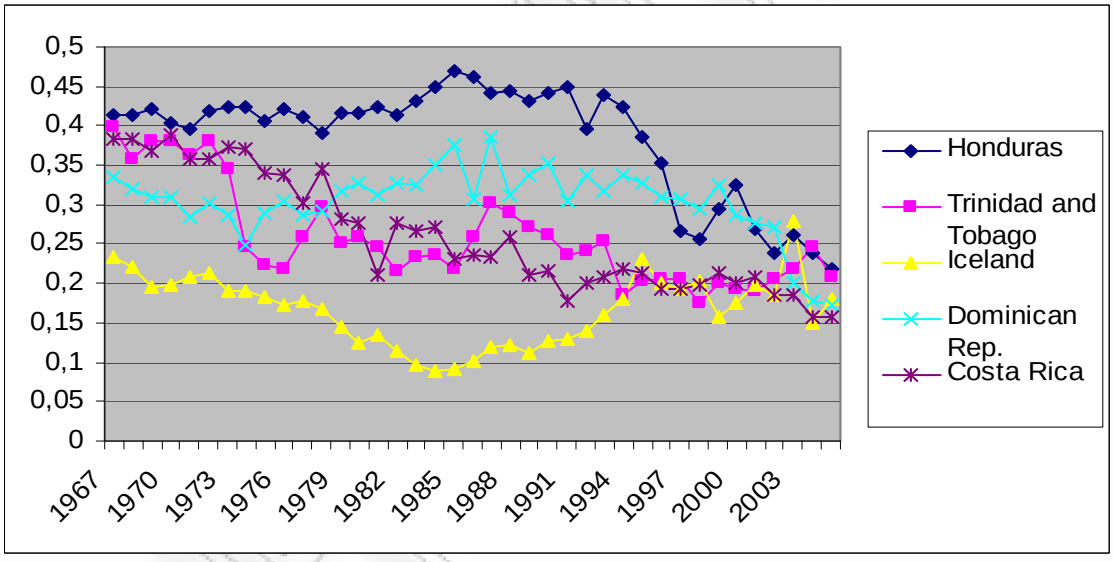
5th dataset – 9th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



5th dataset – 10th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



5th dataset – 11th subgroup - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)



5th dataset – Non-converging countries - levels of the variable Currency Outside Banking System / Base Money (COBS/BM)